STRUCTURE AND DYNAMICS OF NON-FINANCIAL CORPORATIONS IN PORTUGAL

Central Balance-Sheet Studies

December 2010

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Banco de Portugal

EUROSYSTEM

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The population of non-financial corporations, used as a reference for the statistics of the Central Balance-Sheet Database of Banco de Portugal, comprises around 380 thousand corporations in 2009, mostly micro, small and medium-sized enterprises (99.7%). The number of large enterprises accounted for only 0.3% of the total; however, they represented 28% of the number of employees and 41% of the aggregate turnover.

Trade, *Manufacturing and Construction* are the most relevant sectors of activity. As a whole, they aggregate 52% of the number of enterprises, 58% of the number of employees and 69% of the total turnover of the sector. In terms of developments over the last decade, industrial activity-related sectors lost importance, as opposed to an increase in the weight of service activities. This shows a clear change in the Portuguese business structure, where non-tradable goods sectors are playing a more relevant role.

With regard to geographical location, the head offices of enterprises were mostly concentrated on the coastal areas, especially in the Lisbon and Oporto districts. With regard to their legal nature, there was a clear predominance of private limited companies (91%), with public limited companies as the second most relevant legal form (6%). In terms of maturity, around 57% of non-financial corporations have been operating for less than 10 years. However, 65% of the number of employees and 71% of the turnover are associated with companies that have been operating for longer.

As far as business dynamics is concerned, high-growth enterprises, on average, accounted for 11% of the number of non-financial corporations in the 2000-2009 period, although their weight has been declining in the most recent years. Data also show that such high growth is especially due to cyclical factors, given that a considerable share of these corporations ceased activities in the subsequent years and those still active are not able to grow to a greater size.

In aggregate terms, the survival rate estimated for the 1991-2009 period shows that most enterprises (85%) survive in their first two years of life. After ten years, around half of the enterprises are able to remain in activity, and after 19 years this rate drops to 33%.

Large enterprises are more resilient, given that 75% survive after 19 years of activity. In sectoral terms, the *Electricity and water* sector shows the highest probability of survival in all time horizons of activity. This contrasts with the *Trade* sector where, after 19 years of activity, only 28% of enterprises survive.

Overall, non-financial corporations have been considerably resilient, what has contributed to the expansion of their reference population. However, the available information shows that economic developments influence the birth and death of enterprises with a certain lag, and hence the impacts of the current economic situation will not be fully visible yet.

I. INTRODUCTION

The sector "non-financial corporations" (NFC)[1] plays a key role in the Portuguese economy. According to official data, its contribution to the national gross value added in 2009 was 54%,[2] in line with 57%, as accounted for the European Union (EU).[3] Looking back at 2008, for which there is greater detail on the sector, the weight of NFCs in the national businesses was 31% in number of enterprises, 76% in number of employees and 82% in turnover.[4]

The relevance of its contribution to the national economy warrants a need for comprehensive, reliable and detailed information available on the NFC sector, this being the purpose of the Central Balance-Sheet Database of Banco de Portugal (CBSD). For that purpose, the CBSD collects a wide array of information based on non-consolidated accounting data on a relevant set of Portuguese non-financial corporations.[5]

The primary data of the CBSD stems from a quarterly survey to a sample of enterprises, carried out in partnership with Instituto Nacional de Estatística – INE (Statistics Portugal). As of 2006 annual data are obtained through IES (the Portuguese acronym for Simplified Corporate Information) statements submitted by enterprises to the Ministry of Finance[6] (up to 2005 use was made of an annual survey conducted by the CBSD, which was discontinued with the implementation of IES). From this primary data, the CBSD produces and releases aggregate indicators on the activity and situation of NFCs, releasing directly to enterprises reporting annual data through the respective Enterprise and Sector Tables, with economic and financial indicators on each enterprise and the sector of economic activity/size class to which it belongs.

In the context of the activity carried out by the CBSD it is important to be acquainted with the NFC population in Portugal. In fact, to put the indicators obtained from this database into perspective, the Portuguese businesses should be simply characterised. There are, however, difficulties in achieving a clear definition of the number of non-financial corporations existing in Portugal. Taking 2008 as the period of reference, for example, some official publications point to numbers ranging from 350 thousand enterprises – as referred to by INE in *Empresas em Portugal – 2008* – to over 400 thousand, as recorded by the Portuguese Tax Administration, corresponding to those which have submitted the corporate income tax declaration (model 22). Within this range it is possible to find results from other sources, such as the number of enterprises that have submitted the IES.

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[1] The sector "non-financial corporations" represents one of the economy's five institutional sectors. The institutional sectorisation of economic agents is carried out in accordance with the 1995 European system of national and regional accounts (ESA 95), approved through Council Regulation (EC) No 2223/96 of 25 June 1996. ESA is a harmonised reference on the compilation methodology and deadline for release of the national accounts of EU countries, including statistics of the responsibility of Banco de Portugal. Based on this regulation, sole proprietors are included in the institutional sector of households. Hence, all data presented throughout this document for the sector non-financial corporations exclude sole proprietors (according to data from INE, in Portugal these account for around two-thirds of the national businesses, in terms of number of entities).

[2] Source: INE (September 2010), *Contas Nacionais por Sector Institucional* (national accounts by institutional sector).

[3] Source: Eurostat (2010), *Annual Accounts by Institutional Sector - 2009.*

[4] Source: INE (2010), *Empresas em Portugal – 2008* (Enterprises in Portugal – 2008).

[5] For further details on the activity of the Central Balance-Sheet Database of Banco de Portugal, see Supplements 5/2005 and 1/2008 to the Statistical Bulletin, and the publication *Central Balance-Sheet Studies | 1, November 2010 –* "Enterprise and Sector Tables".

[6] As of 2007 and with reference to 2006 data, the IES is the only way enterprises present their annual accounts to public sector entities, thus making it possible – in a single annual reporting in electronic format – to simultaneously comply with four account presentation requirements: submission of the annual declaration to the Ministry of Finance, presentation of annual accounts to the Ministry of Justice, and compliance with statistical reporting based on annual accounting data of enterprises to INE and Banco de Portugal.

The differences observed across the various sources chiefly stem from the implementation of distinct criteria to compute the population. However, from the viewpoint of the relevant economic variables, such as turnover, there are no considerable differences among sources. This shows that disparities in populations essentially result from the treatment of a wide range of enterprises, which although being legally alive, do not make a relevant contribution to the country's production. In order to harmonise this procedure, the Statistical High Council has decided to set up a working group (the so-called FUESEN) targeted at creating a single statistical units file by joining the sources deemed relevant. This file will serve as a basis for all statistics produced by entities belonging to the National Statistical System.[7]

Since there is a need for more detailed knowledge of the NFC population, the CBSD has carried out an exercise considering the existing enterprises in its quarterly and annual databases, as well as corporations included in other micro-databases with considerable coverage, managed by the Statistics Department of Banco de Portugal, such as the Central Credit Register (CCR) [8] and the Securities Statistics Integrated System (SIET, in its Portuguese acronym).[9] This information was also added to the existing information in various external databases, to which Banco de Portugal has access.

As a result of this exercise, a series was obtained for the 1991-2009 period, where enterprises are individually identified and characterised through variables such as turnover or legal nature. The concepts of start and end of activities used in this series do not necessarily coincide with the legal situation of the enterprise, but with the period for which there is evidence that it has been operating.

This study presents a characterisation of this series, which corresponds to the reference population of CBSD statistics. The analysis focuses on population in 2009 and also includes the sector dynamics over the last 10 years. The intention is thus to raise awareness to an institutional sector composed of a high number of heterogeneous entities. The characterisation of this population will also allow indicators published by the CBSD to be better incorporated into the reality of the Portuguese businesses.

All the results shown throughout this document result from the aggregation of CBSD individual information on each enterprise, no adjustment having been made to aggregate indicators.

This document is organised as follows: in addition to the Introduction, Chapter II characterises the NFC population in 2009 in comparison with the situation early in the decade. Chapter III analyses the sector's business dynamics, in particular the estimate of the survival probability of new NFCs. An Annex presents the methodological aspects associated with this document.

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[7] Pursuant to Deliberation No 4/2008 of the *Secção Permanente de Coordenação Estatística* (Standing Section of Planning, Coordination and Dissemination) of the Statistical High Council, of 9 February 2009.

[8] The CCR is a database managed by Banco de Portugal with information supplied by participants (institutions granting credit) on credit granted. For more information, see Supplement 1/2005 to the Statistical Bulletin "Using CCR data for monetary and financial statistics".

[9] SIET is an information system based on the reporting of information on a "security-by-security" and "investor-by-investor" basis, whose purpose is gathering information on securities transactions. For more information, see Supplement 2/2008 to the Statistical Bulletin of Banco de Portugal of June 2008, "Securities Statistics: Integrated System Features and Main Results".

II. CHARACTERISATION OF THE NFC POPULATION

### II.1   Main characteristics of the NFC population

In 2009 the reference population of CBSD statistics was comprised of around 380 thousand NFCs. In the course of the last decade, there was a rise in the number of NFCs, and growth in the 2000-2009 period amounted to 37%.

The sector structure in 2009 is presented below, as opposed to the situation observed 10 years ago. For that, five characteristics of enterprises were taken into account: size, geographical location, sector of activity, legal nature and maturity.

By enterprise size[10]

With regard to enterprise size, 87% of NFCs in 2009 were microenterprises (Chart 1). These, although accounting for the vast majority of national NFCs, comprised only 26% of the number of employees in this institutional sector and 16% of aggregate turnover. By contrast, large enterprises, which in terms of number only represent 0.3% of the NFC sector, account for 28% of the number of employees and 41% of turnover. Given the specific features of large enterprises, Box 1 at the end of this section makes a more detailed analysis of their main characteristics.

Chart 1 – Structure of NFC population by enterprise size (2000 and 2009)
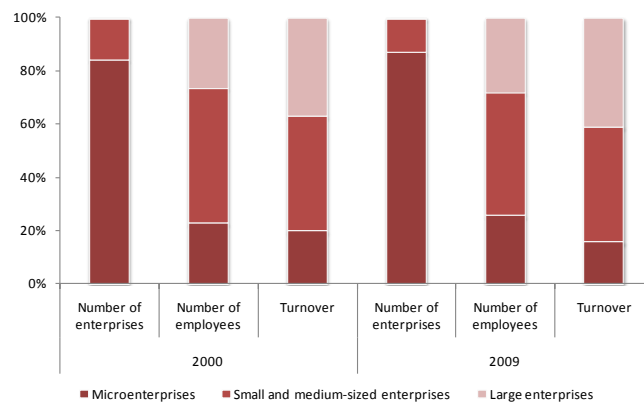
[10]   Size classes follow Commission Recommendation of 6 May 2003 concerning the definition of micro, small and medium-sized enterprises. See the Annex for further details on this classification. However, for the purposes of this analysis, enterprises were classified into the following three size classes: microenterprises, small and medium-sized enterprises, and large enterprises. Hence, the small and medium-sized enterprise class does not include microenterprises.

This structure remained virtually unchanged from early in the decade. However, the weight of microenterprises increased by 3 p.p., both in number of entities and of employees. The weight of aggregate turnover, however, fell by 4 p.p., against an increase in the relevance of large enterprises in this component.

The breakdown by size of non-financial sector enterprises at European level shows a similar bias towards smaller enterprises, with large enterprises accounting for 0.2% of the total, but around one third of the number of employees in the sector and over 40% of total turnover (Chart 2).[11]

Chart 2 – Structure of the non-financial sector in the EU-27, by enterprise size

EU-27, 2005

■ Microenterprises ■ Small and medium-sized enterprises ■ Large enterprises
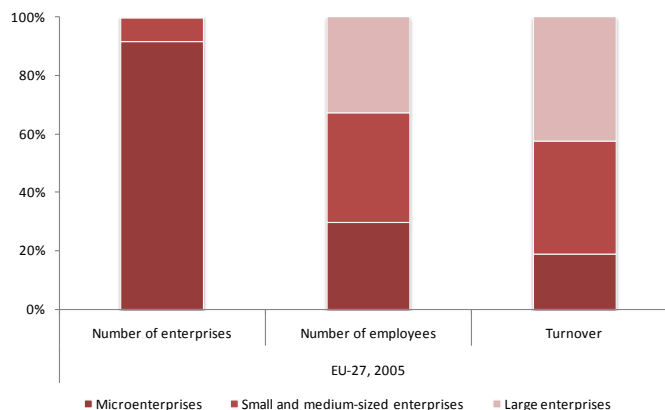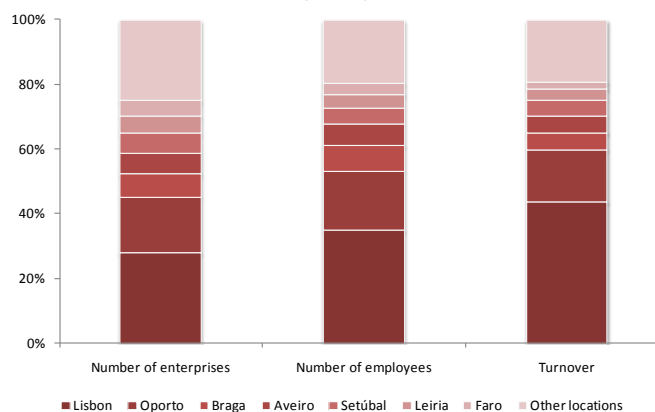
By geographical location[12]

As to geographical location, data available for 2009 show a high concentration of head offices in major urban centres, especially Lisbon, which gathers almost one third of all head offices of national NFCs (28%), and Oporto with 17% (Chart 3). Braga, with a weight of only 7%, ranked the third most important district.

These data reveal the two-headed structure of national business demography in terms of geographical

Chart 3 – Structure of NFC population by geographical location (2009)

■ Lisbon ■ Oporto ■ Braga ■ Aveiro ■ Setúbal ■ Leiria ■ Faro ■ Other locations

location, which is all the more striking when account is taken of the fact that 45% of enterprises registered in Lisbon and Oporto correspond to 60% of turnover and 53% of the number of employees in the NFC sector.

This geographical concentration has remained virtually unchanged as of the start of the decade, demonstrating its structural nature. In fact, in 2000 the Lisbon and Oporto districts concentrated 49% of enterprises, 63% of turnover and 54% of the number of employees in the NFC sector.

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[11]   Data published by Eurostat are used as a reference for the European Union. Of its publications on enterprises, it is worth highlighting the 2010 edition of *Key figures on European business.* Data presented within the scope of this publication refer to the most recent information available (usually on 2008, although for some of the aggregations presented it was only possible to compute information on 2005) and include data on sole proprietors (which is relevant, for example, in the Portuguese case). In sectoral terms the *Agriculture and fishing* sector is excluded, and the criterion for enterprise size classes takes only into account the number of employees. Based on this publication, the European Union is composed of nearly 21 million non-financial corporations, with the Portuguese non-financial sector (including sole proprietors) accounting for 4.2% of that total, which corresponds to 1.4% of total turnover.

[12]   The analysis based on the geographical location of enterprises' head offices resorts to the administrative division of the national territory into districts. See the Annex for further details on the districts taken into consideration.

By economic activity[13]

Considering the breakdown of NFCs by economic activity, stress is clearly laid on three sectors: *Trade, Manufacturing* and *Construction* (Table 1).[14] The *Trade* sector was the most representative in 2009 and in all periods considered, covering 28% of the Portuguese businesses that are part of the NFC sector and 38% of its turnover. As far as the number of employees is concerned, the *Manufacturing* sector was the most relevant, with over 24% of the total. *Construction* ranked the third main sector at the level of the number of employees (13%) and turnover (10%), having been the second activity with the greatest number of enterprises (14%).

Development-wise, there was a "tertiarisation" of the Portuguese economy, marked by a lower weight of tradable goods sectors in contrast to a greater relevance of services sectors. This can be seen in an increased predominance of activities associated with business services (*Professional, scientific and technical activities* and *Administrative and support service activities* – Sections M and N of CAE-Rev.3) throughout the last decade, which was particularly evident in terms of the number of employees. In 2000 these activities employed around 10% of total employees in NFCs, whereas in 2009 the value referring to Sections M and N rose to around 14%. By contrast, in 10 years *Manufacturing* declined by almost 3 p.p. in the number of enterprises, 5 p.p. in turnover and 11 p.p. in the number of employees.

Table 1 – Structure of NFC population by economic activity - 2009 (2000 in brackets)

	CAE-Rev.3 Section	Number of enterprises (% of the total)	Number of employees (% of the total)	Turnover (% of the total)
G	Wholesale and retail trade	27.6% (31.9%)	21.3% (21.7%)	37.7% (39.7%)
C	Manufacturing	11.3% (14%)	23.5% (34.4%)	20.9% (25.7%)
F	Construction	13.5% (11.7%)	13.4% (10.7%)	10.2% (8.9%)
H	Transportation and storage	5.4% (5%)	5.6% (5.7%)	5.2% (3.8%)
D	Electricity, gas, steam and air conditioning supply	0.2% (0.1%)	0.3% (0.6%)	5% (3.2%)
J	Information and communication	2.1% (1.8%)	2.4% (2.2%)	4.3% (5.2%)
M	Professional, scientific and technical activities	9.1% (7.4%)	4.4% (3.2%)	3.7% (2.8%)
N	Administrative and support service activities	3.3% (2.8%)	9.3% (6.4%)	3% (3.9%)
Q	Human health and social work activities	4.2% (3.2%)	5.6% (2.5%)	2.8% (0.8%)
I	Accommodation and food service activities	8.8% (9.6%)	7% (6.3%)	2.3% (1.9%)
L	Real estate activities	6.8% (5.3%)	1.2% (1.2%)	1.8% (1.8%)
A	Agriculture, forestry and fishing	2.6% (2.7%)	1.5% (1.6%)	0.9% (0.8%)
E	Water supply; sewerage, waste management and remediation activities	0.3% (0.2%)	1% (0.6%)	0.8% (0.3%)
R	Arts, entertainment and recreation	1.1% (0.8%)	0.6% (0.5%)	0.5% (0.3%)
B	Mining and quarrying	0.3% (0.3%)	0.4% (0.6%)	0.4% (0.4%)
P	Education	1.2% (1.1%)	1.3% (1.3%)	0.3% (0.3%)
S	Other service activities	2.3% (2.2%)	1.1% (0.7%)	0.3% (0.2%)

The distribution by sector of economic activity[15] of European Union and Portuguese enterprises, as depicted in Chart 4, stresses some interesting points. In fact, while structures are similar in terms of number of enterprises, there are considerable differences in their contributions to aggregate turnover.

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[13] In the classification by economic activity of enterprises use was made of the Portuguese Classification of Economic Activities – Revision 3 (CAE-Rev.3). See the Annex for further details on the economic activity aggregates used.
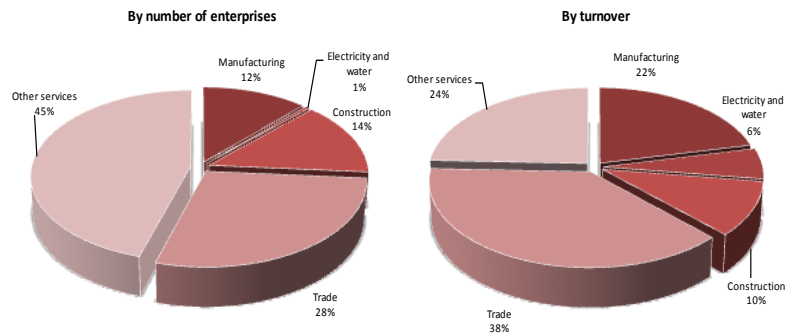
[14] For further details on the elements characterising these sectors of activity, see Box 2, entitled *Specific features associated with the three main sectors of activity*, at the end of this Section.

[15] For this purpose, use was made of the aggregation described in the Annex, excluding *Agriculture and fishing* to ensure comparability with Eurostat data.
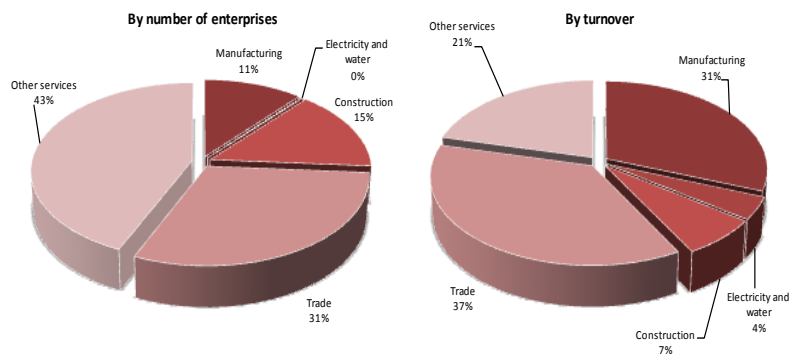
Hence, in the structure by number of enterprises, there is a predominance of the *Other services* aggregate in both populations, accounting for 45% of the national NFC sector and 43% of the non-financial sector as identified by Eurostat, followed by *Trade*, *Construction* and *Manufacturing*. However, a breakdown by turnover shows a greater relevance of tradable goods sectors at European level. In fact, *Manufacturing*, with approximately the same weight in terms of number of enterprises in both populations considered, accounts for 31% of turnover in the European Union and only 22% in Portugal. By contrast, the weight of *Other services* and *Construction* is higher by 3 p.p. in Portugal.

Chart 4 – Structure of NFC population in Portugal and of the non-financial sector in the EU-27, by economic activity

Portugal, 2009

By number of enterprises

Manufacturing 12%
Electricity and water 1%
Construction 14%
Trade 28%
Other services 45%

By turnover

Manufacturing 22%
Electricity and water 6%
Construction 10%
Trade 38%
Other services 24%

EU–27, 2007

By number of enterprises

Manufacturing 11%
Electricity and water 0%
Construction 15%
Trade 31%
Other services 43%

By turnover

Manufacturing 31%
Electricity and water 4%
Construction 7%
Trade 37%
Other services 21%

By legal nature[16]

With regard to the breakdown by legal nature, 91% of national NFCs in 2009 were constituted as private limited companies and only 6% as public limited companies, although these accounted for around 50% of aggregate turnover and 32% of the number of employees in the NFC sector (Chart 5). NFCs that are part of the State Owned Enterprises sector (as Corporate Public Entities) were residual in number, although incorporating 4% of total employees in NFCs.

**Chart 5 – Structure of NFC population by legal nature (2000 and 2009)**

In comparison with 2000, reference should be made to the emergence of Corporate Public Entities and the increased relevance of public limited companies in all indicators, in particular their weight in terms of turnover, which rose by 4 p.p.

By maturity[17]

Considering the maturity of enterprises in the NFC sector in 2009, there was a high predominance of companies set up for less than 10 years (57% of total NFCs), which accounted for 35% of employees and 29% of turnover of the aggregate. However, in terms of other variables under analysis, enterprises set up for over 20 years were clearly predominant. In fact, although they only accounted for around 19% of the number of enterprises of the sector, they aggregated 37% of the number of employees and 41% of total turnover (Chart 6).

Chart 6 - Structure of NFC population by maturity (2000 and 2009)
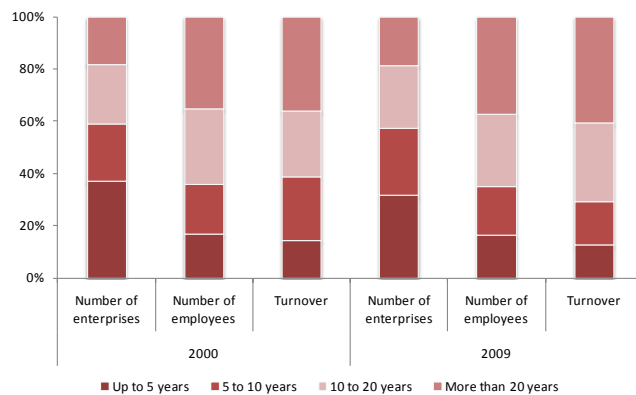
This structure has remained virtually unchanged since the start of the decade, although in 2009 enterprises with lower maturities recorded lower weights. In fact, in 2000 enterprises with maturities of up to 5 years accounted for around 37% of national NFCs, 17% of the respective number of employees and 14% of aggregate turnover, whereas in 2009 these figures dropped to 31%, 16% and 13% respectively.

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[16] See the Annex for further details on the aggregates considered in the analysis by legal nature.

[17] See the Annex for further details on the aggregates considered in the analysis by maturity.

BOX 1 – Main characteristics of large enterprises

In comparison with total NFCs, large enterprises (accounting for 0.3% of this sector's enterprises in 2009) show some specific features that are worth focusing on. Hence, in 2009, as regards the classification of these enterprises by sector of economic activity, two sectors are highlighted: Manufacturing (aggregating 11% of total enterprises but holding 28% of large enterprises) and Administrative and support service activities (involving only 3% of total NFCs, compared with 14% of large enterprises). By contrast, the Trade sector aggregates 28% of total enterprises of the NFC sector, but only 19% of total large enterprises.

However, Manufacturing declined in importance within the large enterprises sub-group, compared with the start of the decade (44% in 2000 vis-à-vis 28% in 2009), which was offset by an increase in the relative weight of enterprises of this size in virtually all other sectors of activity.

With regard to legal nature, it is worth noting that 64% of large national enterprises of the NFC sector are public limited companies, while only 26% are private limited companies (Chart 1.1). The fact that this structure is reversed in comparison with NFC population shows that large enterprises are associated with a very specific type of organisation. The size probably implies a need to meet more demands, namely with the market and investors, such demands being possibly more safeguarded within the scope of the statutory obligations of public limited companies.

Chart 1.1 – Structure of large enterprises and of total NFCs by legal nature (2009)
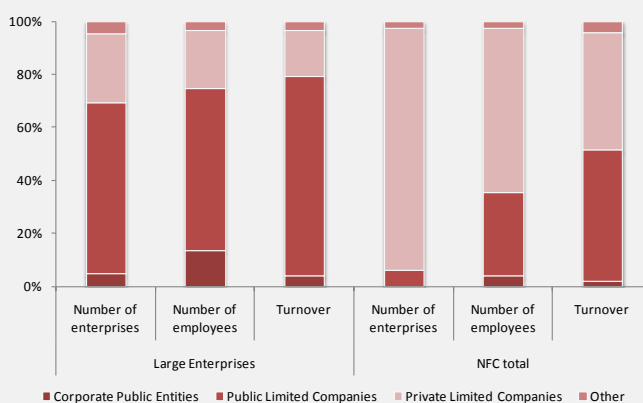
In terms of maturity, enterprises with high maturities are greatly predominant within large enterprises. In fact, of total large enterprises in 2009, 78% show a maturity of more than 10 years, which corresponds to 75% of the number of employees in large enterprises and 77% of the respective total turnover (Chart 1.2). These enterprises also play a more relevant role in comparison with 2000.

Chart 1.2 – Structure of large enterprises by maturity (2000 and 2009)
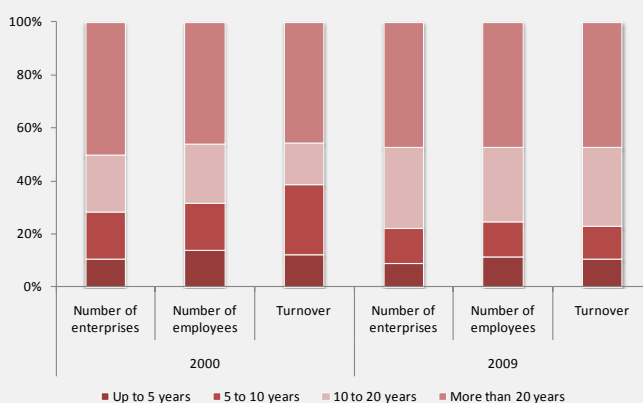
BOX 2 – Specific features associated with the three main sectors of activity

Some sectors of activity have different business structures than those of the NFC aggregate. Table 2.1 shows, for example, a lower predominance of microenterprises in the Manufacturing sector (68%) compared with NFC total population considered in 2009 (87%) and Construction (83%) and Trade (89%) sectors. This lower weight of microenterprises is offset by the remaining size classes, with SMEs and large enterprises in Manufacturing accounting for more than double their weight in total NFCs. These disparities in terms of number of enterprises also impact on turnover and the number of employees.

Table 2.1 – Structure of NFC population and of the three main sectors of economic activity, by size (2009)

CAE Rev. 3 Section	Number of enterprises (% of the total)			Number of employees (% of the total)			Turnover (% of the total)		
	Micro	SMEs	Large	Micro	SMEs	Large	Micro	SMEs	Large
NFC population	86.9%	12.8%	0.3%	25.6%	46.3%	28.1%	15.8%	43.2%	41.0%
C – Manufacturing	67.7%	31.6%	0.7%	13.6%	65.7%	20.7%	6.2%	48.9%	44.9%
F – Construction	83.0%	16.8%	0.2%	28.4%	53.7%	17.9%	18.6%	49.4%	32.0%
G – Trade	89.3%	10.5%	0.2%	35.6%	42.3%	22.1%	19.5%	44.0%	36.5%

In terms of geographical location of enterprises' head offices, the above sectors moved in line with NFC population for reflecting a high concentration in the Lisbon and Oporto districts (Illustration 2.1). However, the Manufacturing sector is more concentrated in the northern coastal area, with the Braga and Aveiro districts as relevant as Lisbon. In turn, in the Construction sector there is a greater relative importance of enterprises having their head office in the Faro district.

Illustration 2.1 – Geographical dispersion of the NFC sector and of the three main sectors of economic activity (2009)
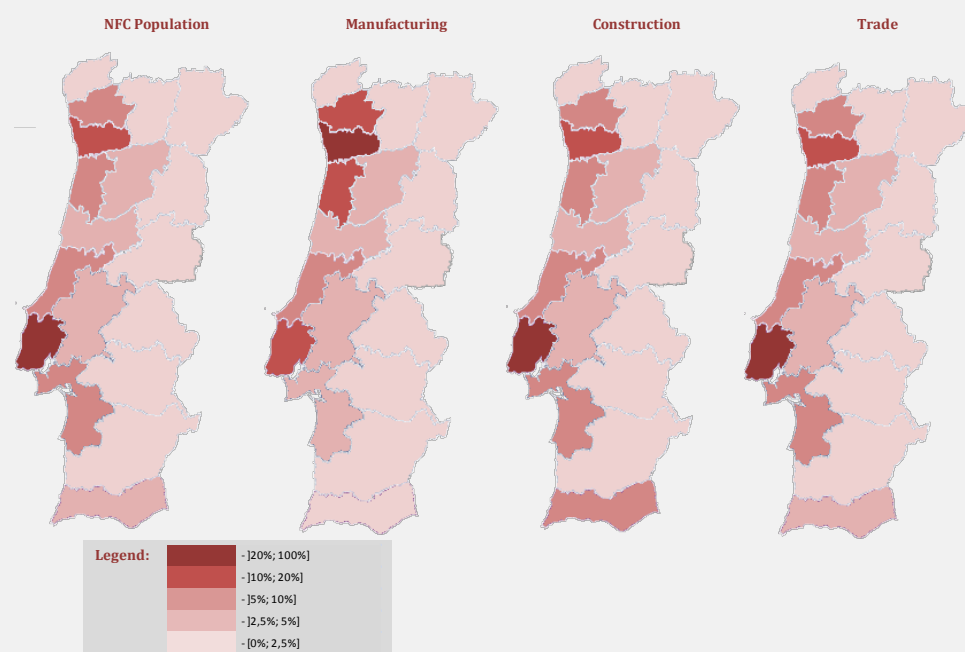
II.2   Business concentration

With the purpose of characterising the NFC sector within the scope of business concentration, an indicator that is commonly used in this type of analysis was calculated: the Herfindahl-Hirschman Index (HHI). This index was estimated based on the market share of each enterprise in its sector of activity, this share being computed on the basis of turnover.[18] The intention was to generally assess, through the HHI, the degree of competition in the NFC sector in Portugal.

The HHI index shows how enterprises in a given segment are similar in terms of market share, this being a particularly important analysis at the level of the sector of activity of enterprises. Table 2 shows the results of this indicator for 2000 and 2009 with regard to the activity aggregates considered in this analysis.

Table 2 – Herfindahl-Hirschman index for NFC population and by sector of economic activity (2000 and 2009)

Year	Sector of economic activity	HHI
2000	NFC population	0.001
	Electricity and water	0.198
	Other services	0.011
	Manufacturing	0.007
	Agriculture and fishing	0.003
	Construction	0.003
	Trade	0.002
2009	NFC population	0.001
	Electricity and water	0.093
	Manufacturing	0.007
	Construction	0.004
	Other services	0.003
	Agriculture and fishing	0.003
	Trade	0.002

An analysis of results shows that the *Electricity and water* sector has higher concentration indices for every period analysed. However, when comparing 2000 and 2009 there was a sharp reduction of this sector's HHI index, from high business concentration (0.198) to a lower level, already close to a situation where concentration is no longer deemed noteworthy (0.093). This is likely associated with the process of liberalisation and restructuring of the national and Iberian energy market, the effects of which were felt more clearly as of the second half of the decade.

The downward trend of the degree of concentration was also felt in the *Other services* sector, albeit to a lesser extent. This sector moved from a situation of relative business concentration (0.011) to one of high competitiveness (0.003). This result seems to have had a contribution from growing business entry into this market, as can be seen in the analysis in Chapter III.

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[18]   The market share s_i was computed on the basis of turnover as $s_i = y_i / \sum_{i=1}^{n} y_i$, the HHI index being given by $\sum_{i=1}^{n} s_i^2$. The HHI index assumes values between $1/n$ and 1, with values below 0.01 denoting a highly competitive market (understood as a market with no indication of business concentration), between 0.01 and 0.1 representing markets with no concentration, between 0.1 and 0.18 denoting markets with some concentration, and values above 0.18 denoting high business concentration. The value 1 is assumed in a monopoly situation where an enterprise holds the whole market share.

III. DYNAMICS OF THE NFC POPULATION

The creation of new enterprises has important repercussions at the level of market efficiency, often implying the development of new products and the implementation of new productive processes. The competition introduced by new enterprises also pushes those already settled to ensure higher levels of efficiency, in order to maintain their dominant positions or simply to ensure survival.

The birth and death of enterprises are an essential component of market dynamics. This dynamics reflects the concept of "creative destruction" introduced by Schumpeter (1942), according to whom this turbulence generates new ideas and ultimately economic growth.

The joint analysis of data on the birth and death of NFCs makes it possible to assess the ability of new enterprises to survive, and to know whether these are replacing old ones or, on the contrary, if there is an expansion in the number of active enterprises (stemming for example from greater dynamics in a specific sector where it is possible for more competitors to coexist). The study of this type of indicators is usually called analysis of business dynamics or of the level of entrepreneurship.[19]

Most such publications on Portugal are exclusively based on the *Quadros de Pessoal* (Lists of Personnel) reported to the Ministry of Labour and Social Solidarity[20] and refer to a relatively limited period of years. This Chapter presents an analysis of the business dynamics of Portuguese NFCs based on a historical series compiled by the CBSD.

Hence, the objective is to overcome some of the previously mentioned limitations, in particular at the level of NFC coverage, the quality of underlying data and the time period covered. In addition, the CBSD database does not include sole proprietors, allowing for an analysis that focuses exclusively on the institutional sector of NFCs.

This Chapter is divided into three Sections. Section III.1 assesses the growth pace of enterprises and identifies the weight of the most dynamic in the various NFC population aggregates. Section III.2 presents indicators to measure turbulence in the sector, and Section III.3 – resorting to non-parametric duration models – presents a set of estimates for the survival probability of new enterprises, with an assessment of the impact of their individual characteristics on longevity.

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[19] The *Manual on Business Demography Statistics – 2007,* jointly prepared by Eurostat and the OECD, is the methodological reference of the concepts associated with this type of study.

[20] The Lists of Personnel are comprised of companies with at least one employee, since these are only obliged to report to the Ministry of Labour and Social Solidarity. These Lists include information on sole proprietors, which has deep implications on the analysis of business dynamics.

III.1   High-growth enterprises and gazelles

An interesting analysis of a country's business structure includes identifying high-growth enterprises (HGEs) and the so-called gazelles,[21] which are in general associated with business innovation and dynamics.

On average, in the 2000-2009 period, HGEs accounted for around 11% of total NFCs (Chart 7). In 2009 this weight stood at 10%, corresponding to 14% of the number of employees and 16% of total turnover. In comparison with the start of the decade, the relative weight of this group of enterprises in the NFC aggregate declined, which was particularly evident in turnover (Chart 8).

The behaviour of gazelles corresponded to a large extent to that observed for HGEs. However, there was a greater stability of their relative weight in the past few years – compared with HGEs – which remained close to the figure recorded in 2000.

An analysis of **enterprise size**[22] shows that the weight of this type of entities is more significant in the smaller enterprises segment. In fact, small and medium-sized enterprises (SMEs) record the highest share of HGEs and gazelles, the former having accounted for 10% of total SMEs, 14% of the number of employees and 17% of the respective turnover in 2009.

Chart 7 – Weight of HGEs and gazelles in NFC population, in number of enterprises (2000 to 2009)
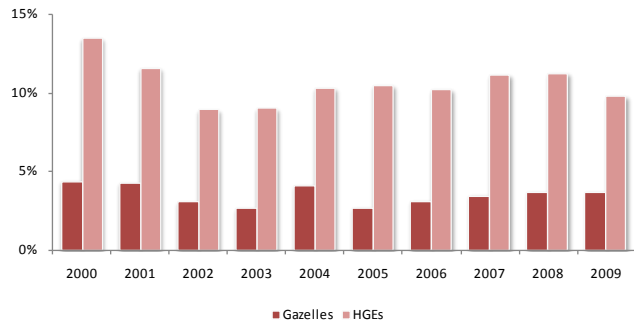
Chart 8 – Weight of HGEs and gazelles in NFC population (2000 and 2009)

The decline in the weight of HGEs in total NFCs was broadly based across all enterprise sizes, although it was more relevant in large enterprises. In 2000 growth was high in around 15% of large enterprises, whereas in 2009 these accounted for little over 5% of the respective population (assessed in total turnover of large enterprises, the weight of large HGEs went down from 19% in 2000 to 10% in 2009).

Also by **sector of activity**, the predominance of these entities is not similar. Table 3 shows that in average terms and in the time horizon considered the sectors where HGEs and gazelles are more relevant were *Electricity and water* and *Construction* (in these sectors HGEs and gazelles accounted for around 14% and 4% of their aggregates respectively).

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[21]   An HGE is an enterprise that shows annual average growth above 20% over a period of three consecutive years. HGEs include gazelles, which are characterised by having been operating for less than five years at the moment when they are identified as HGEs. For the purposes of this study, turnover was used to assess enterprise growth.

[22]   Within the scope of the analysis of business dynamics, it became necessary to assign to each enterprise a single characteristic for its entire period of activity, and hence use was made of the classification existing when the enterprise started activities. However, at size level, account was taken of the "average" size of each enterprise throughout its period of activity in order to avoid distortions associated with the market development of the enterprise. See the Annex for further details on the calculation method of the "average" size.

Table 3 – Average weight of HGEs and gazelles in the respective reference populations (2000 to 2009)

Sector of economic activity	HGEs	Gazelles
NFC population	10.7%	3.5%
Agriculture and fishing	12.0%	2.4%
Manufacturing	10.1%	3.3%
Electricity and water	13.9%	4.4%
Construction	13.5%	3.9%
Trade	8.9%	3.3%
Other services	11.0%	3.7%

With regard to the *Electricity and water* sector, there was a reversal of the broadly based trend of lower predominance of HGEs in the most recent period. In fact, the relative weight of these entities was higher in 2009 than in 2000, both in terms of turnover and the number of employees, remaining virtually unchanged as far as the number of enterprises is concerned (Chart 9). These data seem to be reflecting the recent dynamics of this sector associated with the restructuring of the national energy market (see Section II.2).

As regards the *Construction* sector, there was a decline in the weight of HGEs and gazelles between 2000 and 2003, with these indicators showing sustained growth in the following period. From 2007 onwards there was a noticeable further negative trend, although levels remain above the NFC aggregate average (Chart 10).

Chart 9 – Weight of HGEs and gazelles in the Electricity and water sector (2000 and 2009)

Chart 10 – Weight of HGEs and gazelles in the Construction sector (2000 to 2009)

Finally, it is worth mentioning *Trade* sector enterprises, which account for over one fourth of total NFCs, but record the lowest relative weight of HGEs in terms of the number of enterprises.

By **geographical location**, the situation of HGEs is relatively homogeneous. The Lisbon district, in line with the number of enterprises, incorporates the greatest number of HGEs (30%). The trend of these enterprises of the Lisbon district is a good reflection of the previously mentioned loss in the relevance of the NFC aggregate. Hence, in 2009 HGEs accounted for 10% of enterprises, 16% of the number of employees and 15% of the district's turnover, compared with 13%, 20% and 27% respectively in 2000.

In addition to the characteristics of these enterprises, it is also important to understand their evolution, so as to ascertain whether their high growth is sustainable or only a result of a cyclical situation that does not allow enterprises to cope with the dynamics shown. In this vein, in terms of HGEs and gazelles as a whole the intention was to identify which of them ceased activities in the period under review. Table 4 presents the weight of enterprises under these conditions considering the different aggregation criteria used in this study. In addition, Box 3 – *The influence of growth in the size of NFCs: the case of microenterprises* – at the end of this section provides further details on the specific case of microenterprises.

Table 4 – Relative weight of HGEs and gazelles that have ceased activities vis-à-vis the total of this type of enterprises identified in the 2000-2009 period

Aggregation criteria	Class	Structure of identified aggregations	HGEs	Gazelles
NFC population			**23.8%**	**25.8%**
By size	Microenterprises	83.6%	23.6%	26.5%
	SMEs	16.2%	20.0%	21.9%
	Large enterprises	0.2%	14.6%	18.8%
By district	Lisbon	29.7%	25.9%	28.2%
	Oporto	17.4%	24.6%	26.3%
	Other locations	52.9%	22.4%	24.3%
By legal nature	Private limited companies	94.3%	23.6%	25.5%
	Public limited companies	3.1%	17.7%	21.2%
	Other categories of legal nature	2.6%	38.9%	43.9%
By sector of economic activity	Agriculture and fishing	2.7%	19.1%	22.2%
	Manufacturing	13.7%	26.6%	28.9%
	Electricity and water	0.3%	12.7%	14.7%
	Construction	14.8%	23.2%	25.5%
	Trade	28.4%	28.4%	30.2%
	Other services	40.1%	20.3%	21.8%

Given the results obtained, it is possible to conclude that reaching a high growth level is no guarantee of longevity for enterprises. In fact, approximately one fourth of NFCs under these conditions ceased activities over the period under review.[23] In all aggregations and respective classes, gazelles are more prone to cease activities than HGEs, which shows that when strong growth occurs in the first years of life it may be even more associated with cyclical situations that do not ensure sustainability for the enterprise.

Assessing these indicators according to enterprise characteristics, it may be observed as regards **enterprise size** that the weight of HGEs and gazelles that have ceased activities decreases as their size increases.

As to the **legal nature**, stress should be laid on the high weight of enterprise closures classified in the "other categories of legal nature" aggregate (39% of HGEs and 44% of gazelles in this aggregate, although a very low number of HGEs are included), which is in line with the temporary and cyclical nature of entities included in this class.

By **sector of economic activity**, cessation of activities in enterprises identified as HGEs or gazelles is higher in *Trade* and *Manufacturing* (28% of HGEs and 30% of gazelles in the first case; 27% of HGEs and 29% of gazelles in the second), while the *Electricity and water* sector records the lowest shares.

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[23]   This occurred in some cases by incorporation into other entities and not only through winding-up of the enterprise. However, taking into account the available information, such cases are clearly residual compared with total cases of cessation of activities.

BOX 3 – The influence of growth in the size of NFCs: the case of microenterprises

As referred to throughout the analysis, 87% of enterprises associated with the NFC sector in Portugal in 2009 are microenterprises. In this size class, the available data point to around 10% high-growth enterprises and approximately 4% gazelles existing that year. Although it has been seen that high growth is not a guarantee of longevity for enterprises, this Box seeks to assess whether those that remained active were able to increase their size as a result of such dynamics.

For that purpose, use was made of data from enterprises that, classified as microenterprises during most of their life, were, in some period between 1991 and 2009, identified as HGEs or gazelles. From this basis, the attempts made were to ascertain the maximum size reached by these enterprises throughout their period of activity. The results obtained can be seen in Table 3.1.

Table 3.1 – Maximum size of high-growth microenterprises and gazelles throughout their life (1991 to 2009)

| Size	HGEs	Gazelles
Microenterprises	86.4%	87.8%
SMEs	13.6%	12.2%
Large enterprises	0.0%	0.0%

Hence, the great majority of microenterprises identified as HGEs or gazelles maintained their size throughout their whole life (more than 86% in the case of HGEs and around 88% of gazelles), with only a minority reaching the status of small or medium-sized enterprise (close to 14% of HGEs and 12% of gazelles).

These data strengthen the idea that significant growth in activity (that leads to the classification of enterprises as HGEs or gazelles) is chiefly associated with cyclical factors, which do not guarantee the sustained organic growth of enterprises. Of all microenterprises identified as HGEs or gazelles, only about one tenth reached the status of large enterprise in the period under analysis.

III.2   Turbulence analysis

One of the indicators of market dynamics is given by the churn rate, which corresponds to the sum of the birth and death rates of enterprises.

Chart 11 shows the churn rate of NFCs in Portugal over the last decade.[24] As can be observed, this indicator was always above two digits, showing considerable dynamics within the sector. Turbulence reached the highest levels, i.e. of 20% and 26% in 2000 and 2001 respectively, and the sector

Chart 11 – Churn rate of NFCs (2000 to 2009)

experienced a greater stability in the remaining years of the period under review, with rates ranging from 13% to 17%.[25]
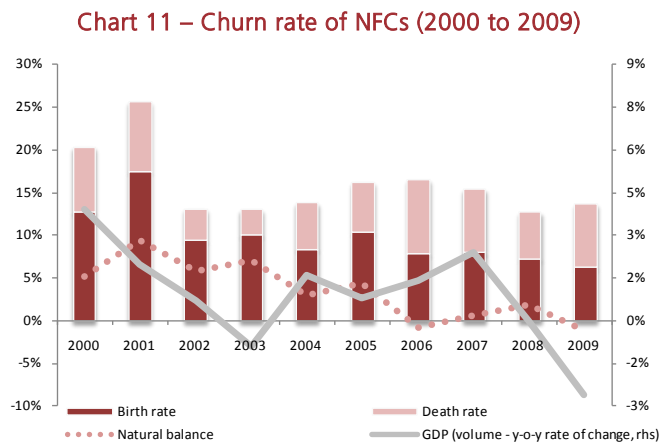
Analysing the contribution from each of its components, the birth rate exceeds the death rate almost every year, which explains growth in the number of active enterprises. However, there are two distinct periods: the first, coinciding with the start of the decade, is marked by a clear supremacy of the birth rate, giving rise to clearly positive natural balances (given by the difference between the birth and the death rate); from 2005 onwards, the death rate increased whereas the birth rate decreased, implying a considerable decline in the natural balance that even reached negative values in some periods, and a greater stability of the total number of active NFCs.

Chart 11 also shows that there is a close relationship between the trend of business demography indicators and economic developments. In fact, the trend of the natural balance of NFCs seems to closely follow developments in GDP, albeit with some lag.

This analysis of the churn rate may be broken down into the individual characteristics of enterprises, to understand if there are sub-groups with a greater contribution to the NFC aggregate value. Starting by analysing **size** classes, microenterprises recorded the greatest turbulence (Chart 12).

The analysis also makes it possible to prove the reduced size of the large majority of NFCs that were born and died in this period, insofar as microenterprises largely determined the turbulence recorded for the NFC aggregate.

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[24]   For CBSD statistics an enterprise is considered a live enterprise in a given year (thus contributing to the total number of NFCs in that year) as long as it has been operating over any period of time that year. Hence, in the computation of population in year *n* from population in year *n-1*, account is taken of births in year *n* less deaths in year *n-1*. Therefore, in Chart 11 the death rate considered in each year relates to the previous year so that the indicators shown can be directly interpreted in the period when they actually affect NFC population.

[25]   There are great difficulties in comparing these results with those of other studies, given that most reference publications at national and European level consider NFCs and sole proprietors jointly. This aggregation is reflected in higher turbulence rates and greater volatility. As an illustration, INE (2009) indicates that the birth rate of non-financial sector entities (incorporating sole proprietors, as already mentioned) stood at 16% in 2007, whereas the associated death rate stood at slightly above 17%. These data imply a turbulence rate of approximately 33%, clearly above that recorded in this analysis (around 15%).

Chart 12 – Birth and death rates of NFCs by size (2000 and 2009)
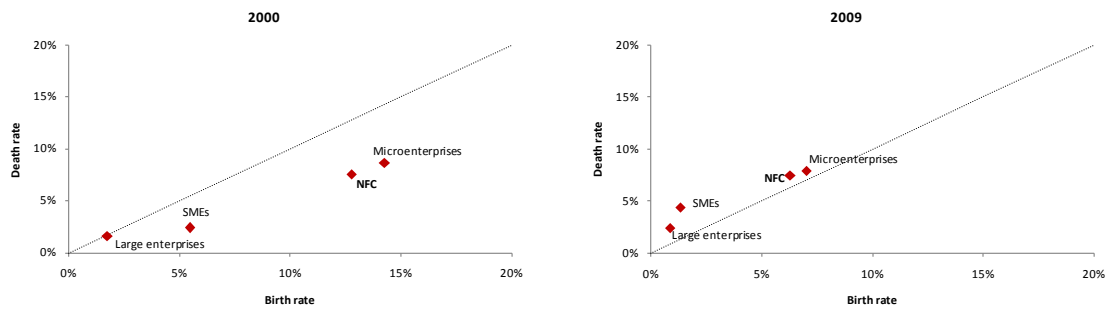
The lower churn rates recorded by both SMEs and large enterprises throughout the whole period were determined by a greater balance between birth and death rates, which stood at relatively low levels compared with those recorded in microenterprises. In fact, in the case of the latter size class, turbulence was due to higher birth and death rates, although the former played a more relevant role, which implies that the NFC populations considered incorporated an increasingly higher share of microenterprises (as seen in Chart 1).[26]

Chart 12 also shows that in 2009 the behaviour of microenterprises was clearly closer to that of the remaining size classes, compared with 2000.

Analysing the churn rate according to the **geographical location** of NFC head offices, Lisbon and Oporto are worth highlighting, for accounting, as a whole, for around 45% of total NFCs registered in Portugal and 60% of aggregate turnover in 2009.

However, the behaviour of churn rates associated with these two districts is quite similar to that of most NFCs, there being thus no significant evidence of distinct behaviours according to the geographical location of enterprises.

Chart 13 – Birth and death rates of NFCs by geographical location (2000 and 2009)
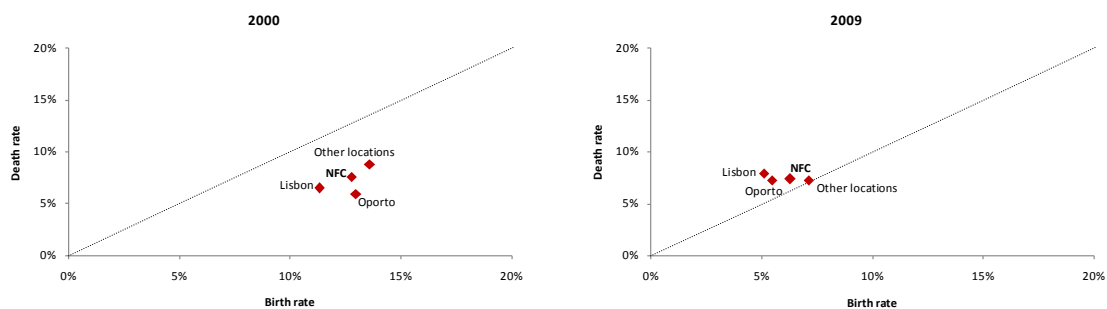
This conclusion may be backed by an analysis of the breakdown of churn rates into birth and death rates for 2000 and 2009 (Chart 13). In fact, there is an evident proximity of indicators across the various districts and, in 2009, also a clear sharp contraction of the churn rate, essentially due to a decline in births. At this level it is interesting to note that in Lisbon and Oporto the natural balance of enterprises is negative, while in the aggregate of the remaining districts it is virtually null.

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[26] Reference should also be made to the value of the natural balance of enterprises, which for the NFC aggregate stood at around 3% in average terms for the 2000-2009 period, while for microenterprises it was approximately 4%.

An equal analysis by **sector of economic activity** of enterprises shows that most of the identified sectors follows a trend of the churn rate similar to that identified for the national NFC aggregate, the level of rates being, however, somewhat distinct. In this vein, Table 5 shows average birth, death and churn rates computed for the 2000-2009 period, for a given group of sectors.[27]

Table 5 – Average birth, death and churn rates, by sector of economic activity (2000 to 2009)[28]

Sector of economic activity	Average birth rate	Average death rate	Average churn rate
Agriculture and fishing	9.7%	6.9%	16.6%
Manufacturing	6.9%	5.8%	12.7%
Electricity and water	13.7%	4.1%	17.8%
Construction	11.5%	6.4%	17.9%
Trade	8.7%	7.0%	15.7%
Other services	10.9%	5.7%	16.6%

The *Manufacturing* sector stood out for consistently presenting the lowest churn rates, which may be associated with the existence of barriers due to the high costs involved in the entry and exit from this activity.

By contrast, in this period the *Construction* and *Electricity and water* sectors recorded an average churn rate of around 18%, due to the creation of enterprises associated with this type of activities. In fact, these sectors showed the highest average birth rates of all the activities identified, with *Electricity and water* also standing out for presenting the lowest average death rate of all the sectors analysed. This is probably associated with the changes experienced in this sector, stemming from the already mentioned process of liberalisation of the Iberian energy market.

The *Other services* sector was also quite dynamic, which was reflected in an average churn rate of almost 17% resulting from the joint effect of a high birth rate (11%) and the second lowest average death rate (below 6%).

It is also important to stress the high average death rate recorded by the *Trade* sector (7%), equivalent only to that recorded in the *Agriculture and fishing* sector.

Chart 14 shows the dynamics seen from 2000 to 2009. Early in the decade virtually all activities were expanding in terms of number of enterprises, although there were major differences among them in terms of the growth rate. In 2009 there was a closer approximation of churn rates, with most activities even reaching a negative natural balance.

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[27]   At the end of this section, Box 4 – *Sectoral breakdown of the NFCs in the 2000-2009 period* – shows the contribution from each sector of activity to the birth rate of NFCs.

[28]   Calculated as simple arithmetic averages of annual birth, death and churn rates, computed from 2000 to 2009 for each of the identified sectors of economic activity.

Chart 14 – Birth and death rates of NFCs by sector of economic activity (2000 and 2009)
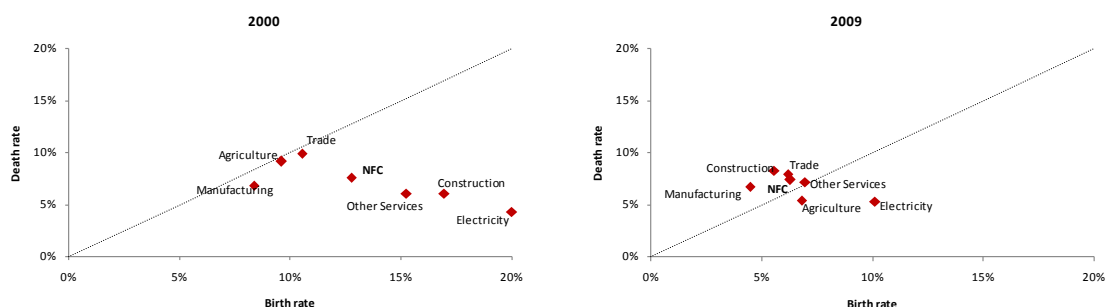
Considering churn rates estimated according to the **legal nature** of enterprises, the weight of private limited companies in NFCs as a whole becomes evident, insofar as these determine the churn rate recorded for most NFCs in the 2000-2009 period. Data also point to greater stability in public limited companies.

This probably stems from a higher capital level required for the setting-up of public limited companies as well as from a higher scrutiny to which they are subject for generally having more dispersed capital. These restraints imply a greater organisational structure that may function as a barrier to both entry and exit from activity. This notwithstanding, public limited companies also follow, although to a lesser extent, the turbulence trend recorded for NFC population over the last decade.

III.3   Survival analysis

As previously described, turbulence in the NFC sector results from the aggregation of births and deaths each year, and these events may be interpreted twofold. On the one hand, they may be a reflection of the replacement of enterprises, i.e. there are new enterprises that are able to prevail on the market (reaching high survival rates in their early years), replacing those that meanwhile have ceased to be efficient. On the other hand, new enterprises may have shorter lives, and hence the same enterprise contributes to the birth rate one year and to the death rate a year later, thus showing a low ability to survive.

Through recourse to econometric methods (in particular non-parametric duration models),[29] this section intends to provide further information on the ability of the new NFCs in Portugal to survive.

According to the information available on the CBSD, more than 511 thousand enterprises commenced activities between 1991 and 2009.[30] Of these, 43% ceased to be active within that 19-year period, implying that, in addition, 57% were still active at the end of the period under review.[31]

Table 6 summarises sample data and also shows the estimates obtained for the survival function of the NFC aggregate. This information shows that in the period under review, new enterprises recorded a high survival rate in the first two years of life (90% in the first year and 85% in the second), with the median of the duration of new enterprises standing between 10 and 11 years. After 19 years, only 33% of NFCs remain active.

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[29]   See the Annex for the methodology associated with the non-parametric duration models used in this section.

[30]   In this exercise, given the interest in obtaining survival estimates for a longer period, use was made of the complete CBSD series, which starts in 1991.
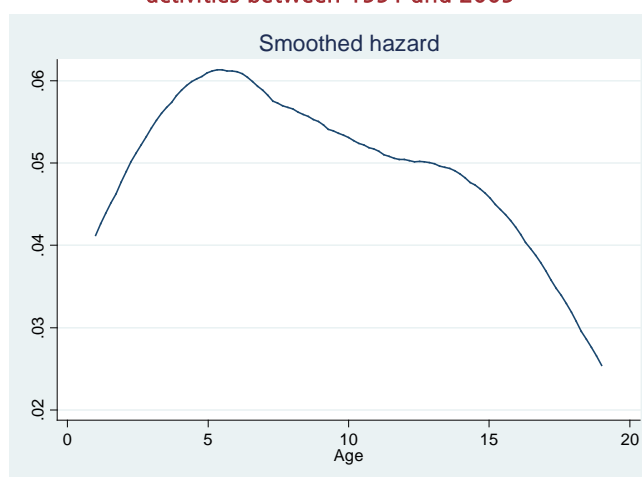
[31]   For the purpose of calculating the survival function, these are censored observations, given that in the course of the period under review there was no cessation of activities. The event analysed may eventually occur for these enterprises, but in a time horizon already falling outside the scope of this sample.

Age	Observations	With no activity	Censored observations	Survival function	Standard deviation	95% confidence interval	
1	511,514	52,875	23,286	89.7%	0.04%	89.6%	89.8%
2	435,353	24,114	25,199	84.7%	0.05%	84.6%	84.8%
3	386,040	29,464	25,124	78.2%	0.06%	78.1%	78.4%
4	331,452	22,904	19,112	72.8%	0.07%	72.7%	73.0%
5	289,436	17,709	24,278	68.4%	0.07%	68.2%	68.5%
6	247,449	16,768	17,192	63.7%	0.07%	63.6%	63.9%
7	213,489	11,791	19,019	60.2%	0.08%	60.1%	60.4%
8	182,679	10,263	16,744	56.8%	0.08%	56.7%	57.0%
9	155,672	7,361	30,338	54.2%	0.08%	54.0%	54.3%
10	117,973	5,832	16,782	51.5%	0.08%	51.3%	51.6%
11	95,359	4,719	7,880	48.9%	0.09%	48.8%	49.1%
12	82,760	3,962	12,225	46.6%	0.09%	46.4%	46.8%
13	66,573	3,464	10,581	44.2%	0.10%	44.0%	44.3%
14	52,528	3,329	9,534	41.4%	0.10%	41.2%	41.6%
15	39,665	1,555	8,749	39.7%	0.10%	39.5%	39.9%
16	29,361	1,286	7,508	38.0%	0.11%	37.8%	38.2%
17	20,567	869	7,180	36.4%	0.12%	36.2%	36.6%
18	12,518	884	1,681	33.8%	0.14%	33.6%	34.1%
19	9,953	211	9,742	33.1%	0.14%	32.8%	33.4%

The hazard function estimation allows for a different analysis of these data, reflecting the risk of closure faced by an enterprise in each period. The smoothed hazard function[32] for the NFC sector, depicted in Chart 15, has a convexed format, with a peak around the sixth year of activity. This means that, after entering the market, enterprises face a high probability of cessation of activities, which increases up to the sixth year of life. Once that threshold is surpassed, the risk of closure declines considerably.

The information gathered from the estimates obtained shows that, even when facing a growing risk of closure in their early years of life, the vast majority of national NFCs are able to remain in activity. Hence, there is evidence that the churn rates seen in this sector are due more to an enterprise replacement effect than to a reduced ability to survive of new enterprises when commencing activity.

Chart 15 – Smoothed hazard estimate of NFCs that commenced activities between 1991 and 2009

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[32] To annul the high irregularity of the hazard function, and thus allow for a simpler graphical analysis, is it usual to smooth the function based on the Kernel method, hence giving rise to the smoothed hazard function. Klein and Moeschberger (2003) present this method in detail.

These results, jointly with essentially positive natural balances throughout the last decade, show a considerable resilience of NFCs set up in Portugal. This has contributed to the expansion of the respective reference population. However, it is worth noting that the high adherence of these indicators' behaviour to economic developments (although, as referred to, with some lag) may determine a change in this dynamics in the years to come, particularly in the wake of a contraction in national economic activity in 2009 and the high uncertainty of economic agents throughout 2010.

This whole analysis may be deepened relying on the aggregation criteria of enterprises. In the following sections an assessment is made of the influence of each characteristic of enterprises – such as size, geographical location, sector of economic activity and legal nature – on the ability of enterprises to survive. However, it should be taken into account that this is a univariate analysis method, i.e. the analysis focuses on the isolated effect of each of these characteristics on the survival probability of the enterprise, with crossed effects falling outside the scope of this study.

By enterprise size

The information in Table 7 and Chart 16 shows that the expectation of survival is positively related to the enterprise size, i.e. the bigger the NFC the higher its ability to stay active in the market.

Table 7 – Survival function for NFCs that commenced activities between 1991 and 2009, by enterprise size

Age	Microenterprises	SMEs	Large enterprises
1	89.0%	98.2%	99.6%
2	83.8%	95.6%	98.9%
3	77.1%	92.2%	97.0%
4	71.5%	88.4%	95.8%
5	67.0%	84.8%	94.6%
6	62.2%	81.6%	91.9%
7	58.7%	78.7%	90.6%
8	55.2%	75.9%	87.8%
9	52.4%	73.9%	86.8%
10	49.7%	71.6%	85.7%
11	47.1%	69.5%	83.5%
12	44.7%	67.3%	82.8%
13	42.2%	65.5%	82.1%
14	39.2%	63.6%	80.4%
15	37.6%	62.0%	79.5%
16	35.8%	60.5%	78.4%
17	34.2%	58.9%	78.4%
18	31.6%	56.2%	74.7%
19	30.8%	55.9%	74.7%

This interdependence is evident since the first year and becomes sharper throughout the life of companies. Hence, in their first year of activity microenterprises record a survival rate of 89%, compared with 98% for SMEs and close to 100% for large enterprises. At 19 years of activity, rates decline to 31%, 56% and 75% respectively, stress being laid on the great resilience of the latter, insofar as three-quarters of large enterprises reach at least 19 years of activity.

These data are supported by hazard function estimates, according to which it is possible to identify risk levels that are inversely proportional to enterprise size, with microenterprises clearly standing out as those facing the greatest risk of closure over their whole existence.[33]

Chart 16 – Smoothed hazard function estimate of NFCs that commenced activities between 1991 and 2009, by enterprise size
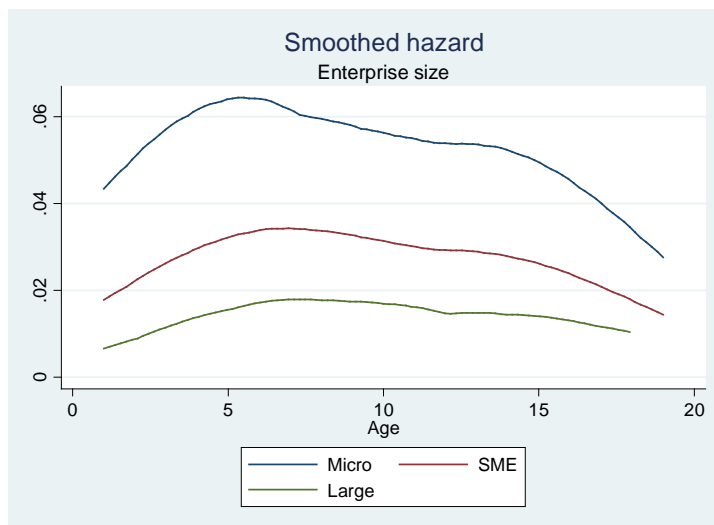
Results of tests to the equality of hazard functions (value of the test statistic and associated p-value)	
Log-rank $[\sim\chi_2(2)]$	6,530.09 (0.000)
Wilcoxon (Breslow) $[\sim\chi_2(2)]$	6,534.87 (0.000)

By geographical location

Table 8 shows the non-parametric estimation results of the survival function for enterprises having their head office in Lisbon, Oporto and all the remaining districts.

Hence, as of the fourth year Lisbon presents systematically lower survival rates than the remaining districts. As a result, during its first year of life, an enterprise in Oporto has a survival probability of over 91%, compared with 90% in Lisbon and 89% in the remaining districts. In the 11th year, less than half of the enterprises survive in Lisbon (47%), while in Oporto the rate is 50% and in the remaining districts 49%. After 19 years of life, the difference between survival rates widens, with Oporto recording the highest value (35%), Lisbon the lowest (31%), and all the remaining districts a 34% rate.

Therefore, the behaviour recorded by enterprises having their head office in Oporto moved closer to that of the remaining districts as a whole, compared with the situation in Lisbon.

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[33] As can be seen from data in Chart 16, statistical tests comparing hazard functions reject their equality, thus evincing differences between the risk levels of the various sizes. This holds true for all other analyses in this section. See the Annex for further details on these tests.

Table 8 – Survival function for NFCs that commenced activities between 1991 and 2009, by geographical location

Age	Lisbon	Oporto	Other locations
1	90.2%	91.4%	88.9%
2	84.9%	86.3%	84.1%
3	78.0%	80.0%	77.8%
4	72.5%	74.4%	72.5%
5	67.9%	69.8%	68.2%
6	62.9%	65.0%	63.8%
7	59.1%	61.4%	60.4%
8	55.6%	57.8%	57.1%
9	52.7%	55.2%	54.5%
10	49.9%	52.6%	51.9%
11	47.3%	50.1%	49.4%
12	44.8%	47.8%	47.1%
13	42.1%	45.5%	44.9%
14	38.8%	43.3%	42.1%
15	37.2%	41.6%	40.6%
16	35.3%	39.9%	38.9%
17	33.8%	38.1%	37.2%
18	31.3%	35.7%	34.6%
19	30.5%	35.0%	33.9%

Chart 17 proves this reality, with Lisbon showing a higher hazard function curve in the whole period under review, while the curve referring to Oporto is closer to that of the remaining districts as a whole.

Chart 17 – Smoothed hazard function estimate of NFCs that commenced activities between 1991 and 2009, by geographical location
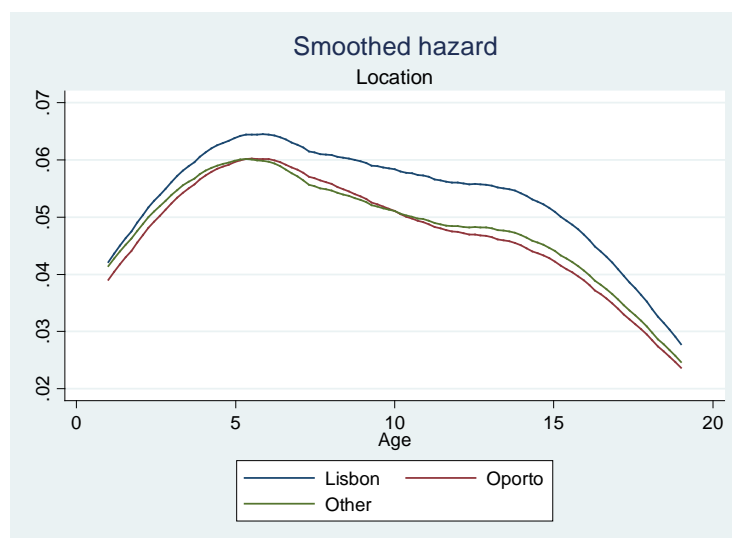
By economic activity

Focusing the analysis on the expectation of survival by economic activity, it is possible to prove the existence of relevant disparities across sectors (Table 9).

The *Electricity and water* sector shows the highest estimated survival rates for all periods, and after 19 years of activity 55% of its enterprises are still active. On the opposite side is the *Trade* sector, whose expectation of survival after 19 years of activity is only 28%. This trend is evident ever since the early years of life, where only *Agriculture and fishing* shows lower survival rates. However, as of the fourth year of activity, the indicator for *Agriculture and fishing* stabilises, and the *Trade* sector goes on to stand out clearly. This situation is confirmed by the fact that half of the enterprises of the *Trade* sector have ceased activities before

reaching the ninth year, compared with around 11 years for *Manufacturing* and *Construction*, 12 for *Agriculture and fishing* and 13 for *Other services*.

Table 9 – Survival function for NFCs that commenced activities between 1991 and 2009, by sector of economic activity

| Age	Agriculture and fishing	Manufacturing	Electricity and water	Construction	Trade	Other services
1	85.1%	90.0%	93.3%	92.0%	87.6%	90.5%
2	81.0%	85.3%	89.3%	87.2%	81.9%	85.9%
3	74.9%	79.2%	85.6%	80.6%	74.2%	80.2%
4	70.6%	74.0%	82.2%	74.8%	68.2%	75.2%
5	66.9%	69.3%	80.1%	69.9%	63.4%	71.2%
6	63.2%	64.9%	77.7%	64.4%	58.4%	66.9%
7	60.0%	61.4%	75.1%	60.8%	54.8%	63.6%
8	57.3%	57.9%	72.3%	57.1%	51.3%	60.3%
9	55.3%	55.2%	70.7%	54.4%	48.6%	57.6%
10	52.7%	52.4%	68.8%	51.8%	45.9%	55.0%
11	50.4%	50.0%	65.5%	49.2%	43.4%	52.5%
12	48.0%	47.5%	63.9%	47.0%	41.0%	50.2%
13	45.5%	45.1%	62.5%	44.3%	38.6%	47.9%
14	42.1%	42.6%	61.0%	40.4%	36.0%	45.3%
15	40.5%	40.9%	60.5%	38.7%	34.3%	43.7%
16	38.8%	39.4%	59.2%	36.8%	32.8%	41.8%
17	37.7%	37.8%	58.1%	35.3%	31.2%	40.1%
18	36.1%	35.8%	55.0%	32.6%	28.7%	37.3%
19	35.2%	35.3%	55.0%	31.9%	28.1%	36.5%

The same type of analysis may be carried out through observation of the hazard function (Chart 18), where the *Electricity and water* sector stands out from the remaining activities for showing lower and more stable risk levels.

Trade is on the opposite side, where enterprises consistently face a greater risk of closure, only matched by *Construction* after 15 years of life.

It is also interesting to note the evolution of the hazard function in the *Agriculture and fishing* sector in the early years of life. In fact, although NFCs show a higher risk in their early years of life, they rapidly reverse this, and in general, are able to record a hazard function with levels rather close to those of *Manufacturing* and *Other services*.

Chart 18 – Smoothed hazard function estimate of NFCs that commenced activities between 1991 and 2009, by sector of economic activity
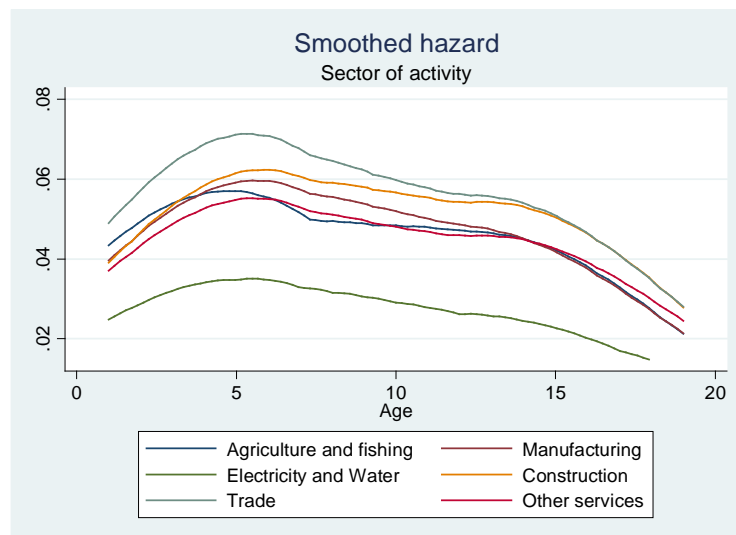
Results of tests to the equality of hazard functions
(value of the test statistic and associated p-value)

Log-rank [$\sim\chi_2(5)$]	3,166.24 (0.000)
Wilcoxon (Breslow) [$\sim\chi_2(5)$]	3,124.58 (0.000)

By legal nature

Table 10 shows estimates of the survival function according to the legal nature of NFCs. Private limited companies record a survival rate lower than that of public limited companies since the first year (92% and 95% respectively). This difference increases as the life of enterprises also increases, with half of the public limited companies still active with 17 years, compared with 11 years in private limited companies. After 19 years of activity, the former show a survival rate of over 47%, whereas the estimated rate for the latter stands at 36%.

Table 10 -Survival function for NFCs that commenced activities between 1991 and 2009, by legal nature

Age	Private limited companies	Public limited companies	Other categories of legal nature
1	91.8%	95.2%	64.4%
2	86.8%	92.5%	58.1%
3	80.7%	89.0%	46.0%
4	75.2%	85.7%	41.0%
5	70.7%	82.7%	36.6%
6	66.1%	78.8%	31.9%
7	62.5%	75.4%	28.9%
8	59.1%	72.3%	25.9%
9	56.4%	69.7%	23.7%
10	53.7%	67.4%	21.4%
11	51.2%	64.8%	19.4%
12	49.0%	62.4%	16.9%
13	46.7%	60.5%	14.3%
14	44.8%	57.9%	8.2%
15	43.1%	55.8%	7.7%
16	41.3%	53.8%	6.9%
17	39.6%	51.9%	6.4%
18	36.9%	48.9%	5.7%
19	36.3%	47.5%	5.3%

In addition, the aggregation of the remaining categories of legal nature (grouping Corporate Public Entities, co-operatives, clusters, etc.) shows higher volatility and a much lower expectation of survival in all periods. This is linked to the often temporary nature of these enterprises, associated with specific projects with a relatively low time horizon for carrying on their activities. For this type of companies, the expectation of surviving after 19 years of activity is estimated at only 5%.

The estimated curve of the hazard function according to legal nature (Chart 19) also supports previous assessments, insofar as the risk associated with "other categories of legal nature" is substantially higher than estimated for private limited companies and public limited companies, the latter recording the lowest risk levels.

Chart 19 – Smoothed hazard function of NFCs that commenced activities between 1991 and 2009, by legal nature
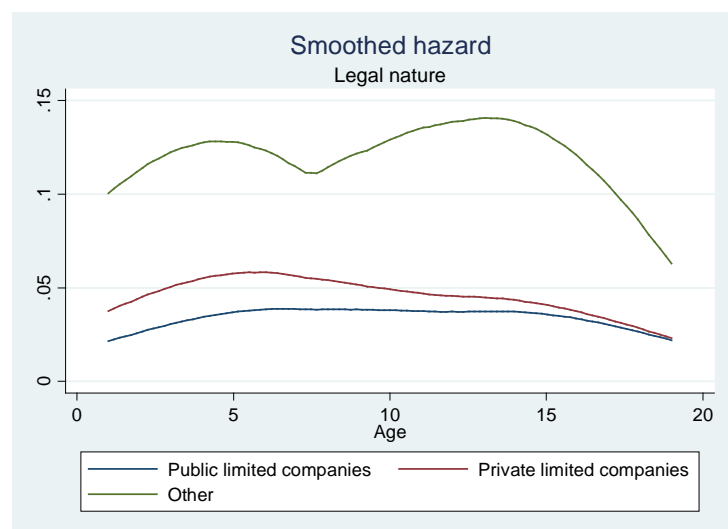

Results of tests to the equality of hazard functions
(value of the test statistic and associated p-value)

Log-rank [$\sim\chi_2(2)$]	36,446.95 (0.000)
Wilcoxon (Breslow) [$\sim\chi_2(2)$]	38,226.50 (0.000)

BOX 4 – Sectoral breakdown of new NFCs in the 2000-2009 period

The analysis of the dynamics of the NFC sector over the past decade makes it possible to identify different behaviours of the sectors of economic activity comprising it. This is seen at the level of both the churn rate and the estimated survival rates. In fact, economic agents tend to explore the opportunities of growth markets, which may lead to the emergence of merger trends in the creation of enterprises in specific sectors to the detriment of others.

This dynamics may be detected through the sectoral breakdown of new enterprises entering annually into the NFC sector (Chart 4.1).

Chart 4.1 – Weight of the sectors of economic activity in the total NFC birth rate (2000-2009)
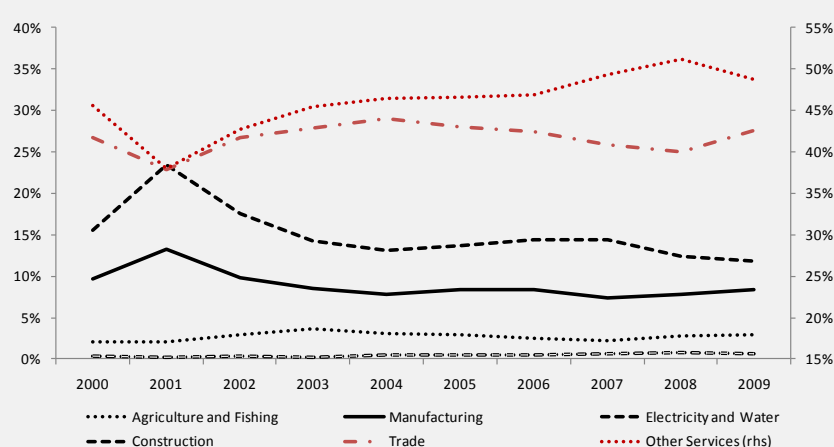
The available data show that, on average, around ¾ of the new NFCs are associated with service-related sectors (Trade and Other services) in the 2000-2009 period. Trade shows some fluctuations over the decade, and records an average weight of 27% in the period under review. Other services record more sustained growth, accounting on average for 46% of new NFCs.

Construction, on the other hand, has been decreasing in importance in new enterprises, ending 2009 with a 12% contribution to this aggregate, compared with 23% in 2001. The contribution from Manufacturing also falls, albeit more slightly, to stand at 8% in 2009, from 13% in 2001. Stress should also be laid on the relative stability of this sector in the 2003-2009 period, where its contribution to total NFC births ranges between 7% and 8%.

Finally, Agriculture and fishing and Electricity and water make marginal contributions to total NFC births.

In sum, over the past decade service-related sectors were clearly dynamic, confirming that the productive activity has shifted to non-tradable goods sectors.

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ANNEX

Annex: Analysis methodology

Throughout this study, distinct aggregations of primary data are presented, thus allowing for a better reading of results. This Annex shows the classifications adopted at the level of aggregations by size, geographical location, sector of economic activity, maturity and legal nature, thus systematising the vast majority of the concepts presented throughout this document. Finally, insofar as this analysis incorporates specific notions associated with the business dynamics of NFCs, there is also a description of the methodology adopted within that scope.

Classifications adopted

The aggregations presented throughout the document sometimes result from counting the number of enterprises with a specific characteristic. At other times, turnover and the number of employees are aggregated by categories of interest. Within the scope of this document, **Turnover** means the total amount of sales and services rendered. With regard to the **Number of employees**, the concept used in the annual data sources of the Central Balance-Sheet Database intends to gauge the average number of employees in the months of the year during which the enterprise was active, obtained through the following ratio:

$$\frac{\text{Sum of the number of employees on the last business day of each month of activity of the year}}{\text{Number of months of activity of the year}}$$

The number of employees on the last business day of each month includes all those who were working for the enterprise in the reference period, regardless of their contractual ties.

- Enterprise size

The classification by size adopted within the scope of this analysis is based on the Commission Recommendation of 6 May 2003 concerning the definition of micro, small and medium-sized enterprises.

Based on this Recommendation, a microenterprise is defined as an enterprise which employs fewer than 10 persons and whose annual turnover and/or annual balance-sheet total does not exceed EUR 2 million; a small enterprise is defined as an enterprise which employs fewer than 50 persons and whose annual turnover and/or annual balance-sheet total does not exceed EUR 10 million; a medium-sized enterprise is defined as an enterprise which employs fewer than 250 persons and has an annual turnover not exceeding EUR 50 million, and/or an annual balance-sheet total not exceeding EUR 43 million. Large enterprises fall outside the scope of the previous conditions.

There being a great similarity between the results shown for small and medium-sized enterprises in Portugal and those for NFCs, the analysis by size was restricted to three classes: micro, small and medium-sized enterprises (includes "small" and "medium" but excludes "micro") and large enterprises.

In turn, still as regards the classification of enterprises by size, within the scope of this analysis a few comparisons are made vis-à-vis the average situation at European level, in particular with recourse to Eurostat data. Even though the adopted classification is not the same, it is worth stressing that the sizes calculated by Eurostat observe the thresholds for the classes of number of employees, not taking into account annual turnover nor total assets. Hence, in order to correctly understand these data, the concept of microenterprise concerns, in this case, enterprises employing fewer than 10 persons (regardless of turnover and total assets recorded) and so on, while observing the thresholds of the above-mentioned Commission Recommendation, with enterprises employing more than 250 persons being classified as large enterprises.

Within the scope of the business dynamics analysis developed in Chapter III account was taken of the "average" size of each enterprise throughout its period of activity, computed as the arithmetic average of the size calculated in each year of activity. This is warranted given the need to have a single characterisation for each enterprise throughout its entire period of activity, to avoid distortions associated with their evolution in the market. Hence, the average size of each enterprise (i) assumes the following typology:

$$\overline{dim}_{i.} = \frac{\sum_{t=a}^{T} dim_{i,t}}{T - a + 1}$$

With $t = a, a + 1, \ldots, T$ where $\{a\}$ will be the first year of activity of the enterprise and $\{T\}$ the last, and where $dim_t = \{1,2,3,4\}$, depending on the enterprise being classified as micro, small, medium-sized or large enterprise respectively, in the year $\{t\}$.

- Geographical location

The references to aggregations of a geographical nature used in this analysis are based on a breakdown of the national territory by administrative regions identified as districts (associated with enterprises' head offices, considering 18 districts in mainland Portugal, one in the Autonomous Region of Madeira and three in the Autonomous Region of Azores), as can be seen in Table A.1.

Table A.1 – Aggregations associated with geographical location

Districts	
Angra do Heroísmo	Horta
Aveiro	Leiria
Beja	Lisbon
Braga	Ponta Delgada
Bragança	Portalegre
Castelo Branco	Oporto
Coimbra	Santarém
Évora	Setúbal
Faro	Viana do Castelo
Funchal	Vila Real
Guarda	Viseu

- Sector of economic activity

By default, the aggregation by economic activity presented throughout this document follows the section of the Portuguese Classification of Economic Activities, revision 3 (CAE-Rev.3).[34]

Under Statistics Portugal, CAE-Rev.3 established a new framework for Portuguese economic activities, harmonised with the Statistical classification of economic activities in the European Community (NACE-Rev.2),[35] thus replacing CAE-Rev.2.1. Structural changes were introduced vis-à-vis the latter, stemming from the above-mentioned harmonisation and the transposition of NACE-Rev.2 into the National Statistical System, but also from a need to adopt a structure that was more adjusted to the current national socio-economic organisation.

In this study, to facilitate the reading of some of the data presented use was also made of another type of aggregation, which on the basis of CAE Sections, groups them into six categories, as shown in Table A.2.[36]

Table A.2 – Aggregations associated with the classification of economic activity

CAE- Rev.3 Section	Name	Supplementary aggregation
A	Agriculture, forestry and fishing	Agriculture and fishing
B	Mining and quarrying	Manufacturing
C	Manufacturing	
D	Electricity, gas, steam and air conditioning supply	Electricity and water
E	Water supply; sewerage, waste management and remediation activities	
F	Construction	Construction
G	Wholesale and retail trade; repair of motor vehicles and motorcycles	Trade
H	Transportation and storage	Other services
I	Accommodation and food service activities	
J	Information and communication	
L	Real estate activities	
M	Professional, scientific and technical activities	
N	Administrative and support service activities	
P	Education	
Q	Human health and social work activities	
R	Arts, entertainment and recreation	
S	Other service activities	

As far as the classification by economic activity is concerned, these supplementary aggregations were also kept for comparison with the situation at European level, computed from data made available by Eurostat. However, Eurostat does not incorporate information on Section A of CAE-Rev.3 and also has a reduced coverage of activities that are part of Sections P and Q of CAE-Rev.3. This should be taken into consideration in the analysis of the indicators shown.

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[34] The structure of CAE-Rev.3 was published in Decree-Law No 381/2007 of 14 November, and may be consulted on the website of Statistics Portugal, at http://www.ine.pt.

[35] Regulation (EC) No 1893/2006 of the European Parliament and of the Council of 20 December 2006.

[36] Sections O (Public administration and defence; compulsory social security), T (Activities of households as employers; undifferentiated goods- and services-producing activities of households for own use) and U (Activities of extraterritorial organisations and bodies) are essentially comprised of entities that are not covered by the statistical concept of NFC, wherefore their analysis was excluded from this document. Section K (Financial and insurance activities) was also excluded and therefore also non-financial holding companies, although belonging to the NFC sector (as regulated in the European system of national and regional accounts in the Community (ESA 1995), approved by Council Regulation (EC) No 2223/96 of 25 June 1996). This exclusion is warranted by the very specific characteristics of these entities, which distinguish them from the remaining NFCs.

- Legal nature

The national legislative framework encompasses a variety of distinct classifications: public limited companies, private limited companies, Corporate Public Entities, municipal corporations, additional company groups and European economic interest groupings, cooperatives, associations, foundations and unincorporated businesses.

The presentation of results based on this breakdown would introduce too much noise in the analysis, wherefore the focus was only on public limited companies, private limited companies and occasionally Corporate Public Entities, the remaining entities having been aggregated under "Other".

- Concepts associated with business maturity and demography

Reference is often made to aggregations made based on business maturity, understood as the difference between the reference data for the analysis and the set-up date of enterprises. In order to define strata that are relatively consistent at the level of the information produced, the calculated maturities were aggregated into four distinct brackets, i.e.:
  - up to and including 5 years;
  - more than 5 and up to and including 10 years;
  - more than 10 and up to and including 20 years;
  - more than 20 years.

The intention was thus to capture three distinct phenomena: the typical start-up of an enterprise, identified by the first stratum; enterprises with longer start-up periods or that are being established in the market (second stratum); and finally, different levels of actual establishment of enterprises in the market, identified by the third and fourth strata.

Within the analysis of business dynamics in the NFC sector, use is often made of specific concepts associated with business demography. These concepts, defined based on the *Manual on Business Demography Statistics - 2007*, prepared by Eurostat and the OECD, make it possible to identify those cases where business dynamics is reflected in the growth of enterprises and the growth pace of their activity. Therefore, a **high-growth enterprise (HGE)** is an enterprise whose annual average turnover growth is higher than 20% in a period of three consecutive years.[37] This group of entities includes **gazelles**, which being high-growth enterprises, have less than five years of activity from their setting-up until they are defined as HGEs.

Also, **birth rates** are calculated from the ratio of enterprises that have commenced activities to the number of active enterprises in the reference period. The calculated **death rates** result from the ratio of enterprises that have ceased to have activity to the number of active enterprises in the reference period.

Methodology associated with survival analysis

For the development of the survival analysis presented in this study, use was made of a sample of 511,514 NFCs, gathering enterprises that commenced activities between 1991 and 2009.

- Non-parametric duration models

Duration models can be applied to business demography analysis by interpreting the survival function (S_t) as the probability of an enterprise surviving beyond a given period t, conditional on the fact that it has survived until then.

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[37] This can also be calculated on the basis of the trend of the number of employees.

The **survival function**, being a probability, is restricted to a range between zero and one. At the initial moment ($t = 0$) it takes the value one and decreases, tending to zero as time elapses ($t \to \infty$). Considering T a non-negative variable that represents the time elapsed between the moment of entry into the market and the exit, the survival function is represented by:

$$S(t) = 1 - F(t) = \text{Prob}(T > t)$$

With $F(t) = \text{Prob}(T \le t)$ representing the cumulative distribution function.

The **hazard function** ($h(t)$) measures the instantaneous hazard rate, i.e. the probability of death of an enterprise in a given period, conditioned by the fact that the enterprise has survived until then:

$$h(t) = \lim_{\Delta t \to 0} \frac{\text{Pr}\,(t + \Delta t > T > t | T > t)}{\Delta t} = \frac{f(t)}{S(t)}$$

where $f(t) = \frac{dF(t)}{dt}$ is the density function.

It is possible to obtain estimates for these functions without assuming any statistical distribution. In this case use is made of non-parametric methods, among which stress should be laid on the Kaplan-Meier estimator, applied within the scope of this work. The analytical expression of this estimator is given by:

$$\hat{S}(t) = \prod_{j | t_j \le t} \frac{n_j - d_j}{n_j}$$

where n_j and d_j are respectively the number of enterprises at risk and the number of closures in period t_j. The product is calculated for all risk periods until period t. An important characteristic of this estimator is that it can be used in samples with censored data,[38] which is instrumental for this type of analysis.

In addition to the aggregate analysis, one of the points of greatest interest of this type of analysis is the comparison of survival and hazard functions of enterprises according to some of their characteristics (size, sector of economic activity, legal nature, geographical location, etc.). In those cases, there is a series of tests that may be applied to determine whether the survival rates presented by enterprises are in fact distinct in statistical terms.

When there are no censored observations, the usual sample comparison tests may be used. When there are censored data, such as this analysis, some changes have to be introduced in these procedures.

This analysis used log-rank and Wilcoxon tests, insofar as the former tend to give more weight to the differences seen between samples in the later years of survival, whereas the Wilcoxon test assigns greater relevance to the early years of life. Since the remaining tests are generally in an intermediate situation, there being concordance in the results presented by the two selected tests, the probability of the remaining showing coincident results will be rather high.[39] Both tests have the equality in survival functions as null hypothesis, in which case they follow a χ^2 distribution with $k - 1$ degrees of freedom, where k is the number of samples under test.

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[38] Censored data means data that are partially unknown within a given sample. In this study, censored observations represent enterprises that have spent the entire period of analysis without cessation of activities, which is warranted by the fact that data collection stopped before that happened.

[39] Lawless (2003) presents the derivation process of this type of tests.

CENTRAL BALANCE-SHEET STUDIES

1 | Enterprise and Sector Tables

2 | Structure And Dynamics Of Non-Financial Corporations In Portugal