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TOURISM EXPOSURE  
AND FIRM SURVIVAL

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# Survival of the fittest: Tourism Exposure and Firm Survival

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## Abstract

In this paper, we estimate a discrete-time hazard model to study firm survival in the Portuguese Tourism sector. This sector has experienced a remarkable performance over the last decades. When compared to other sectors, tourism firms are more likely to exit: (i) if they are young (less than 10 years of existence); and (ii) if they belong to the lower tail of the firm distribution (i.e. belong to the group of worse performers). Within tourism related sectors, we find that firms whose activities are offered mostly to tourists, such as travel agencies and hotels, are always among the best performers in terms of survival. Moreover, despite of Tourism being one of the most volatile sectors in periods of high uncertainty, results show a higher survival resilience among established tourism associated firms.

JEL: L25, L83, C23, C55

Keywords: Firm survival, Tourism exposure, Firm dynamics, Hazard model.

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## 1. Introduction

According to the World Travel and Tourism Council (WTTC) the total contribution of Travel and Tourism amounted to 10.4% of the world GDP in 2019 (USD 8,811.0bn), with a share in employment (including wider effects from investment, the supply chain and induced income impacts) of 10%, corresponding to 318,811,000 jobs (WTTC 2020a). Tourism related GDP grew 3.5% between 2018 and 2019, one percentage point above overall GDP growth. In Portugal, tourism also plays a central role on the country's economic performance. In 2019 the total contribution of tourism corresponded to 17.1% of GDP and 20.7% of total employment (around 1,003,700 jobs).<sup>1</sup>

The worldwide growth of touristic flows and tourism demand in Portugal contributed to the growing number of new touristic firms in Portugal. The growth of the number of new tourism related firms makes the analysis of their life cycle and determinants of their survival an important research question. Hence, the focus of our paper is on the understanding of the survival of tourism related firms and how these compare to firms in other activity sectors. Using the European Community's NACE Rev.2 classification, we categorize firms into three main sectors: Manufacturing, Total Tourism and Other Services.<sup>2</sup> For a better understanding of the survival of tourism related firms, we further divide the Total Tourism group into Mainly Tourism and Partly Tourism. The former group includes firms whose activities are offered mostly to tourists, such as travel agencies and hotels; and the latter includes firms which also provide services to natives but whose business activity is significantly influenced by tourism flows, such as restaurants, bars and transports. Interestingly, we observe that the number of active firms in the Mainly Tourism group more than doubled between 2005 and 2017, which corresponds to the period of our analysis.

Firm survival has received increasing attention over the years in the literature in general and in the tourism literature in particular. While some authors have explored alternative methodologies (Park and Hancer 2012; Li and Sun 2012; Li *et al.* 2013), survival (or duration) models are typically employed to study the phenomenon (Gokovali *et al.* 2007; Kaniovski *et al.* 2008; Thrane 2012; Gémar *et al.* 2016; Falk and Hagsten 2018; Türkcan and Erkuş-Öztürk 2019; Leoni 2020). Most studies in the tourism literature are concerned with the determinants of success and survival within the Hospitality sector, highlighting the importance of activity-specific factors such as location and competitiveness (Kaniovski *et al.* 2008; Gémar *et al.* 2016; Türkcan and Erkuş-Öztürk 2019; Vivel-Búa *et al.* 2019; Leoni 2020), management related factors (Brouder and Eriksson 2013; Mehraliyev 2014; Gémar *et al.* 2016; Leoni 2020), or access to and adoption of information

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1. See WTTC (2020b) and for a more detailed description of the recent evolution see Caires *et al.* (2019).

2. The Other Services group excludes all tourism related activities (Total Tourism).

and communication technologies and innovation (Buhalis and Law 2008; Scaglione *et al.* 2009; Lee *et al.* 2013; Sirirak *et al.* 2011; Falk and Hagsten 2018). The link between the financial condition of firms and their survival has also been recognized as important determinants in the Tourism sector (Gu and Gao 2000; Youn and Gu 2010; Li and Sun 2012; Li *et al.* 2013; Park and Hancer 2012; Vivel-Búa *et al.* 2019). In this context, variables that are typically considered are meant to capture firms' profitability, debt usage and solvency, as well as liquidity and cash-flow measures (Gu and Gao 2000; Li and Sun 2012; Youn and Gu 2010; Park and Hancer 2012; Li *et al.* 2013; G  mar *et al.* 2016; Vivel-B  a *et al.* 2019). G  mar *et al.* (2016) also consider tangible assets. In addition, most studies find firm size to be a crucial factor for survival (Kaniowski *et al.* 2008; Falk and Hagsten 2018).

The contribution of this paper is threefold. First, our analysis contributes to the understanding of firm dynamics in the tourism sector, a sector which has experienced significant and steady growth over the last decades, and which plays a prominent role in the Portuguese economy. Second, available literature has mainly focused on explaining different survival dynamics but only within the Tourism sector. Focusing on the financial health of firms we explain how the survival of firms operating in Tourism related sectors differs from that of other sectors. Third, we situate our contribution within a growing literature on firm survival in the Tourism sector by using a discrete-time hazard model, which accounts explicitly for the grouped nature of data, and allows to explicitly accommodate additional covariates in the analysis.

Our analysis reveals four noteworthy patterns. First, tourism firms have, on average a higher exit probability than manufacturing and other services firms over the first ten years of existence, but the likelihood of exit is lower when firms with more than ten years are considered. Second, the differences between tourism related firms and firms in other sectors are larger in the lower tail than in the upper tail of the firm distribution. Third, within the Total Tourism group of firms, the probability of survival is always higher for the best performing firms in the Mainly Tourism activities, but for the worse performing ones, it is only higher in the first ten years in the market. Finally, firm dynamics in terms of survival is similar between Transport and Restaurants and different from other tourism activities, presenting not only a higher likelihood of exiting the market, but also a clear decreasing pattern throughout the life-cycle of the firm.

The remainder of this paper is organized as follows. Section 2 briefly presents additional literature related to survival analysis. Section 3 describes the data and the econometric model used to study the survival of tourism related firms. Section 4 presents the model estimates, and finally, Section 5 concludes.

## 2. Survival Related Literature

To study market performance, it is important to understand the life duration patterns of firms and the determinants of their survival, in addition to new firm entry (Mata and Portugal 1994; Mata *et al.* 1995) and the specific tourism related literature discussed above.

The financial health of firms is known to be intimately related to their survival. Cooley and Quadrini (2001) show that introducing financial constraints into a model of firm dynamics allows for conditional simultaneous dependence on age and size, and highlight that smaller (controlling for age) and financially constrained firms are more likely to exit. Albuquerque and Hopenhayn (2004) and Clementi and Hopenhayn (2006) model lender-borrower contracts to finance an initial project in which the lender is re-paid through profits at early stages. Financial frictions arise endogenously and borrowing constraints are influenced by collateral value. The models highlight the importance of capital structure and collateral, and predict that firms with higher debt levels have lower value from staying in the market, higher revenues are associated with lower probability of exit, and survival is increasing with firm age.

There is considerable empirical evidence to support these predictions. Lower profitability, smaller size, higher leverage and a lower commitment to fixed assets have been associated with higher chances of failure across a wide range of countries, periods, and firm samples (Fotopoulos and Louri 2000; Zingales 1998; Bridges and Guariglia 2008; Tsoukas 2011). The evidence for Portugal is analogous. Farinha and Santos (2006) show that higher firm leverage and lower ratio of tangible to total assets have a positive impact on the exit probability of Portuguese start-ups. The debt structure and funding relationships also play an important role in firm's decision to exit (Mata, Antunes, and Portugal 2010). Mata and Portugal (1994) and Mata *et al.* (1995) study the life duration of portuguese firms in the manufacturing sector and the survival of new plants, respectively, showing that age and size are important predictors of firm and plant survival, alongside sectoral characteristics such as higher growth or lower entry. Mata and Freitas (2012) also show debt to assets and return on assets to be important determinants of firm survival, when studying the differences in survival trends of foreign and domestically owned firms. Simoes (2017) finds that exporting firms have a reduced likelihood of failure when compared to non-exporting firms, suggesting a positive impact of exposure to international demand on the survival of Portuguese firms.

## 3. Data and Methodology

In the analysis that follows we use firm-level data covering the period between 2006 and 2017 which is drawn from *Informação Empresarial Simplificada* (IES), an administrative dataset covering the universe of portuguese firms. IES includes balance sheet and income statement information, yearly reported by firms to the



Ministry of Justice, Ministry of Finance, Banco de Portugal and Statistics Portugal during tax payments. We focus on firms in Manufacturing, Tourism-associated activities, and Other Services with positive values of turnover and assets, and less than 45 years of existence in 2006. A firm is considered to die in year  $t$  if the firm reports its closure in year  $t$ , by termination of activity, dissolution, or liquidation; or reports its activity in year  $t$  but does not report for at least two consecutive years after year  $t$ .

In the context of survival, our sample combines features of a population sample, an inflow sample and a stock sample (Jenkins 2005). Firm-level data stems from administrative records, not directly related to duration. We consider firms which were already active in 2006 (and continue to be for at least one additional year) as well as firms born between 2007 and 2017. Data is right-censored as we do not observe the end of the duration spell - death - of every firm, and left-truncated, or with *delayed entry*, as some firms already have ongoing spells when they are first observed. Importantly, these firms are the selection of survivors from cohorts which we incompletely observe. Left-truncation imposes that interpretation is conditional on survival until 2006, but these characteristics pose no threats to our estimation (Jenkins 1995).<sup>3</sup> Finally, our data is interval-censored as there is information on whether the firm was active or closed (dead) by the end of each year, but not when during the year the firm closed its activity. All these features are appropriately accounted for in the model we consider.

### 3.1. Group Definitions by Activity

We are particularly interested in accounting for differences in firm survival related to their business activity and exposure to tourism. Hence, based on the European Community's classification NACE Rev.2, we categorize firms into three distinct sectors, according to their activity: Total Tourism, Manufacturing, and Other Services.<sup>4</sup>

In order to identify firms in sectors with larger influence of tourism we follow the definitions put forward by the Eurostat (2018). The Total Tourism sector includes firms with activity directly or indirectly related to tourism and is divided into two subgroups: Mainly Tourism and Partly Tourism (see Table 1). A first part of our analysis compares firms in Total Tourism with firms in the remaining sectors, while the second part of our analysis explores differences in the intensity of tourism exposure by separately analyzing Mainly and Partly Tourism. The former group includes firms whose activities are offered mostly to tourists, such as travel agencies and hotels; the latter includes firms which also provide services to natives but whose

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3. In the context of the cloglog model (which is the approach we consider), the predicted hazard rate for a firm in period  $t$  is conditional upon survival until  $t - 1$  (see Section 3.2).

4. The Other Services group excludes all tourism related activities (Total Tourism).

business activity is significantly influenced by tourism flows, such as restaurants, bars and transports.

NACE Code	Description	Total Tourism	
		Partly Tourism	Mainly Tourism
H491	Passenger rail transport, interurban	x	
H4932	Taxi Operation	x	
H4939	Other passenger land transport	x	
H501	Sea and coastal passenger water transport	x	
H5110	Passenger air transport		x
I5510	Hotels and similar acco		x
I5520	Holiday and other short-stay acco		x
I5530	Camping grounds, recreational vehicle parks and trailer parks		x
I5610	Restaurants and mobile food service	x	
I5630	Beverage serving	x	
N771	Renting and leasing of motor vehicles	x	
N7721	Renting and leasing of recreational and sports goods	x	
N79	Travel agency, tour operator reservation service and related		x

Table 1. **Tourism Activity Classification**

**Notes:** Eurostat (2018) article on "Tourism Industries - economic analysis". Sector code according to NACE Rev.2.

Since our analysis is mainly focused on firms which are mainly dedicated to tourism-related activities, this implies that a narrow set of firms is characterized as Mainly Tourism (between 2,700 and 3,500 firms each year). Partly Tourism considerably broadens the definition and accounts for roughly 20,000 firms per year. Around 30,000 firms are in the Manufacturing sector each year and the Other Services sector is by far the one with the largest share of firms, with circa 110,000 firms each year, which is expected, given the large heterogeneity of activities accounted for by this sector.

Hotels and Similar Accommodation are the activity with the largest number of firms in the Mainly Tourism sector, representing 58.7% and 42.9% of all firms of the sector in 2007 and 2015, respectively. Over the period of analysis travel agencies account for approximately 26%. Holiday and short-stay accommodation is the activity facing the highest growth in the number of firms during the period, representing 27.7% of all firms in this sector in 2015, more than doubling its 2007 prevalence. Restaurants, bars and passenger land transport are the largest activities in the Total Tourism sector, representing around 40%, 30% and 30%, respectively of firms in this sector throughout the period. Table 2 provides a detailed distribution of firms by activity in the Mainly Tourism sector.

	2007	2008	2009	2010	2011	2012	2013	2014	2015	Total
Passanger air transport	0.59%	0.62%	0.68%	0.82%	0.70%	0.72%	0.70%	0.75%	0.75%	0.71%
Hotels and similar acc	58.68%	57.70%	57.46%	56.85%	56.03%	54.05%	52.53%	49.41%	42.93%	53.57%
Holiday and short-stay acc	12.79%	12.80%	13.17%	13.81%	14.87%	17.40%	18.45%	20.88%	27.66%	17.24%
Camping, recreational vehicle and trailer parks	1.77%	1.82%	1.65%	1.75%	1.71%	1.82%	1.83%	1.84%	1.84%	1.78%
Travel agencies	26.16%	27.06%	27.05%	26.77%	26.69%	26.01%	26.50%	27.13%	26.83%	26.69%
Total	2706	2742	2795	2802	2859	2914	3008	3200	3485	26511

Table 2. **Mainly Tourism: Distribution by Main Activities**

Table 3 shows the distribution of firms by activity in the Partly Tourism sector. Food and beverage serving firms are the most prevalent activities within the Partly Tourism sector, with Restaurants and Bars accounting for around 67% of all firms. Passenger land transport providing firms, such as trains and buses, represent between 27% and 30% of firms in this sector.

	2007	2008	2009	2010	2011	2012	2013	2014	2015	Total
Passenger land transport	30.59%	30.15%	29.98%	29.99%	29.66%	29.77%	29.60%	28.75%	27.62%	29.57%
Sea water trans	0.15%	0.19%	0.18%	0.17%	0.18%	0.18%	0.18%	0.21%	0.25%	0.19%
Inland water trans	0.09%	0.11%	0.10%	0.11%	0.10%	0.10%	0.10%	0.09%	0.09%	0.10%
Restaurants	37.05%	37.33%	37.50%	37.72%	37.97%	37.91%	37.93%	38.29%	39.30%	37.89%
Bars and Snack Bars	30.27%	30.36%	30.31%	29.99%	29.96%	29.82%	29.91%	30.32%	30.23%	30.13%
Renting of vehicles	1.47%	1.48%	1.51%	1.53%	1.56%	1.58%	1.62%	1.65%	1.75%	1.57%
Renting of goods	0.14%	0.15%	0.17%	0.20%	0.23%	0.25%	0.27%	0.33%	0.40%	0.24%
Reservation Services	0.23%	0.23%	0.25%	0.29%	0.35%	0.38%	0.38%	0.36%	0.37%	0.32%
Total	20037	20151	20085	19924	19961	19699	19457	19784	20247	179345

Table 3. **Partly Tourism: Distribution by Main Activities**

The Manufacturing sector includes all firms in section C of NACE Rev. 2. The Other Services sector includes firms in the Wholesale and Retail; Transportation; Accommodation and Food Services; Information and Communicatio; Real Estate; Professional, Scientific and Technical activities; Administrative and Support activities; and Other Service activities, excluding those included in the Total Tourism group.<sup>5</sup>

A large number of firms in Other Services are dedicated to Wholesale and Retail activities (around 60%), and Professional, Scientific and Technical activities, which represent between 14% and 17% of all Services firms. The prevalence of firms in the remaining sectors is relatively lower and can be observed in Table 4, which details the distribution of activities within the Services sector. While our sample includes only firms for which information and complete duration spells are available, final sample sectorial growth rates are analogous to those observed for the universe.

5. Other Services correspond to sections G, H, I, J, L, M, N and S of NACE REV 2 excluding those included in Total Tourism (see Table 1 for Eurostat's Tourism Industries definitions).

	2007	2008	2009	2010	2011	2012	2013	2014	2015	Total
Wholesale and Retail	59.5%	58.8%	58.3%	58.0%	57.5%	57.0%	56.9%	56.7%	56.4%	57.7%
Transportation and Storage	7.4%	7.3%	7.3%	7.1%	6.9%	6.7%	6.5%	6.4%	6.3%	6.9%
Accommodation and Food Services	0.2%	0.2%	0.2%	0.2%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%
Information and Communication	3.4%	3.5%	3.6%	3.7%	3.8%	4.0%	4.2%	4.3%	4.3%	3.9%
Real Estate	5.3%	5.3%	5.2%	5.1%	5.0%	5.0%	5.0%	5.2%	5.4%	5.2%
Professional, Scientific, Technical	15.7%	16.1%	16.6%	17.1%	17.8%	18.3%	18.4%	18.5%	18.5%	17.5%
Administrative and Support	4.6%	4.8%	4.8%	4.8%	4.7%	4.8%	4.8%	4.8%	4.9%	4.8%
Other Services	3.9%	4.0%	4.0%	4.0%	4.0%	4.0%	3.9%	3.8%	3.9%	3.9%
Total	104735	107236	108078	107861	108696	109108	109130	111835	114646	981325

Table 4. **Other Services: Distribution by Sector**

### 3.2. The Discrete Time Proportional Hazards Model

In this paper we employ a complementary log-log (cloglog) model, which is a discrete time version of the proportional hazards model, to analyse the survival patterns of firms.<sup>6</sup> In our analysis, duration is measured in years and thus conventional continuous time duration models are not suited for analysis. As argued by Jenkins (2005), the cloglog model is the most commonly used discrete-time model for dealing with intrinsically continuous but grouped data. The underlying assumption of the proportional hazards model is that the hazard rate depends only on time at risk, the so-called baseline hazard, and on explanatory variables affecting the hazard independently of time. The hazard rate function is defined as the probability of failure in the interval  $[j, j+1]$  conditional on surviving at least until  $j$ .

Specifically, the discrete-time hazard rate (or failure rate, rate of death, instantaneous risk, etc.), which yields the conditional probability of exit at time  $t$ , is  $h(t) = P(D = t | D \geq t)$ ,  $t = 1, 2, \dots, J - 1$  where  $D$  is a random variable representing the time at which the survival spell ends (death). The hazard function at time  $t$  is thus interpreted as the rate of death at  $t$ . This follows directly from the fact that  $1 - h(t) = \frac{S(t)}{S(t-1)}$ .

The survival function is the complementary cumulative distribution function, i.e., the probability of staying alive until  $t$ ,

$$S(t) = P(D > t) = \prod_{j=1}^t [1 - h(j)] \quad (1)$$

where  $S(\cdot)$  is a decreasing function such that  $S(0) = 1$  (if  $P(D = 0) = 0$ ) and  $\lim_{t \rightarrow \infty} S(t) = 0$ . In a proportional hazards framework, an extension to discrete time starts from the conditional survival function,  $S(t | \mathbf{x}_i) = S_0(t)^{\exp(\mathbf{x}_i' \beta)}$ , where  $S_0$  is the baseline survival function and  $S(t | \mathbf{x}_i)$  is the probability that a firm with covariates  $\mathbf{x}_i$  survives until  $t$ . Moreover, given the relationship between the

6. The  $\log(-\log(\cdot))$  is the *complementary log-log* transformation which gives name to the cloglog model.

hazard and the survival function in (1), the complement of the hazard function is,  $1 - h(t|\mathbf{x}_i) = [1 - h_0(t)]^{\exp(\mathbf{x}_i'\beta)}$ , so that,

$$h(t|\mathbf{x}_i) = 1 - [1 - h_0(t)]^{\exp(\mathbf{x}_i'\beta)}. \quad (2)$$

Applying the cloglog transformation to (2) yields,

$$\log(-\log[1 - h(t|\mathbf{x}_i)]) = \beta'\mathbf{x}_i + \gamma_j, \quad (3)$$

where  $\gamma_j$  is the complementary log-log transformation of the baseline hazard, i.e.,  $\gamma_j := \log(-\log(1 - h_0(t)))$ , with  $j = 1, \dots, 8$  which indexes times at risk of death and the hazard depends on a vector of covariates  $\mathbf{x}_j$  (which can be fixed or time-varying). The baseline hazard is then parameterized using a polynomial specification (quadratic and cubic in duration), chosen due to its flexibility which allows the data to fit properly without parametric constraints associated with predetermined distribution functions (Mata *et al.* 2010). The model is then estimated resorting to *episode splitting*, that is transforming duration data into binary-outcome (Dead=1 for end of spell and Dead=0 for survival).

Hazard-based duration models have been extensively used for several decades in fields such as biometrics, industrial engineering and economics. These models represent a class of analytical methods which are appropriate for modeling data that have as their focus an end-of-duration occurrence, given that the duration has lasted up to some specified time (Kiefer 1988; Hensher and Mannering 1994). This concept of conditional probability of termination recognizes the dynamics of duration; i.e., it recognizes that the likelihood of ending the duration depends on the length of elapsed time since the start of the duration.

Two important features characterize duration data. One is that the data may be censored; and the other is that exogenous determinants of the event times characterizing the data may change during the event spell. The hazard-based approach to duration modelling can accommodate both of these features in a relatively simple and flexible manner. On the other hand, accommodating censoring within the framework of traditional regression methods is quite cumbersome, and incorporating time-varying exogenous variables in a regression model is anything but straightforward.

The distribution of duration is modeled via the probability of ending the survival spell (dying) at time  $t$ . In this context we intend to model and estimate the impact of covariates (group belonging) on the probabilities of failure, i.e., the hazard rates. In this setting there is left censoring, or *delayed entry*, and the hazard rates are to be interpreted as the probability of failure in  $t$  conditional on survival until  $t - 1$ .

### 3.3. Failure predictors

In the proportional hazards framework, the baseline hazard is scaled by different values of covariates, variables which are important in predicting failure. In addition to being interested in how the predicted hazard of tourism-exposed firms differs

from that of firms in Manufacturing and Other Services, we are also interested in understanding how the impact of such covariates on the predicted hazard and survival differs across groups of interest. We resort to the literature on (overall and tourism-related) firm survival to assess the most important factors in influencing failure (see Section 2). We include firm size, measured by the logarithm of sales (*SALES*), the return on total assets as measure of profitability and defined by the ratio of operating profit to total net assets (*ROTA*), a ratio of debt-obtained funds to total assets as a measure of firm leverage (*DEBT*), and the ratio of fixed to total assets was included as a proxy for firm collateral (*FIXED*).<sup>7</sup>

Empirical studies of the impact of firms' financial performance and structure on their survival have mostly confirmed theoretical predictions (see Section 3.2). Accordingly, we expect *SALES*, *ROTA* and *FIXED* to negatively impact the hazard rate of firms, while *DEBT* is expected to increase the failure probability. The exposure to international demand and the growth of the tourism sector of the last decades in Portugal motivates our expectation for a negative impact of tourism exposure on firms' hazard rate.

The main summary statistics for each sector are shown in Table 5. Manufacturing firms are the largest, while firms in the Other Services sector have higher *SALES* than firms in Total Tourism, both on average and at the median. This effect is driven by firms in the Partly Tourism sector, as firms in Mainly Tourism outperform Other Services and Partly Tourism. Firms in Mainly Tourism are the ones with the highest fixed assets as a share of total assets, followed by Partly Tourism and Manufacturing. Food and Beverage and, particularly, Accommodation firms rely heavily on buildings, while Manufacturers are intimately linked with factories and machinery. Firms in the tourism sectors are also on average more indebted, while Manufacturing is the sector where *DEBT* levels are on average lowest (considering the median instead, it is the firms in Other Services). Manufacturing firms are the most profitable, followed by firms in the Other Services sector. Mainly Tourism firms are the worst performing both on average and at the median. Detailed yearly descriptive statistics are provided in Table A1 of the Appendix .

Considering the age profile of firms, we observe that Manufacturing firms are on average older and also exiting later when compared to firms in the Other Services sector. Firms associated with Tourism activities are the oldest among all groups, on average, despite the sectors' growth and dynamism which fosters the creation and entry of new firms in the market. This fact suggests that these firms may be more resilient than those in the remaining sectors, facing lower death probabilities (surviving for longer). This is particularly true for firms mainly dedicated to Tourism activities, where this effect may be larger. This argument seems to be supported

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7. Firms with incomplete information were excluded. Key variables were trimmed at the 99th percentile to limit the influence of outliers.

by the Age Upon Death variable (see Table 5), which shows that Mainly Tourism firms indeed exit later, both on average and at the median.

	Manufacturing	Other Services	Total Tourism	Mainly Tourism	Partly Tourism
AGE					
mean	17.60	14.41	18.60	18.22	18.65
sd	13.49	12.28	15.81	14.22	16.03
p50	14	11	13	15	13
SALES					
mean	12.53	11.92	11.23	12.04	11.11
sd	1.92	1.99	1.80	2.41	1.65
p50	12.40	11.88	11.26	12.16	11.17
ROTA					
mean	4.38	4.11	1.51	0.67	2.68
sd	9.78	9.55	10.21	8.12	12.47
p50	4.23	3.45	1.91	0.92	3.40
DEBT					
mean	16.41	20.77	26.83	27.43	26.00
sd	17.75	25.26	28.10	27.40	29.03
p50	11.29	10.65	17.52	19.70	14.04
FIXED					
mean	29.39	23.32	56.55	57.79	54.81
sd	19.15	28.53	29.50	29.61	29.24
p50	26.10	11.40	61.61	61.63	61.48
N	252413	981325	205856	26511	179345
Age Upon Death					
mean	14.39	11.36	12.61	15.48	12.36
sd	12.54	10.92	13.18	14.06	13.08
p50	10	8	8	12	8
N	13008	57501	12186	954	11232

Table 5. **Summary Statistics** - Total

Table 6 zooms in on the activities included in the Total Tourism sector, which are the focal point of the analysis in section 4.3. Among these, Hotels and Transports are the oldest. Hotels and Other Accommodation naturally rely more heavily on fixed assets, but are also the most indebted. Transports firms are the most profitable while Bars exhibit an average negative profitability measure. Unsurprisingly then, they are among the groups which exit younger, on average, together with Restaurants. Travel Agencies and Hotels are the ones with higher levels of SALES among all groups in our sample. Detailed statistics of firms' age profiles including the age distribution of firms in each year by sector, and the yearly distribution of firms by age bin and sector confirm the discussed patterns and can be seen in Tables A2 to A4 in the Appendix.

	Transports	Restaurants	Bars	Travel Agencies	Hotels	Other Accomodation
Age						
mean	21.77	16.71	18.29	15.40	21.71	11.72
sd	16.79	15.22	16.05	12.71	15.12	10.08
p50	13	12	14	12	19	10
SALES						
mean	10.15	11.69	11.27	12.62	12.34	10.06
sd	1.12	1.70	1.54	2.36	2.03	2.47
p50	10.00	11.80	11.40	12.82	12.40	10.47
ROTA						
mean	6.70	1.63	-1.63	2.67	0.35	-0.46
sd	10.13	17.10	18.84	11.27	7.54	8.35
p50	4.75	3.05	1.86	3.19	0.73	0.14
DEBT						
mean	9.10	21.10	16.96	7.86	29.29	25.29
sd	14.07	27.65	26.28	13.30	27.44	31.86
p50	4.62	5.34	0	0.02	22.58	8.73
FIXED						
mean	25.15	47.41	44.79	17.28	62.18	68.99
sd	20.72	28.90	30.89	19.81	27.09	31.35
p50	18.99	47.04	43.86	10.21	66.30	82.73
N	53321	67956	54039	7077	14203	4571
Age Upon Death						
mean	19.83	10.70	11.52	13.36	18.68	11.65
sd	16.14	11.71	12.43	12.39	15.55	11.51
p50	13	6	7	9	15	10
N	1621	5240	4165	355	433	151

Table 6. **Summary Statistics** - Sub-categories

#### 4. Empirical Analysis of Firm Survival

This section provides the results and a discussion of our survival regression analysis. First, we compare the firm dynamics in the Total Tourism sector with that of firms in Other Services and Manufacturing. Then we analyze potential heterogeneity within the Total Tourism sector by discussing the potential differences between Mainly Tourism and Partly Tourism. Finally, we individually compare the different activities within the Total Tourism sector.

##### 4.1. Total Tourism Firms Survival

Results of our regression analyses comparing the three main groups of activities (Total Tourism, Manufacturing, and Other Services) are displayed in Table 7, columns (1) to (6) and Figure 1. In Table 7 we provide the results for the



conventional cloglog model and report for each sector a specification with a linear and a quadratic term on age, and another with a cubic term as well.

The results indicate that the four covariates used in the model and discussed in section 2 are important for the different sectors. In particular, *SALES*, *ROTA*, and *FIXED* have a negative impact on the probability of exit while *DEBT* is positively associated. Nevertheless, while the impact of *ROTA* and *DEBT* is similar among sectors, the negative impact of *SALES* and *FIXED* is around half in Tourism firms when compared to firms in the Manufacturing and Other Services sectors. Thus, the results show that the likelihood of survival depends on the financial situation of the firms, as companies with larger size (log sales), higher profitability (share of operating profits to total net assets), higher collateral (ratio of fixed to total assets) and with lower leverage (ratio of debt-obtained funds to total assets) have a lower probability of exit. This first set of results leads to the idea that the dynamics of an average firm in terms of survival in the tourism sector is not that different from the dynamics of an average firm from Other Services or Manufacturing.

In terms of firm age, the results show that for the three sectors considered, the linear term is negative and the squared term positive. The only difference between sectors is the magnitude of the coefficients. For instance, for Total Tourism, in absolute value, these are around two times the values for the other sectors. When we allow for the possibility of a cubic term, the evidence is mixed: for Other Services the term is positive but non-significant, for Manufacturing it is negative and marginally significant while for Total Tourism it is negative and significant.

To examine the patterns of survival in more detail, Figure 1 displays the observed hazards for the average firm in each of the three sectors to exit (panel 1). In addition, in panels 2 to 4, we also analyze the hazard for firms at different points of the distribution (e.g. median firm (percentile 50), and firms at the 25th and 75th percentiles in terms of covariates). In particular, we present the predicted hazard rates, taking into account the firms in the 25th, 50th and 75th percentiles (which we define as P25, P50, P75, respectively), of each covariate (*SALES*, *ROTA*, *FIXED*, and *DEBT*), in panels 2 to 4, respectively. The results in Figure 1 consider the effects of the determinants of exit upon these hazard rates.

	Manufacturing		Services		Total Tourism		Mainly Tourism		Partly Tourism	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
const	-0.988*** (0.049)	-0.969*** (0.050)	-1.117*** (0.021)	-1.122*** (0.021)	-1.296*** (0.044)	-1.250*** (0.045)	-1.702*** (0.146)	-1.750*** (0.147)	-1.225*** (0.047)	-1.175*** (0.048)
AGE	-0.026*** (0.002)	-0.034*** (0.004)	-0.027*** (0.001)	-0.025*** (0.002)	-0.062*** (0.002)	-0.086*** (0.004)	-0.015* (0.006)	0.004 (0.014)	-0.065*** (0.002)	-0.092*** (0.004)
AGE2	0.000*** (0.000)	0.001*** (0.000)	0.000*** (0.000)	0.000* (0.000)	0.001*** (0.000)	0.002*** (0.000)	0.000 (0.000)	-0.001 (0.000)	0.001*** (0.000)	0.002*** (0.000)
AGE3	- (0.000)	-0.000* (0.000)	- (0.000)	0.000 (0.000)	- (0.000)	-0.000*** (0.000)	- (0.000)	0.000 (0.000)	- (0.000)	-0.000*** (0.000)
SALES	-0.116*** (0.004)	-0.114*** (0.004)	-0.112*** (0.002)	-0.113*** (0.002)	-0.070*** (0.004)	-0.063*** (0.004)	-0.072*** (0.010)	-0.076*** (0.011)	-0.075*** (0.004)	-0.067*** (0.004)
ROTA	-0.014*** (0.000)	-0.014*** (0.000)	-0.012*** (0.000)	-0.012*** (0.000)	-0.011*** (0.000)	-0.011*** (0.000)	-0.011*** (0.001)	-0.011*** (0.001)	-0.011*** (0.000)	-0.011*** (0.000)
DEBT	0.002*** (0.000)	0.002*** (0.000)	0.002*** (0.000)	0.002*** (0.000)	0.002*** (0.000)	0.002*** (0.000)	0.001 (0.001)	0.001 (0.001)	0.002*** (0.000)	0.002*** (0.000)
FIXED	-0.008*** (0.000)	-0.008*** (0.000)	-0.006*** (0.000)	-0.006*** (0.000)	-0.004*** (0.000)	-0.004*** (0.000)	-0.012*** (0.001)	-0.012*** (0.001)	-0.003*** (0.000)	-0.003*** (0.000)
Obs	252413	252413	981325	981325	205856	205856	26511	26511	179345	179345
Year FE	yes		yes		yes		yes		yes	

Table 7. **Cloglog Hazard - Different Samples**

**Notes:** Robust standard errors in parentheses. Significance levels: 1%\*\*\* 5%\*\* 10%\*.

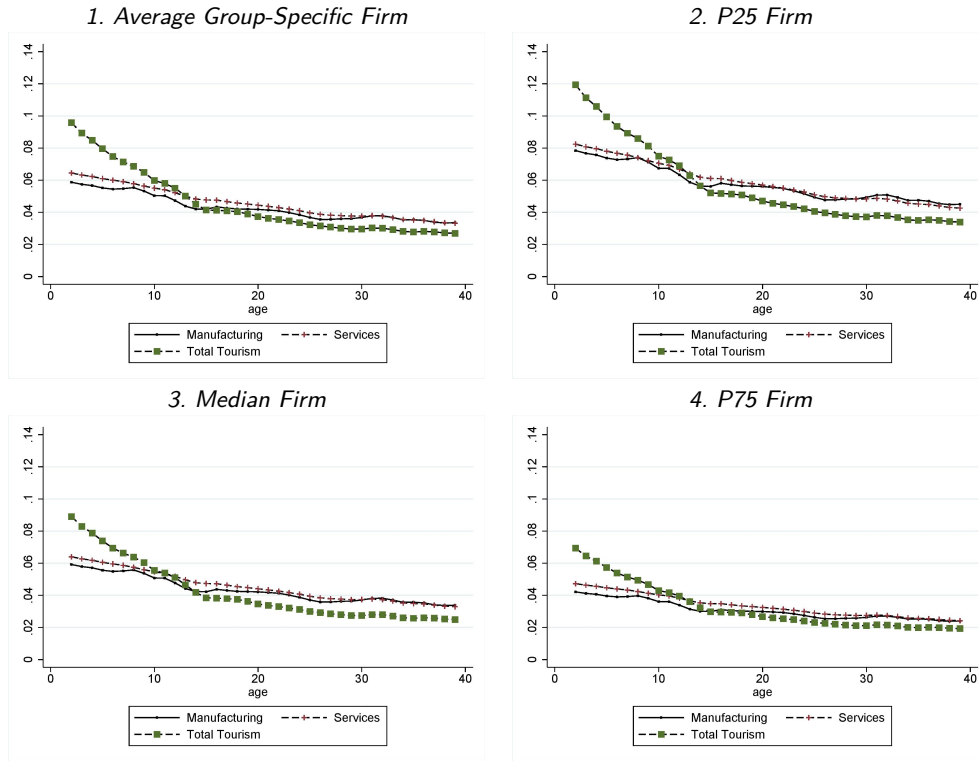


Figure 1: Predicted Hazard Rates

**Notes:** Panel 1 represents the predicted hazard for each group-specific average firm (average firm for models (2), (4) and (6) of Table 7). Panels 2 to 4 represent the predicted hazard using the models in Table 7 using the values for the within-group p25, median and p75 of each covariate. As debt positively influences hazard, when remaining covariates were set to p25 it was set to p75, and when the remaining covariates were set to p75, it was set to p25.

The observed patterns are identical for Manufacturing and Other Services, but display some difference when compared to Total Tourism. In all sectors we observe a decrease in the hazards, but smoother in the case of Manufacturing and Other Services. In fact, in the first years the hazards of the average firm in the Tourism sector is clearly above the ones presented by the other sectors but drops considerably until age 15 where the hazard becomes smaller than in the other sectors. Then the hazard rates decrease slowly and present a similar pattern in all sectors.

The empirical results show that Tourism firms have on average a higher probability of exit than Manufacturing and Other Services firms in the first 10 years. In contrast, when we compare firms with more than 10 years, the likelihood to exit is lower among firms in the Tourism sector. Overall, firms in the 25th, 50th, and 75th percentiles provide a similar insight in terms of the evolution of the hazard. The main difference is in terms of magnitude, and particularly in the first 5 to 10

years, where firms presenting worse indicators are more likely to exit and display a bigger difference between Tourism and other sectors. Despite the similar evolution, firms with better indicators in the Tourism sector, are closer in performance to firms in the other sectors in terms of hazard rates. Hence, differences are larger in the lower tail than in the upper tail of the firm distribution.

#### **4.2. *Mainly Tourism vs. Partly Tourism***

In this section we compare the two main group of activities within the Total Tourism as described in the previous section: Mainly Tourism and Partly Tourism.

Columns (7) to (10) in Table 7 display the results for the two groups. The results indicate that firm size, profitability, and collateral are important determinants of the likelihood of exiting the market in both sectors but leverage is only significant for firms in the Partly Tourism activities. The negative impact of firm size and profitability is similar between sectors, but the negative impact of the collateral variable is almost 4 times higher for the Mainly Tourism activities. In general, empirical results show that Mainly Tourism firms have on average a lower probability of exit than Partly Tourism firms.

The evidence on the relation between firm age and probability of exit is different between the two groups. For Partly Tourism all terms (linear, quadratic and cubic (when used)) in both specifications are significant. In contrast, for the Mainly Tourism firms we do not observe significant differences by age. The only significant term is the linear term but it is only marginally significant.

Therefore, in Figure 2, the observed patterns are not identical for the two sectors. It clearly decreases for the Partly Tourism firms, while the hazards for the Mainly Tourism firms are relatively constant over time. On average, the hazard rates of the Partly Tourism firms are always above the Mainly tourism firms. However, when the firms are older (between 30 and 40 years) the difference is less than 1 percentage point, and the hazard rate in both sectors is closer to 3%. In contrast, in the first couple of years the hazard rate for a firm in the Partly Tourism is around 10% while in the Mainly Tourism sector it is below 4%. Finally, the likelihood of exit among Mainly Tourism firms is always lower than the one presented by firms in the Manufacturing and Other Services sectors.

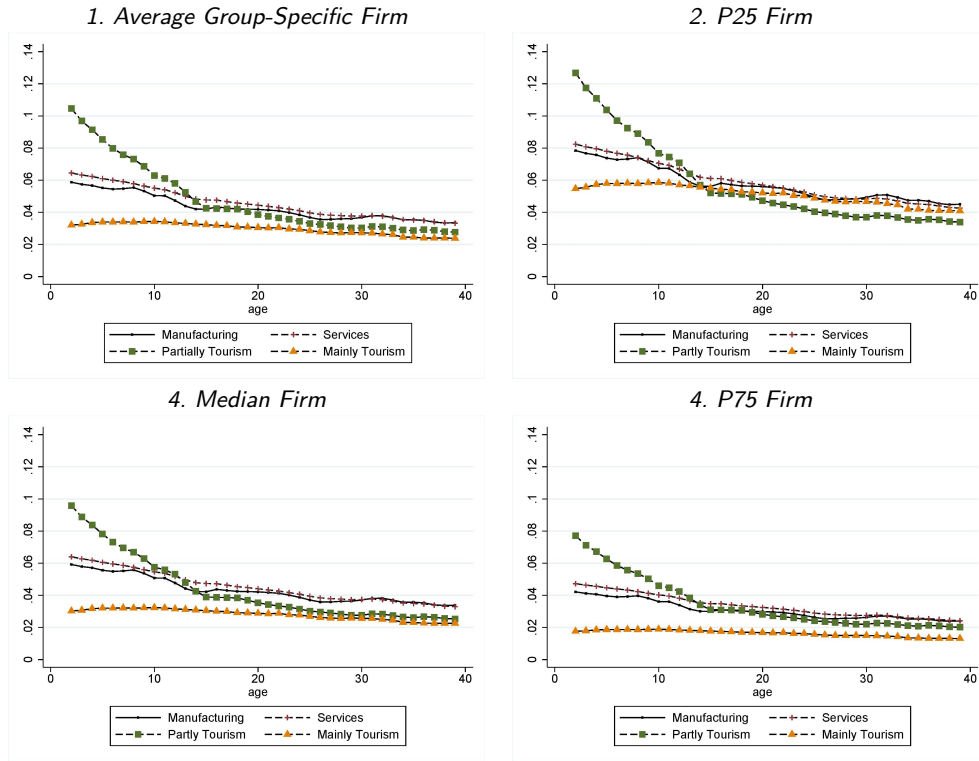


Figure 2: Predicted Hazard Rates

**Notes:** Panel 1 represents the predicted hazard for each group-specific average firm (average firm for models (2), (4), (8) and (10) of Table 7). Panels 2 to 4 represent the predicted hazard using the models in Table 7, using values for the within-group p25, median and p75 of each covariate. As debt positively influences hazard, when remaining covariates were set to p25 it was set to p75, and when the remaining covariates were set to p75, it was set to p25.

Looking at firms with different indicators it is interesting to observe that for firms with lower sales, lower profitability, lower collateral, and higher debt the hazards for firms from the Partly Tourism after age 15 turn out to be lower than the ones in the Mainly Tourism sector. In fact, the probability of exit goes from 13% in the first year to 4% at age 40, while this rate is around 5% and relatively constant for the firms in the Mainly Tourism sector. This result shows that the worse performers in the Mainly Tourism group are more vulnerable firms than similar firm in the Partly Tourism sector after 10/15 years in the market.

This phenomenon is not observed for firms with the best indicators where the probability of exit is always around 2%, in contrast to the ones in Partly Tourism where the probability goes from 8% to 3%. Thus, a firm in the Mainly Tourism sector that presents higher sales, higher profitability, higher collateral, and lower

debt is more likely to survive than firms in the same part of the distribution in the Partly Tourism sector.

Hence, empirical results show that the probability of survival is always higher for the best performing firms in Mainly Tourism, but for the worse performing in this sector the likelihood of survival is only higher during the first 10 years in the market.

#### 4.3. Differences by industries offering services to tourists

Results of our regression analysis by individual activities within the tourism sector are displayed in Table 8 and Figure 3. As before, we use the conventional cloglog model but report only results from the specification using the linear, quadratic and cubic term on firm age.

	Transports (1)	Restaurants (2)	Bars (3)	Travel Agencies (4)	Hotels (5)	Other accom. (6)
const	-0.790*** (0.146)	-0.838*** (0.066)	-0.700*** (0.075)	-1.983*** (0.280)	-1.344*** (0.211)	-1.763*** (0.359)
AGE	0.018 (0.017)	-0.070*** (0.006)	-0.071*** (0.007)	0.037 (0.025)	-0.030 (0.019)	0.075 (0.049)
AGE2	-0.001* (0.000)	0.001*** (0.000)	0.001*** (0.000)	-0.002 (0.001)	0.001 (0.001)	-0.003 (0.002)
AGE3	0.000** (0.000)	-0.000 (0.000)	-0.000 (0.000)	0.000* (0.000)	-0.000 (0.000)	0.000 (0.000)
SALES	-0.255*** (0.018)	-0.079*** (0.005)	-0.099*** (0.006)	-0.071*** (0.021)	-0.108*** (0.016)	-0.080* (0.031)
ROTA	-0.007*** (0.001)	-0.010*** (0.000)	-0.009*** (0.000)	-0.013*** (0.001)	-0.012*** (0.001)	-0.005* (0.002)
DEBT	0.002 (0.001)	0.002** (0.001)	0.001* (0.001)	0.006* (0.003)	-0.002 (0.002)	0.003 (0.003)
FIXED	-0.008*** (0.001)	-0.005*** (0.001)	-0.003*** (0.001)	-0.010*** (0.003)	-0.011*** (0.002)	-0.014*** (0.003)
Obs	53321	67956	54039	7077	14204	4571
Year FE	yes	yes	yes	yes	yes	yes

Table 8. **Cloglog Hazard - Individual Activities of the Total Tourism Sector**

**Notes:** Robust standard errors in parentheses. Significance levels: 1%\*\*\* 5%\*\* 10%\*.

The results indicate that the determinants of the different activities of exiting the market are, indeed, different. First, leverage is only relevant to Restaurants, only marginally significant to Bars and Travel agencies but not important to

the other activities (Transports, Hotels, and Other Accommodation). In what concerns the other variable, sales and profitability are relevant to all activities except Other accommodation, for which it is only marginally significant, and collateral is important for all activities. Furthermore, in terms of magnitude, the heterogeneity of the impacts of the different determinants in the different activities should be highlighted, in particular, the higher sensitivity of firms belonging to the transport sector regarding sales. For instance, for an increase of 1 standard deviation of the logarithm of sales (lnsales), the likelihood of exiting in the transport sector is around 30 percent, while in the Hotels, Other Accommodation and Travel Agencies around 20 percent, and less than 15 percent in Restaurants and Bars.

The evidence regarding the relation between age and probability of exit is different between sectors. In the Restaurants and Bars only the linear and quadratic terms are significant, in the Transport sector only the quadratic and the cubic terms are significant (but only marginally in the first case). In the remaining activities, Travel Agencies, Hotels, and Other Accommodation we do not observe any term regarding firm age to be significant.

Therefore, in Figure 3, the observed patterns are not identical between activities in terms of the hazard rates <sup>8</sup>. Taking into account Figure 3 we can divide activities into three groups: i) Transports and Restaurants; ii) Travel Agencies, and iii) Bars, Hotels and Other Accommodation.

In the first group we observe higher hazard rates when compared to the other activities and a clear decreasing pattern (from around 12 percent in the first year to 8 percent at age 10 and close to 5 percent after 20 years in the market). The second group presents a stable but slightly increasing path (from below 4 percent in the beginning to around 5 at age 10 and 20), and in the last group the hazard rates are pretty much constant over time (around 3 percent).

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8. The analysis is restricted to the years below 20 as some of the industries, in particular Other Accommodation, do not have enough firms after that period to perform a reliable analysis

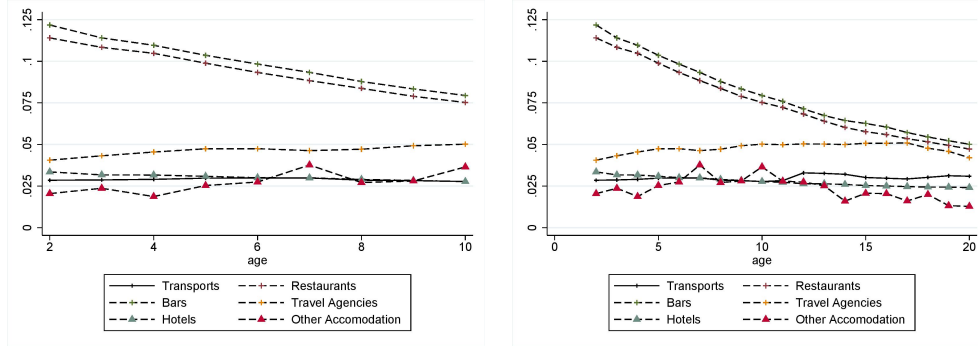


Figure 3: Predicted Hazard Rates

**Notes:** These figures plot the predicted hazard of each group-specific average firm (average firm for models (1) to (6) of Table 8). Panel 1 displays 10 years of life, Panel 2 displays 20.

The results suggest that the firm dynamics in terms of survival is similar between Transport and Restaurants and different from other tourism activities presenting not only a higher likelihood of exiting the market but also a clear decreasing pattern throughout the life-cycle of the firm. In addition, Hotels and Other Accommodation present a similar pattern (also similar to Bars) presenting the lower hazard rates in the sector and a relatively stable pattern overtime. Firms in the Travel Agencies industry are between these two groups in terms of survival but present a slightly increasing trend.

## 5. Concluding Remarks

Consistent with the literature, in the Tourism sector, the probability of survival depends on the financial strength of firms, as firms with larger size, profitability, leverage and with lower leverage have a lower probability of exit. The results suggest that the determinants of firm survival in the Tourism sector are similar to the ones observed for other sectors. However, in terms of firms survival dynamics the empirical results show that tourism firms have on average a higher probability of exit than Manufacturing and Other Services firms during the first 10 years of existence. In contrast, when we compare firms with more than 10 years, the likelihood to exit is lower among firms in the Tourism sector.

Within the Tourism sector's related activities, the empirical results show that the probability of survival is always higher for the best firms in the Mainly Tourism activities, but for the worse performing firms, the survival in the Mainly Tourism activities is only higher in the first 10 years in the market. Furthermore, within the tourism sector, there is clear evidence of heterogeneity. The results indicate that the determinants of the different activities of exiting the market are, indeed,



different. In terms of hazard rates, Transports and Restaurants observe a higher hazard when compared to the other activities but a clear decreasing pattern.

Overall, firms associated with tourism activities, conditional on surviving more than ten years, are more resilient when compared to firms operating in the Manufacturing or Other Services sectors. Despite of being one of the most volatile sectors in periods of high uncertainty, results show a higher survival resilience among established tourism associated firms.

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**Appendix: Additional Summary Statistics**

	2007					2008					2009				
	Manu	Services	Ttour	Mtour	Ptour	Manu	Services	Ttour	Mtour	Ptour	Manu	Services	Ttour	Mtour	Ptour
AGE															
mean	15.99	13.16	17.06	17.25	17.04	16.44	13.42	17.48	17.71	17.45	16.92	13.74	17.92	17.94	17.92
sd	12.76	11.77	15.10	13.59	15.30	12.94	11.87	15.26	13.81	15.45	13.12	12.00	15.42	13.83	15.63
p50	13	9	11	14	10	13	10	11	14	10	13	10	11	14	11
SALES															
mean	12.59	12.01	11.23	12.22	11.09	12.63	12.02	11.28	12.28	11.15	12.62	12.02	11.30	12.25	11.17
sd	1.87	2.03	1.78	2.25	1.67	1.90	2.05	1.78	2.30	1.65	1.90	2.01	1.77	2.36	1.63
p50	12.46	11.99	11.26	12.31	11.17	12.50	12.00	11.30	12.38	11.22	12.50	11.98	11.33	12.38	11.24
ROTA															
mean	5.79	5.72	2.45	1.29	3.91	6.48	5.62	4.05	3.23	5.06	4.83	5.17	2.62	1.75	3.70
sd	9.49	9.96	8.76	6.94	10.43	8.94	9.26	9.18	7.28	10.98	8.68	10.50	8.99	7.46	10.48
p50	4.54	4.74	2.31	1.47	3.27	5.32	4.47	3.87	2.78	4.84	4.58	4.46	2.84	1.40	3.96
DEBT															
mean	12.08	17.41	24.31	25.08	23.34	12.28	17.69	23.05	22.34	23.92	15.35	18.35	23.77	21.99	25.98
sd	16.68	26.66	28.35	26.21	30.79	16.72	26.57	28.95	25.80	32.37	17.54	26.35	29.64	25.66	33.79
p50	3.78	0.06	12.98	15.69	0.17	4.33	0.87	9.66	11.29	0.45	9.45	3.34	8.80	14.23	2.56
FIXED															
mean	29.98	29.69	56.58	57.04	56.02	28.76	29.17	56.54	56.15	57.02	29.30	31.31	57.09	56.47	57.85
sd	18.96	29.96	28.93	29.22	28.56	18.68	29.41	29.53	29.98	28.98	18.88	30.16	29.10	29.04	29.16
p50	26.10	18.10	61.88	63.62	60.06	22.96	19.63	59.24	58.45	61.69	23.49	20.65	62.71	61.99	62.71
N	29018	104735	22743	2706	20037	28963	107263	22893	2742	20151	28503	108078	22880	2795	20085
Age upon death															
mean	13.03	9.70	11.29	13.71	11.08	12.98	10.14	10.91	16.62	10.49	14.02	10.43	11.79	14.14	11.58
sd	11.11	9.58	11.96	10.42	12.07	11.43	9.85	11.90	16.45	11.39	12.35	10.05	12.33	11.12	12.42
p50	9	7	7	12	7	9	7	7	12	7	9	7	7	13	7
N	1,623	6,658	1,391	111	1,280	1,924	7,608	1,508	104	1,404	1,838	7,373	1457	120	1,337

Table A1. **Summary Statistics**  
Yearly Part 1

	2010					2011					2012				
	Manu	Services	Ttour	Mtour	Ptour	Manu	Services	Ttour	Mtour	Ptour	Manu	Services	Ttour	Mtour	Ptour
AGE															
mean	17.42	14.15	18.40	18.41	18.40	17.87	14.54	18.82	18.72	18.84	18.16	14.84	19.22	18.83	19.28
sd	13.28	12.12	15.58	14.03	15.79	13.42	12.24	15.75	14.14	15.97	13.59	12.38	15.91	14.24	16.14
p50	14	10	12	15	12	14	11	13	16	12	15	12	13	16	13
SALES															
mean	12.54	11.97	11.29	12.19	11.17	12.57	11.99	11.31	12.17	11.18	12.52	11.92	11.28	12.04	11.17
sd	1.86	1.97	1.75	2.28	1.63	1.87	1.94	1.74	2.25	1.62	1.91	1.94	1.77	2.37	1.63
p50	12.41	11.93	11.33	12.31	11.24	12.43	11.94	11.35	12.26	11.26	12.38	11.85	11.32	12.17	11.23
ROTA															
mean	3.60	4.79	1.94	0.50	3.82	4.59	4.71	1.29	-0.12	3.40	4.08	3.17	0.23	-0.68	1.54
sd	11.00	9.73	8.62	6.39	10.58	8.69	8.89	8.79	6.82	10.75	9.17	9.02	10.95	10.86	10.95
p50	3.99	3.75	2.31	0.61	4.17	4.24	3.85	1.28	0.25	3.58	4.16	1.97	1.14	0.44	1.40
DEBT															
mean	17.76	17.93	23.70	23.09	24.50	18.95	21.56	28.61	27.80	29.81	18.98	21.42	29.13	30.17	27.65
sd	18.54	25.16	28.75	25.19	32.83	17.81	23.64	25.24	25.30	25.10	17.94	24.03	25.68	25.97	25.20
p50	14.20	3.14	11.08	15.94	4.13	15.41	12.70	22.58	22.58	29.56	14.21	12.73	26.41	28.13	23.65
FIXED															
mean	29.83	31.79	56.75	56.42	57.18	29.66	20.27	57.35	58.46	55.71	29.78	20.17	56.84	58.49	54.49
sd	19.27	30.74	29.51	29.25	29.84	19.02	27.21	28.95	28.45	29.60	19.28	27.24	29.02	29.45	28.23
p50	23.87	21.61	61.29	60.70	61.48	28.00	8.59	64.05	64.05	63.96	27.99	8.09	62.49	61.61	66.83
N	27879	107861	22726	2802	19924	27598	108696	22820	2859	19961	27334	109108	22613	2914	19699
Age upon death															
mean	14.24	10.82	11.70	15.64	11.38	15.50	11.44	12.72	16.48	12.41	15.15	12.06	13.83	15.99	13.65
sd	12.33	10.33	12.23	13.74	12.05	13.23	10.73	13.46	15.66	13.22	12.75	11.30	13.77	13.35	13.79
p50	10	8	7	12	7	11	8	8	12	8	12	9	10	13	9
N	1,469	6,372	1183	87	1,096	1,650	7,084	1525	117	1408	1485	6743	1514	115	1399

Table A1. **Summary Statistics**  
Yearly Part 2

	2013					2014					2015				
	Manu	Services	Ttour	Mtour	Ptour	Manu	Services	Ttour	Mtour	Ptour	Manu	Services	Ttour	Mtour	Ptour
AGE															
mean	18.50	15.17	19.58	18.86	19.69	18.58	15.22	19.49	18.43	19.67	18.66	15.35	19.36	17.75	19.64
sd	13.78	12.50	16.11	14.43	16.35	14.04	12.62	16.33	14.67	16.58	14.20	12.71	16.49	14.82	16.74
p50	15	12	14	16	14	15	13	15	15	14	15	13	15	15	15
SALES															
mean	12.46	11.84	11.17	11.93	11.05	12.42	11.78	11.10	11.77	10.99	12.43	11.79	11.13	11.64	11.04
sd	1.94	1.96	1.75	2.36	1.61	1.99	2.00	1.86	2.54	1.71	1.98	1.99	1.91	2.72	1.71
p50	12.32	11.78	11.17	12.06	11.08	12.30	11.73	11.12	11.91	11.03	12.30	11.74	11.17	11.86	11.09
ROTA															
mean	3.18	2.67	-0.82	-0.61	-1.14	3.58	3.32	0.78	0.51	1.20	3.68	3.41	1.67	1.03	2.68
sd	9.62	8.51	10.80	7.21	14.56	10.40	8.41	11.80	9.24	15.00	11.16	11.23	12.11	8.51	16.20
p50	3.11	2.30	0.81	-0.05	1.41	3.71	2.30	1.66	0.89	3.56	4.22	3.35	2.05	1.25	2.89
DEBT															
mean	16.18	22.91	30.35	30.67	29.87	18.24	22.84	28.95	31.86	24.31	16.75	23.03	28.27	31.13	23.74
sd	16.90	24.59	28.78	28.43	29.30	18.42	24.69	28.10	29.76	24.53	17.44	25.91	28.52	30.69	24.02
p50	13.10	15.23	24.60	25.30	21.66	12.73	15.97	21.04	24.05	17.53	14.13	13.08	19.39	21.35	17.16
FIXED															
mean	29.67	18.68	56.44	58.67	53.13	28.71	18.56	55.80	59.08	50.56	28.86	19.16	55.46	58.52	50.61
sd	19.33	26.31	29.67	29.86	29.09	19.35	26.41	30.04	30.20	29.03	19.42	26.86	30.61	30.84	29.62
p50	28.21	5.99	62.17	64.03	59.84	27.45	5.44	62.34	66.36	57.03	26.33	5.34	60.58	61.64	58.50
N	27062	109130	22465	3008	19457	27649	111835	22984	3200	19784	28407	114646	23732	3485	20247
Age upon death															
mean	14.99	12.77	13.52	17.01	13.24	15.44	13.02	13.92	15.65	13.77	15.58	13.17	14.29	14.41	14.27
sd	12.49	11.93	13.71	16.34	13.45	14.18	12.37	14.85	14.33	14.90	13.90	12.27	14.08	14.64	14.03
p50	12	9	9	10	9	11	9	9	10	8	11	9	10	10	10
N	1090	5857	1296	95	1201	940	4902	1168	97	1071	989	4904	1144	108	1036

Table A1. **Summary Statistics**  
Yearly Part 3

	Total Tourism						Mainly Tourism						Partly Tourism					
	Avg	Sd	P25	P50	P75	N	Avg	Sd	P25	P50	P75	N	Avg	Sd	P25	P50	P75	N
2007	17.06	15.10	7	11	24	22743	17.25	13.59	7	14	22	2706	17.04	15.30	7	10	24	20037
2008	17.48	15.26	7	11	24	22893	17.71	13.81	8	14	23	2742	17.45	15.45	7	10	24	20151
2009	17.92	15.42	8	11	24	22880	17.94	13.83	8	14	24	2795	17.92	15.63	8	11	24	20085
2010	18.40	15.58	8	12	25	22726	18.41	14.03	8	15	24	2802	18.40	15.79	8	12	25	19924
2011	18.82	15.75	8	13	25	22820	18.72	14.14	8	16	25	2859	18.84	15.97	8	12	25	19961
2012	19.22	15.91	8	13	26	22613	18.83	14.24	8	16	25	2914	19.28	16.14	8	13	26	19699
2013	19.58	16.11	8	14	26	22465	18.86	14.43	8	16	26	3008	19.69	16.35	8	14	26	19457
2014	19.49	16.33	7	15	26	22984	18.43	14.67	7	15	26	3200	19.67	16.58	7	14	26	19784
2015	19.36	16.49	6	15	26	23732	17.75	14.82	5	15	26	3485	19.64	16.74	7	15	26	20247
Total	18.60	15.81	7	13	25	205856	18.22	14.22	8	15	25	26511	18.65	16.03	7	13	26	179345

	Total Tourism						Mainly Tourism						Partly Tourism					
Age group	1 to 5	5 to 10	10 to 20	20 to 30	30 to 40	N	1 to 5	5 to 10	10 to 20	20 to 30	30 to 40	N	1 to 5	5 to 10	10 to 20	20 to 30	30 to 40	N
2007	17.8%	29.0%	22.5%	10.6%	5.5%	22743	16.0%	17.9%	32.6%	19.4%	6.3%	2706	18.0%	30.5%	21.2%	9.4%	5.4%	20037
2008	18.1%	25.9%	24.6%	11.1%	5.7%	22893	15.5%	16.5%	33.2%	19.3%	7.3%	2742	18.5%	27.1%	23.4%	9.9%	5.4%	20151
2009	18.2%	21.2%	28.3%	11.5%	5.9%	22880	15.9%	15.3%	32.8%	19.5%	8.5%	2795	18.6%	22.1%	27.7%	10.4%	5.6%	20085
2010	18.0%	13.2%	35.7%	11.8%	6.4%	22726	15.8%	14.0%	32.8%	19.8%	9.4%	2802	18.3%	13.1%	36.1%	10.7%	6.0%	19924
2011	17.9%	11.6%	36.8%	12.1%	6.6%	22820	15.6%	12.8%	33.9%	19.4%	9.8%	2859	18.2%	11.4%	37.3%	11.1%	6.1%	19961
2012	17.9%	11.4%	36.3%	12.8%	6.6%	22613	16.6%	12.0%	32.7%	20.2%	10.0%	2914	18.1%	11.3%	36.9%	11.7%	6.1%	19699
2013	17.5%	12.1%	35.1%	13.8%	6.5%	22465	16.9%	13.1%	30.9%	20.6%	9.9%	3008	17.6%	11.9%	35.8%	12.7%	6.0%	19457
2014	19.9%	11.5%	33.3%	14.0%	6.5%	22984	20.8%	12.3%	28.2%	20.4%	10.2%	3200	19.8%	11.3%	34.1%	13.0%	5.9%	19784
2015	22.2%	11.2%	31.4%	14.0%	6.6%	23732	25.1%	12.5%	24.5%	20.1%	10.2%	3485	21.8%	11.0%	32.6%	13.0%	6.0%	20247
Total	18.6%	16.3%	31.6%	12.4%	6.3%	205856	17.8%	14.0%	31.1%	19.9%	9.1%	26511	18.8%	16.7%	31.6%	11.3%	5.8%	179345

Table A2. Age Descriptives - Major Groups - Tourism



	Manufacturing						Other Services					
	Avg	Sd	P25	P50	P75	N	Avg	Sd	P25	P50	P75	N
2007	15.99	12.76	7	13	21	29018	13.16	11.77	5	9	17	104735
2008	16.44	12.94	7	13	22	28963	13.42	11.87	5	10	18	107236
2009	16.92	13.12	8	13	23	28503	13.74	12.00	5	10	18	108078
2010	17.42	13.28	8	14	23	27879	14.15	12.12	6	10	19	107861
2011	17.87	13.42	8	14	24	27598	14.54	12.24	6	11	19	108696
2012	18.16	13.59	8	15	25	27334	14.84	12.38	6	12	20	109108
2013	18.50	13.78	8	15	25	27062	15.17	12.50	6	12	20	109130
2014	18.58	14.04	8	15	26	27649	15.22	12.62	6	13	21	111835
2015	18.66	14.20	8	15	26	28407	15.35	12.71	6	13	21	114646
Total	17.60	13.49	8	14	24	252413	14.41	12.28	6	11	19	981325

Age group	Manufacturing						Other Services					
	1 to 5	5 to 10	10 to 20	20 to 30	30 to 40	N	1 to 5	5 to 10	10 to 20	20 to 30	30 to 40	N
2007	16.0%	23.8%	30.2%	17.0%	7.7%	29018	25.7%	24.4%	29.8%	11.5%	4.4%	104735
2008	16.2%	22.4%	29.2%	18.3%	8.2%	28963	25.4%	23.5%	29.8%	12.4%	4.6%	107236
2009	16.5%	21.1%	28.4%	19.5%	8.7%	28503	25.3%	22.4%	29.9%	13.3%	4.8%	108078
2010	16.3%	14.0%	34.0%	19.8%	9.6%	27879	24.3%	19.4%	32.8%	13.8%	5.3%	107861
2011	15.8%	12.0%	35.4%	20.2%	10.1%	27598	23.3%	17.3%	34.8%	14.4%	5.7%	108696
2012	16.2%	12.0%	34.0%	20.9%	10.0%	27334	22.5%	17.3%	34.6%	15.3%	5.7%	109108
2013	15.9%	12.6%	33.0%	21.2%	10.1%	27062	21.5%	17.6%	34.2%	16.1%	5.9%	109130
2014	17.9%	11.9%	31.2%	21.4%	10.2%	27649	23.1%	16.4%	33.2%	16.6%	6.0%	111835
2015	19.1%	11.6%	30.1%	20.9%	10.6%	28407	24.0%	15.6%	32.4%	16.8%	6.3%	114646
Total	16.7%	15.8%	31.7%	19.9%	9.5%	252413	23.9%	19.3%	32.4%	14.5%	5.4%	981325

Table A3. Age Descriptives - Major Groups - Non Tourism

	Transports						Restaurants						Bars					
	Avg	Sd	P25	P50	P75	N	Avg	Sd	P25	P50	P75	N	Avg	Sd	P25	P50	P75	N
2007	18.92	16.36	7	8	40	6150	15.53	14.45	5	11	21	7424	17.12	15.21	6	13	22	6065
2008	19.79	16.44	8	9	41	6097	15.78	14.62	5	11	21	7523	17.33	15.36	6	13	23	6118
2009	20.58	16.50	9	10	42	6046	16.12	14.82	5	11	22	7532	17.72	15.62	6	13	24	6088
2010	21.21	16.57	10	11	43	6005	16.45	14.98	6	12	22	7516	18.24	15.83	6	14	25	5976
2011	21.93	16.68	11	12	44	5953	16.83	15.17	6	12	23	7580	18.58	16.03	6	14	25	5980
2012	22.58	16.74	12	13	45	5898	17.22	15.37	6	12	23	7468	18.88	16.23	6	15	26	5875
2013	23.10	16.87	13	14	46	5799	17.65	15.63	6	13	24	7381	19.18	16.44	6	15	26	5819
2014	23.78	17.02	14	15	47	5729	17.50	15.78	6	13	24	7575	18.83	16.68	6	14	27	5998
2015	24.41	17.13	15	16	48	5644	17.23	15.89	5	13	24	7957	18.78	16.84	5	14	27	6120
Total	21.77	16.79	9	13	42	53321	16.70	15.22	6	12	23	67956	18.29	16.05	6	14	25	54039

	Transports						Restaurants						Bars					
Age group	1 to 5	5 to 10	10 to 20	20 to 30	30 to 40	N	1 to 5	5 to 10	10 to 20	20 to 30	30 to 40	N	1 to 5	5 to 10	10 to 20	20 to 30	30 to 40	N
2007	4.0%	58.0%	4.3%	0.4%	1.4%	6150	25.7%	19.5%	27.8%	12.4%	7.2%	7424	22.8%	16.4%	29.3%	14.6%	7.5%	6065
2008	4.1%	49.7%	12.7%	0.4%	0.8%	6097	25.9%	18.6%	27.6%	13.1%	7.4%	7523	23.5%	15.6%	28.3%	15.2%	7.8%	6118
2009	4.7%	34.1%	28.0%	0.3%	0.8%	6046	25.6%	18.0%	27.3%	13.8%	7.6%	7532	23.4%	15.6%	27.3%	15.7%	7.9%	6088
2010	5.7%	6.6%	55.0%	0.4%	0.7%	6005	24.9%	16.7%	28.2%	14.2%	7.9%	7516	22.5%	14.8%	27.1%	16.1%	9.1%	5976
2011	6.3%	3.8%	57.6%	0.4%	0.8%	5953	24.2%	15.6%	29.2%	14.6%	8.1%	7580	22.2%	13.6%	27.6%	16.8%	9.0%	5980
2012	6.4%	4.0%	57.3%	0.9%	0.7%	5898	23.7%	15.2%	28.9%	15.3%	8.0%	7468	22.1%	13.4%	26.7%	17.4%	9.2%	5875
2013	7.0%	4.9%	55.6%	1.7%	0.7%	5799	22.4%	15.7%	28.4%	16.4%	7.9%	7381	21.4%	13.8%	25.7%	18.7%	9.1%	5819
2014	7.5%	5.2%	54.3%	2.5%	0.5%	5729	24.4%	14.9%	27.3%	16.3%	7.8%	7575	25.0%	12.5%	24.0%	18.5%	8.7%	5998
2015	7.8%	5.4%	53.6%	3.0%	0.5%	5644	27.5%	13.6%	25.5%	16.1%	7.7%	7957	26.3%	12.3%	23.1%	17.8%	8.8%	6120
Total	5.9%	19.5%	41.6%	1.1%	0.8%	53321	24.9%	16.4%	27.8%	14.7%	7.7%	67956	23.3%	14.2%	26.6%	16.8%	8.5%	54039

Table A4. **Age Descriptives - Minor Groups - Part 1**

	Travel Agencies						Hotels						Other Accom.					
	Avg	Sd	P25	P50	P75	N	Avg	Sd	P25	P50	P75	N	Avg	Sd	P25	P50	P75	N
2007	15.06	12.39	6	12	22	708	19.72	14.47	9	17	26	1588	10.56	8.37	6	9	12	346
2008	14.96	12.55	6	12	21	742	20.50	14.67	10	18	27	1582	11.04	8.49	7	10	13	351
2009	15.15	12.57	6	12	20.5	756	20.76	14.67	10	18	28	1606	11.36	8.81	6	10	14	368
2010	15.65	12.69	6	12	20	750	21.42	14.88	11	19	29	1593	11.56	9.06	6	10	15	387
2011	15.85	12.74	6	12	20	763	22.01	15.02	11	19	29	1602	11.48	8.73	5	10	15	425
2012	16.01	12.59	6	13	21	758	22.55	15.20	12	20	30	1575	11.51	9.17	5	11	15	507
2013	15.75	12.81	6	12	21	797	22.89	15.36	12	21	30	1580	11.78	9.64	4	11	16	555
2014	15.31	12.96	5	12	21	868	22.83	15.74	11	21	30	1581	12.02	10.40	4	10	17	668
2015	14.92	12.93	5	11	21	935	22.81	15.71	11	21	30	1496	12.57	12.69	3	8	18	964
Total	15.40	12.70	6	12	21	7077	21.71	15.12	11	19	29	14203	11.72	10.08	5	10	15	4571

Age group	Travel Agencies						Hotels						Other Accom					
	1 to 5	5 to 10	10 to 20	20 to 30	30 to 40	N	1 to 5	5 to 10	10 to 20	20 to 30	30 to 40	N	1 to 5	5 to 10	10 to 20	20 to 30	30 to 40	N
2007	23.3%	18.4%	30.9%	17.7%	3.7%	708	12.0%	15.1%	31.1%	22.7%	8.9%	1588	20.2%	30.3%	42.2%	5.2%	0.6%	346
2008	24.9%	17.5%	31.1%	15.9%	4.4%	742	10.7%	13.5%	31.4%	23.5%	10.1%	1582	18.2%	28.8%	44.7%	6.0%	0.9%	351
2009	24.3%	16.9%	33.2%	13.6%	6.2%	756	11.1%	12.0%	30.6%	24.3%	11.2%	1606	20.1%	27.2%	42.1%	7.9%	1.4%	368
2010	22.9%	16.7%	34.0%	13.5%	6.7%	750	10.7%	10.7%	30.1%	24.9%	12.6%	1593	22.7%	23.0%	42.9%	8.3%	1.8%	387
2011	20.6%	18.6%	34.5%	12.7%	7.7%	763	10.2%	9.4%	30.6%	25.3%	12.7%	1602	27.3%	16.0%	46.1%	7.5%	2.1%	425
2012	19.0%	19.3%	33.5%	13.1%	9.5%	758	10.7%	8.3%	29.6%	26.4%	12.6%	1575	31.2%	13.8%	41.8%	10.1%	1.8%	507
2013	21.1%	19.6%	30.5%	13.8%	9.3%	797	10.2%	9.4%	27.7%	27.2%	12.8%	1580	30.6%	15.0%	40.9%	10.3%	1.8%	555
2014	25.3%	18.5%	26.4%	14.6%	9.7%	868	12.7%	8.8%	25.9%	26.8%	13.2%	1581	34.4%	12.7%	36.1%	12.3%	2.7%	668
2015	28.1%	17.8%	24.7%	15.1%	9.5%	935	13.8%	8.9%	23.3%	27.5%	14.4%	1496	40.0%	13.1%	26.1%	13.3%	3.8%	964
Total	23.4%	18.1%	30.7%	14.4%	7.5%	7077	11.3%	10.7%	29.0%	25.4%	12.0%	14203	29.7%	18.1%	38.3%	9.8%	2.2%	4571

Table A4. Age Descriptives - Minor Groups - Part 2

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