"Incubated early stage startuppers and their initiatives in Athens during the Crisis (2010-2016)"
by

Ioannis Besis and Ioanna Sapfo Pepelasis

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Ioannis Besis[1] and Ioanna Sapfo Pepelasis[2]

Abstract

This paper is based on a unique dataset that contains sixteen key socio-economic indicators for 443 early stage startuppers and their 255 incubated early stage initiatives/startups in Athens throughout the crucial years of 2010-2016-a period during which the Greek economic crisis was deepening. It maps the key features of this nascent ecosystem and its drivers. This ecosystem was flexible and responded to changing conditions over this seven year period. Incubated startuppers were on the whole young, well educated, cosmopolitan and well rounded (had diversity in skills). As for incubated startups they consisted largely of advanced business activities/processes, b2c was important but b2b was also quite widespread and a little over one in ten was based abroad. Finally, in accordance to the international literature and wider policy expectations regarding the startup ecosystem at the moment in Greece, this paper examines the special features of two subcohorts of initiatives: 'survivors' and 'those that had customers abroad'.

Keywords: demography, entrepreneurship, startuppers, early stage initiatives, socio-economic indicators, drivers of success, incubators, Economic Crisis, Athens.

JEL Classification: Y10, M13, L26, 052, 033, L29

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1. Introduction

In the years following the outbreak of the economic Crisis in Greece in 2009, a new outward looking and innovative enterprise enclave emerged. Intrigued by this development, in 2016, we started collecting material on a 'big' unknown: the ecosystem of incubated startups and with the financial assistance of two AUEB funded programs we have constructed a unique dataset that specifically contains a total of sixteen key socio-economic indicators for the 443 early stage startuppers and their 255 initiatives[3] hosted in the seven most seminal incubators in Athens throughout the crucial years of 2010-2016-a period during which the economic Crisis was deepening.

Our work fills an important gap in the literature. Our substantial data base and variety of socioeconomic indicators as noted above, in addition to our: evolutionary/annual perspective, examination of two important subgroups and combination of qualitative and quantitative methodology (see Section 4) allow for an in depth analysis of the early stage startup ecosystem, our purpose being to understand its drivers.

This study is indeed timely:

The 2019 STARTUP HEATMAP EUROPE shows that in spite of an improving economic climate, around forty percent of startuppers eventually leave the country in order to evolve entrepreneurially and this share is substantially higher than what is the case in other countries of Southern Europe. We hope to contribute towards informing the debate on policy actions necessary for a reversal of the brain drain and the further dissemination of an innovative extrovert business ecosystem which is recognized by all today as a sine qua non for a sustainable and tenable path of economic development for Greece.

We have organized our paper as follows: Section 2 reviews the international and Greek literature. Section 3 briefly presents the incubators/hosts that appear in our study. Sources, data base construction and methodology are discussed in Section 4. Sections 5 and 6 present on the basis of descriptive statistics the findings for the total data set and two subcohorts of initiatives/startups: survivors and those that had customers abroad. Section 7 consists of a univariate analysis of the two subcohorts by Spiros Paraskevas[4]. Section 8 discusses the subcohort findings of the descriptive statistics vis a vis the univariate analysis. Section 9 is the epilogue.

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[3] In this paper we use the terms initiative, startup, firm interchangeably.
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2. Literature Review

2.1. International Literature

As mentioned above our data base exclusively consists of incubees. The functions of incubators as organizations and how they impacted startups has attracted the attention of the international literature (indicatively see: Mian (1996); Albort-Morant and Ribeiro-Soriano (2016)). As for early stage startuppers and their initiatives, this is a well-researched topic in the rich and disparate literature. For the organization of our data base and the selection of indicators we have selectively consulted this   as well as the literature on Greece (see below).

There are plenty studies linking entrepreneurship/startups to economic growth as for example, Tortella & Quiroga (eds) (2013) and Cassis & Pepelasis Minoglou (2006). Some studies in particular have focused on what drives success/ survival: Astebro & Bernhardt (2003) examines the relation between the survival of new small businesses and bank loans. They have collected a sample of small businesses launched in 1987 in the United States and investigate their survival in 1991. They have found that there is a negative correlation between having a bank loan and business survival, but a positive correlation between having a non-bank loan and survival. Nicolò and Nania (2017) explore Italian firms that were established from 2009 to 2011 and they found that companies with strong capitalization have high survival rates at a five-year period. Cefis and Marsili (2003) use a non-parametric approach to estimate the probability of survival of firms in Netherlands. They suggest that innovation affects positively the firms' survival and young firms are most exposed to the risk of exit. However, in the long term, they benefit most of innovation to survive in the market. Finally, Cook et al. (2012) examine the survival patterns of new firms for the period 2009-2011 and their findings revealed "the odds of a firm surviving from year one to year two appear to be no better than the odds of them surviving from inception to year one".

Other studies discuss startups in relation to internationalization:

For example, Coeurderoy et al. (2012) construct a dataset for young firms in UK and Germany and investigate the determinants of internationalization and firm survival. Their findings indicate that young firms are more likely to survive when they pursue an internationalization strategy based on resource consolidation. Cavusgil & Knight (2015) analyze the "born global" phenomenon of early stage companies and its importance. This study links the rise of "born globals" to the contemporary global business environment. It also underlines that technological development may be a catalyst for

further enhancement in the internalization process of young firms. Finally, Burgel & Murray (2000) analyzed 398 export decisions taken from a UK survey of 246 technology based startups with international activities in order to determine the modes of foreign market entry and which the reasons for their choices are.

2.2. Literature on Greece

Turning to the existing literature on the new local startup ecosystem in Greece, it is divided in two interrelated strands. The first strand focuses on incubators and technology parks as organizations and the second strand examines startuppers and/or their initiatives. This strand is only indirectly linked to our topic, the following academic research has been undertaken: Bakouros, Mardas & Varsakelis, (2002) and Sofouli and Vonortas (2007) provide a history of the genesis and development of science & technology parks and business incubators prior to the Crisis. Another study, that of Ratinho and Mitsopoulos (2017), examines five of the emerging incubators in Greece during the Crisis and their models of support.

Regarding the second strand it focuses on startups. Apart from articles in the local and international press (See references to some of these in Pepelasis and Protogerou, 2018), research has been conducted by a variety of organizations. Notably, the annual Global Entrepreneurship Monitor (GEM) surveys on Greece conducted by the Foundation of Economic and Industrial Research provide demographic data on early stage entrepreneurs, qualitative data on their initiatives and the national entrepreneurial environment. The seed stage fund MARATHON VC (www. Marathon.vc) has referred to investments in Greek Startups for the period of 2010-2016, (Gasteratos, 2017) some characteristics of founders (2018) (education level, age, work experience, previous role) and the investments and exits of successful Greek startups (Gasteratos, 2019). Enterprise Greece (2019), the official agency of the Greek State to promote investment in Greece, has written on the startup ecosystem by providing data about the most funded Greek Startups and Exits, as well as the importance of the new available funding tools that use Equifund (Public-Private Partnership created through European and national funds) to help the Greek Startups grow. In addition, the technology hub Found.ation and the European digital innovation and entrepreneurial education organization EIT Digital (2019) examined the characteristics of pre-seed and seed stage Greek startups (those startups that either maintain the headquarters in Greece or one of its founder is a Greek citizen) while also providing a general view on the incubation ecosystem of startups.

Furthermore, the well-known consulting firm BCG (Athens Office) published a paper (2018) examining the obstacles to boost local entrepreneurship.

As for academic research it has focused on other issues, not strictly or exclusively connected to startups such as for example the rise of creative industries (Protogerou *et al.*, 2015) and the new entrepreneurship model (Pepelasis and Protogerou,2018). There is an obvious gap in the academic literature in studying exclusively the startup ecosystem during the Crisis years. However, we should note the following studies which are of some interest: An unpublished empirical survey at the Laboratory of Industrial and Energy Economics at NTUA (Lambropoulos, 2015) charts in a power point the features of 77 startups from 2010 to 2015 based on a questionnaire sent to the founders with purpose to analyze the characteristics of startups and incubators and to propose actions to improve the services of the existing incubators. In addition, there are also four articles that focus on startups for the pre-Crisis period: The structured survey article of Kanellos (2013) that has examined knowledge based entrepreneurship in high technology young firms between 2000 and 2010; Vlachos (2016) which examines the determinants of self-employment/creating start-ups from an occupational choice point of view, means entering into self-employment for 2001-2008 analyzed on the basis of a logit model; and lastly, the article of Vliamos & Tzeremes, (2011) that examines through nonparametric techniques, the factors influencing the entrepreneurial process, entrepreneurial characteristics and motives in new business formation in central Greece (the region of Thessaly) on the basis of 164 questionnaires for the pre-crisis period. Vlachopoulou, Ziakis and Petridis examined some of the characteristics of Greek Startups, their success factors and their interaction with the startup ecosystem in Greece. We have constructed a detailed table (see Appendix 4) in which all the studies that concerned Greek Startups are presented in terms of their database, time period covered, basic questions and overlapping points with our work.

Finally, indirectly connected to the theme of startups is the study of Apergis and Fafaliou (2014) who collected data from 1,500 students from 2005 to 2010 in order to examine the factors that influence Greek University students to shift into establishing a new business venture.

In a nutshell, there is an interesting and diverse international literature on entrepreneurship and startups, but for the case of Greece there are important gaps in knowledge on the subject. We aim to fill part of this gap with our analysis as noted in the introduction.

3. The Selected Incubators

As we exclusively examine incubated startuppers/initiatives it is important that we provide some background information on this form of organization. The incubator ecosystem that has emerged in Greece during the crisis was preceded by failed attempts of the state from the 1990s onwards to support startups and knowledge based business through the creation of science and technology parks (Sofouli and Vonortas 2007 and Bakouros, Mardas, & Varsakelis, 2002).

During the period under review the Athenian business incubation ecosystem consisted of a total of fifteen incubators and there was diversity among them in terms of their, institutional setting/embeddedness and their primary emphasis. The seven selected incubators for our sample satisfied the following three criteria: they were all situated in Athens, not sector based and were exclusively focused on early stage startups. A brief description of each of these incubators follows on the basis of information drawn from their websites. They were all established between 2010 and 2014 and we list them in alphabetical order.

- Acein (est. 2014) is based at AUEB the largest Greek business school and a major strategic goal is the transfer of technology from academia to business.
- EGG (est.2013) is the incubator of Eurobank (one of the four largest bank in Greece) that also acts as an accelerator that provides equity funding to startups.
- Ekinisi Lab (est. 2014) is the incubator of the Hellenic Federation of Enterprises and it differs from the other incubators in that it has a presence not only in Athens but also in two other prominent port cities: Heraklion in Crete and Volos in Thessaly.
- Iqbility (est. 2013) belongs to the IT based business group Quest Holdings and it provides pre seed financing via equity funding.
- MIT Enterprise Forum Greece (est. 2013), is a chapter of the global MIT Enterprise Forum founded "by a group of entrepreneurs and business professionals with strong engineering backgrounds. It focuses on rapidly transforming ideas of the local scientific/engineering community into world-changing companies".
- NBG Business Seeds (est.2010) is based at the National Bank of Greece, (the country's oldest and largest bank) and it fosters new business initiatives that are "innovative and export-oriented" while also providing financial support.

- Orange Grove (est.2013) is an initiative of the Embassy of the Kingdom of the Netherlands in Athens and it describes itself as "an international incubator offering support to innovative entrepreneurs around Greece".

Among these seven incubators, Egg had hosted the largest number of startups, while Iqbility had the lowest number.

There were also eight other organizations in Athens at the time assisting startuppers and their initiatives but we do not include them in our sample for a number of reasons: Either because they were smaller than those we selected; and/or they were sector-based and/or were difficult to categorize as they came under several umbrellas (eg. VCs, Accelerators, Co-working spaces etc.); and/or the names of the startups were not available in their website; and/or they focused on medium stage start-ups.

These organizations are: Corallia (2005) and Metavallon (2011); Aephoria.net (2013); ID-GC (2013); Invent ICT (2016); Innovathens (2014); Microsoft Innovation Center (2008); The Athens Startup Business Incubator (TH.E.A) (2014).

4. Sources, Data base Construction and Methodology

4.1. Sources

It is not possible to gauge through national statistics the demographics and key indicators of startuppers and their initial stage ventures. Thus, in order to construct our sample we resorted to the websites of the seven seminal at the time incubators situated in Athens that focused on providing services to early stage startuppers.

In addition, in order to enrich our information on incubees we also consulted the following sources: the web sites of start-ups; social media sites (LinkedIn, Facebook); and articles/interviews in the press on start-uppers and their enterprises. We also gathered some information from questionnaires sent to startuppers-'incubees'. One caveat is necessary here: The examination here of only early stage incubated entrepreneurship entails a hidden bias in our results as those who seek out incubation are aspiring entrepreneurs who are perhaps best informed and educated.

4.2. Database Construction and Methodology

As already mentioned above, our methodology is that of descriptive statistics analysis; our ultimate purpose being to understand the main features and drivers of success of early stage startup(er)s in the Greek incubation ecosystem.

There were certain difficulties regarding the construction of the sample. Notably, a feature of the incubated early stage startup ecosystem is that often one initiative would receive incubation from more than one incubator (i.e. two or more rarely three incubators). For this reason, in such cases in order to avoid double counting we took into consideration only the first incubator 'visited' (This was around 20% of our sample of incubated enterprises).

At one stage an attempt was made with two colleagues to add a probit model to our statistical survey in order to grasp quantitatively survival (See Poster, Pepelasis, Besis, Bournakis and Papanastassiou, 2019). By definition modeling has some constraints given the qualitative nature of the indicators and at this time until we collect more data (see Epilogue) we refocus on our initial direction of analysis, namely that of a statistical survey (Sections 5 and 6). However, for the two startup subcohorts we have selected at this stage (survival and customers abroad, see below in this Section) in addition to descriptive statistics we also include a filter based selection method (univariate analysis) by Spiros Paraskevas (Section 7).

Our data base consists of 443 individual entrepreneurs and their first stage 255 incubated young enterprises (nascent ventures) and we examine in total sixteen socio-economic indicators. These indicators are divided in two groups:

The first group consists of seven startupper/founder specific indicators:

1. Age
2. Gender
3. Level of education
4. Field(s) of education
5. Variety in skills: Whether the there was a diversity between the founders graduate and post graduate degrees
6. Whether the company sector is related to the founder's education
7. Whether the founder has experience abroad. (By experience abroad we mean that the founder has worked abroad for at least one year).

The second group consists of nine startup/firm specific indicators:

1. Geographical Location
2. Business Sector
3. High Tech vs Low Tech goods (High Tech companies we measure those which are in the categories of software, hardware, robotics, Internet of Things (IoT),

analytics, Augmented Reality, biotechnology, gamification, fintech and energy and as low tech: agriculture, agro food, architecture, education, fashion, art, event services, music, culture, leisure travel and tourism, maritime, fishing, sports and HR)

4. High Tech vs Low Tech in terms of process of production (As high tech in terms of process we measure those companies which are either high tech or low tech but with an advanced production method).

5. Whether the good offered is a Physical Product or Service

6. Whether the good offered is b2c or b2b

7. Whether the startup has customers abroad

8. Number of founders per startup

9. Whether among the founders there exist relatives. Founders who belong in this category have been detected either because this is obvious (as they have the same last name) or because although they have different last names, it has been stated so in interviews or articles.

For each of the aforementioned sixteen socioeconomic indicators we present our findings both statically (for the period as a whole, 2010-2016) and whenever possible, given data constraints dynamically (per annum), i.e on the basis of the year of date of origin of a project /startup (and not the year of its legal formation).

In order to enrich our analysis, we also embrace the focus of the international literature on two key areas: the drivers of business success and internationalization. For this reason we have also created two cohorts/ subsamples of the total population of the sample.

The first cohort consists of the population of survivors: Namely, those startups that were still in existence in 2018 and we compare the findings for the sixteen socio-economic indicators of this survivor cohort with the findings for the total population of our sample (See Section 7 below). This allows for a 'first understanding' of the drivers of business success in the early stage startup ecosystem during the Crisis given our data constraints. The conventional way of measuring business success is through a variety of metrics in economic performance: sales/turnover, total assets, number of employees etc. But, because we examine first stage startups such a procedure is not possible and so we use startup survival in 2018 as a proxy for success.

The second subsample consists of the population of those startups that had customers abroad. This is the only firm specific indicator for early stage startups that can be used as an indicator of internationalization.

5. Descriptive Statistics: Findings for the total incubated population in our sample

5.1. Basic demographics of the sample

The key demographic observations regarding the sample are:

1) From the total population of startups incubated between 2010 and 2016 a little less than 4% had been established before 2010.[5]

2) The numberof startuppers/founders was almost twice as large as that of initiatives/startups for the period as whole.

3) For both of these indicators as the per annum graphs below depict, up to 2014 inclusive was there a rising trend and that there disruption followed thereafter. However, it is possible that the numbers for the last one or two years may be somewhat underestimated in our sample as occasionally an incubated startup may not seek to start incubation the actual year it is born/established. (This 'strategy' as observed by Ioannis Besis has become rather more apparent over the years with the maturing of the incubation ecosystem.)

Numbers of established startups/initiatives (first column) and founders (second column) for the period 2010-2016 as a whole.

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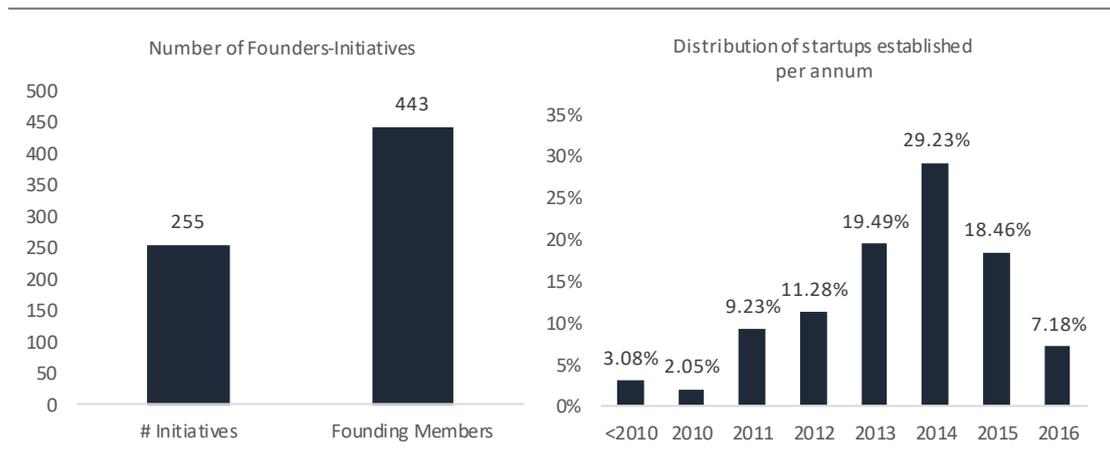
[5] For a brief discussion of the features of this group see Appendix 1.

Number of Founding Members

Year	%
2010	2.56%
2011	9.09%
2012	10.80%
2013	23.58%
2014	23.86%
2015	22.44%
2016	7.67%
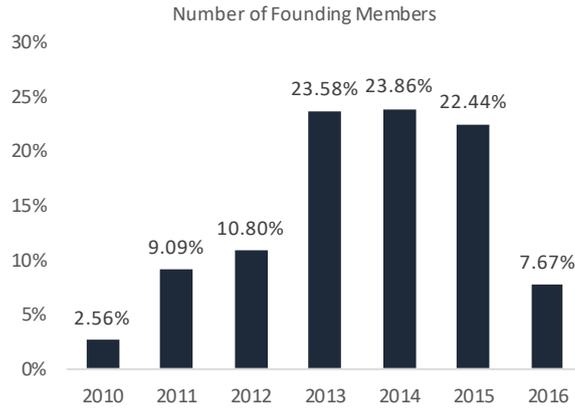
5.2. Socio Economic Indicators

5.2.1. Founder specific indicators

The largest age group among startuppers was the 20 to 29 year olds. On a year to year basis the picture was similar with the exception of 2013 and 2014 during which the 30-39 group held first position.

Distribution of age of founders

Distribution of age per annum
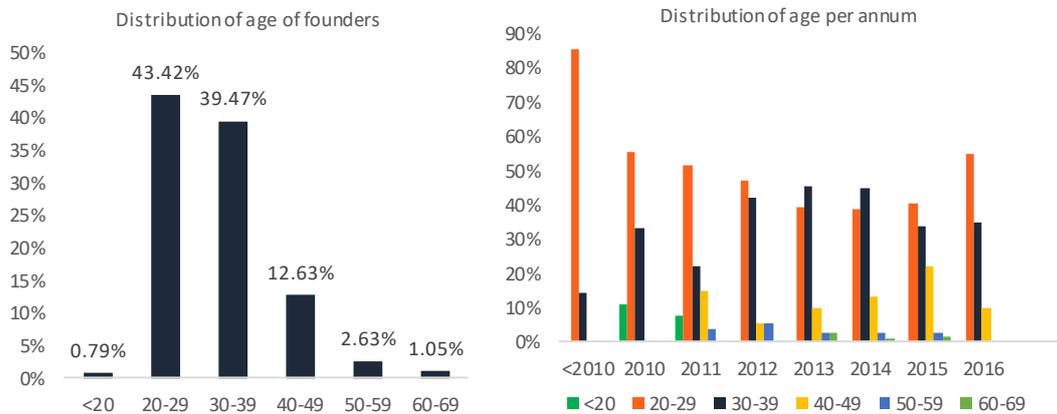
1) Gender

Startuppers were dominantly male as females accounted for a little less than one fourth of the total during the years under review. The share of males in the total population of founders was at its highest in 2010 (89%) and was much lower from 2014 onwards ranging from 68 to 72%. Perhaps females were followers (i.e slower in catching up with this ecosystem). For more information on gender see Appendix 2.

Distribution of gender — Male 75.58%, Female 24.42%

Distribution of gender per annum

	<2010	2010	2011	2012	2013	2014	2015	2016
Female	0.00%	11.11%	18.75%	18.18%	16.67%	32.12%	28.24%	32.00%
Male	100.00%	88.89%	81.25%	81.82%	83.33%	67.88%	71.76%	63.00%
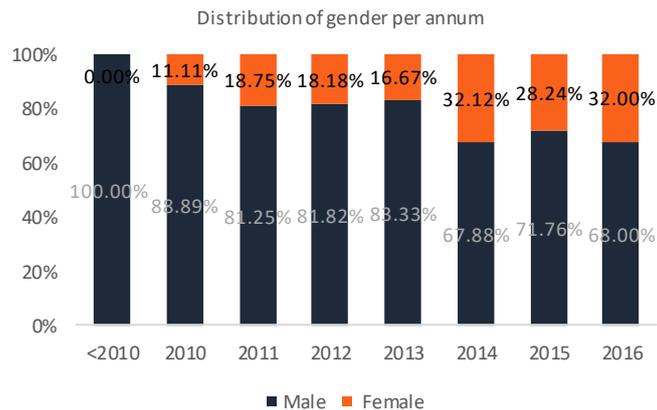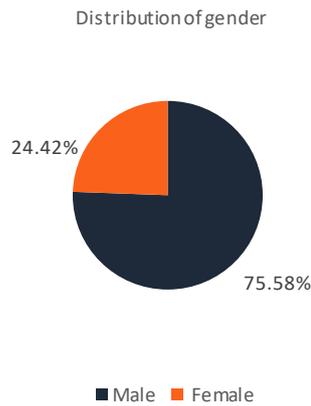
## 2) Level of Education

For the period as a whole, only a miniscule amount of startuppers held simply a secondary level/high school degree. The lion's share of founders were college graduates and M.Sc/Masters degree holders. Within this group, over time there was a rise in the share of college graduates and a fall in the share of Masters Degree holders. The fact that for the period as a whole, PhD students, Post graduate researchers and Professors accounted for 11% of the total shows that the links between startups and academia are not negligible. However, Professors were latecomers to the field as they first appeared as start-uppers in 2013.

Distribution of the level of education and educational / professional status — High School 0.26%, University Student 2.90%, BA/BSc 36.94%, Master 41.16%, PhD Student 3.96%, PhD 7.65%, Postgraduate... 3.17%, Professor 3.96%

Distribution of the level of education and educational / professional status per annum
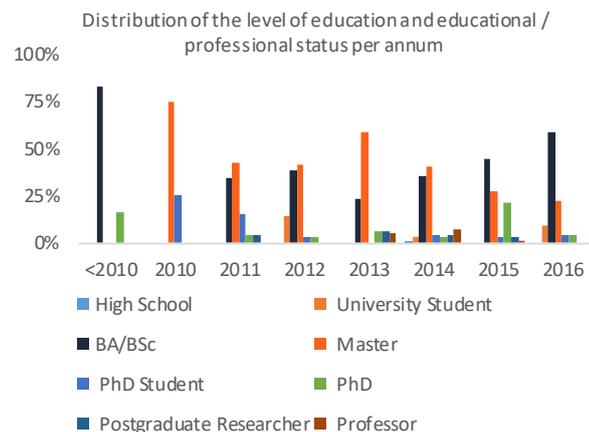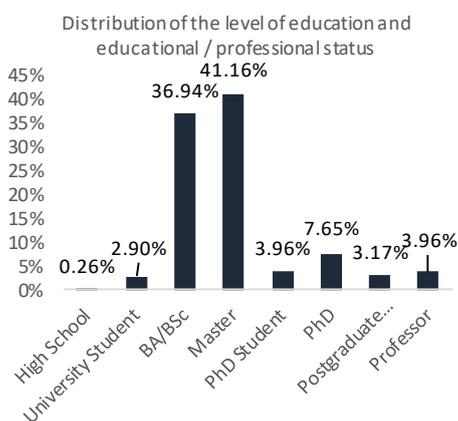
## 3) Field(s) of education

At the undergraduate level of studies, for the period as a whole in order of importance the three fields of engineering, economics and business, and computer science accounted for over 70% of founders.

At the beginning engineering and computer science predominated, whereas by the end of the period economics and business outpaced them and there was a wider variety of

subjects present. The same observations generally hold as with for undergraduate studies with the difference that for the period as a whole economics and business studies held the first position.

BA/BSc
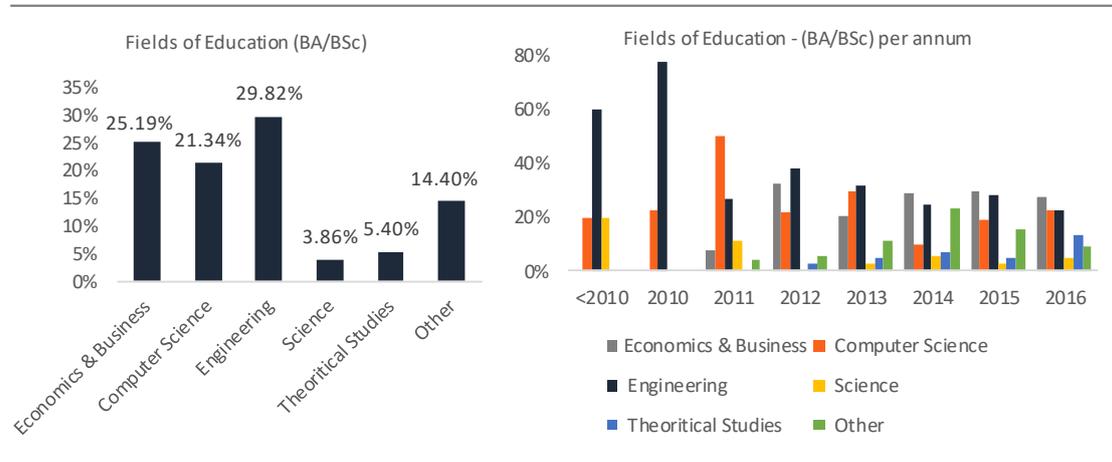
Masters – PhD
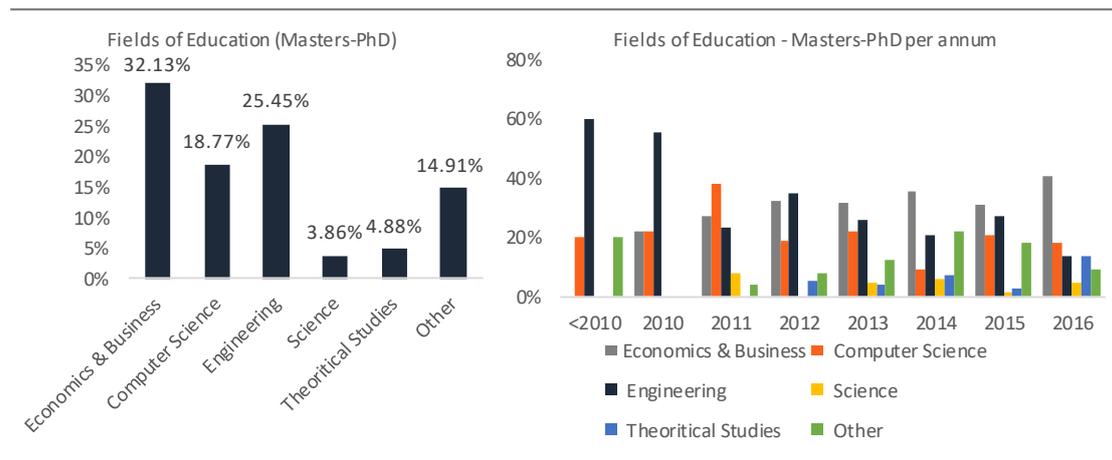
4) Variety of skills (whether there is digression between the undergraduate and graduate studies of founders)

Throughout the period under review nearly 60% of the founding members held a Master's Degree and above. A little over one fourth of this group pursued graduate studies in fields different from their undergraduate specializations.

Notably, this feature was more pronounced at the end of the period. Within the new startup ecosystem this is a 'modern' feature that hopefully might become stronger as today a variety of skills is considered a point of advantage in terms of mindset and secures higher rates of success in career and business according to the literature.

Variety in skills
(digression between undergraduate-graduate studies)

26.02% Yes

73.98% No

■ Yes ■ No

Variety in skills per annum

Year	Yes	No
2010	14.29%	85.71%
2011	40.00%	60.00%
2012	15.00%	85.00%
2013	47.54%	52.46%
2014	27.27%	72.73%
2015	18.75%	81.25%
2016	50.00%	50.00%

■ Yes ■ No
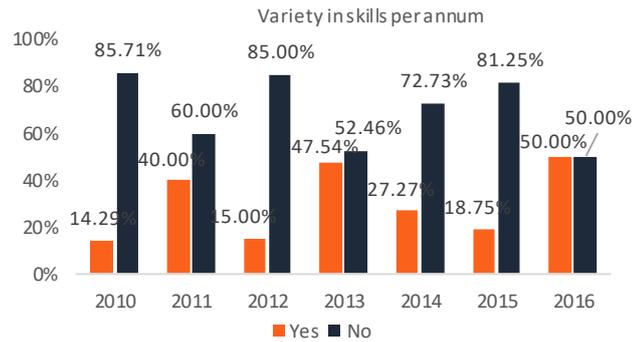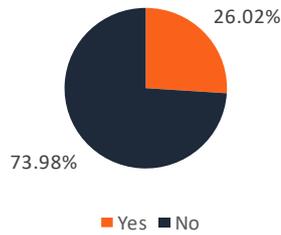
5) Whether the company/startup sector was related to the founder's education

For the period as a whole this was not the case for slightly under half of the founders. Interestingly, there was growing flexibility/open mindness or perhaps a growing absence of opportunities in their fields of specialization- as the share of founders whose education was unrelated to the company sector reached its peak in 2016.

Company Sector related to founder's education

49.60% No

50.40% Yes

■ Yes ■ No

Company Sector related to founder's education per annum

Year	Yes	No
2010	50.00%	50.00%
2011	64.29%	35.71%
2012	40.00%	60.00%
2013	55.26%	44.74%
2014	53.70%	46.30%
2015	57.14%	42.86%
2016	14.29%	85.71%

■ Yes ■ No
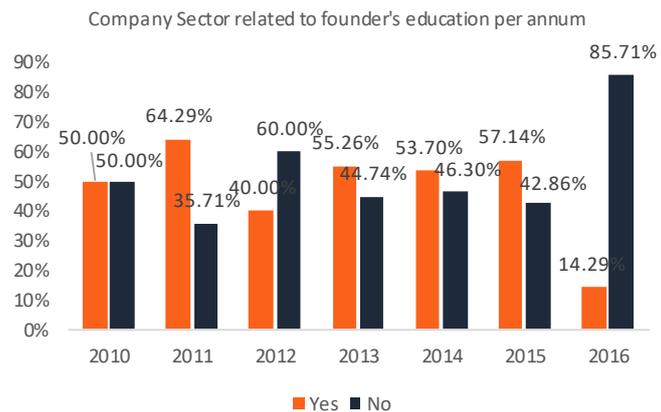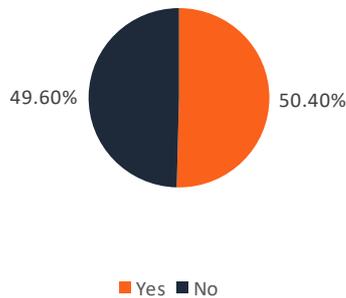
6) Whether the Founder has had Experience Abroad

For the period as a whole about 47% of the founders have had experience abroad. However, there was a rising trend in this indicator only up to 2014. This suggests that after that date Greeks living abroad were more reluctant to move to Greece to set up a startup and/or that startup inclined Greeks living in Greece with experience abroad shifted away from new enterprising.

Experience Abroad

Experience Abroad per annum
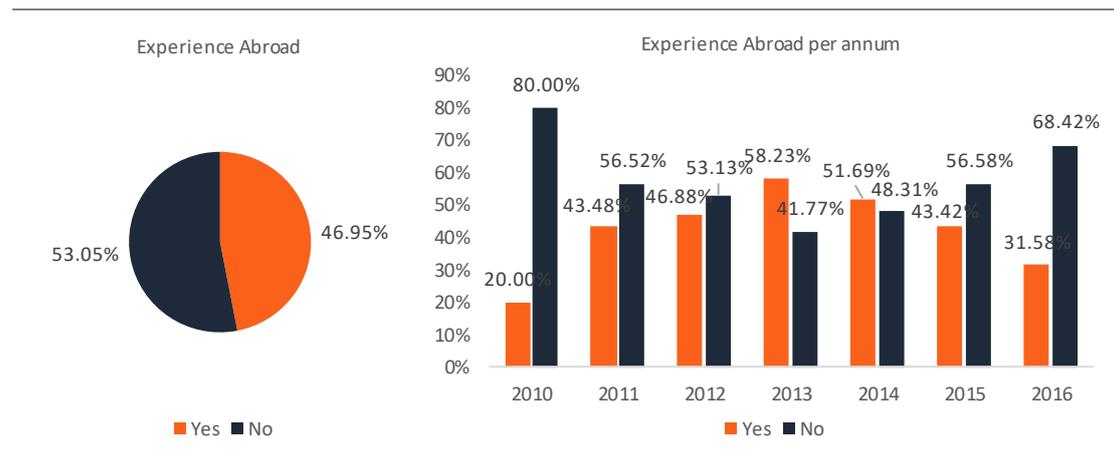
5.2.2. Firm/startup specific indicators

1) Geographical Location

Roughly 80% of the startups had their headquarters in Athens and a little under 7% were established in other areas of Greece: Heraklion and other places in Crete, Ioannina, Kalamata and other locations in Messinia, Mytilini, Thessaloniki, the perfectures of Kilkis, Serres and the city of Trikala.

Interestingly, a little over 13% of the startups were established outside Greece. Especially following the imposition of capital controls some companies in order to be more flexible and for tax reasons established their headquarters abroad while simultaneously maintaining production in Athens. The UK held the first position in this category and in order of importance the following countries followed: USA, Netherlands, Cyprus and Australia. Some of these choices were the outcome of strong ties with long standing Greek expatriate communities and some were related to the geographical dispersion of the brain drain. The choices of the UK and the USA were a product of both factors.

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Location — Location per annum
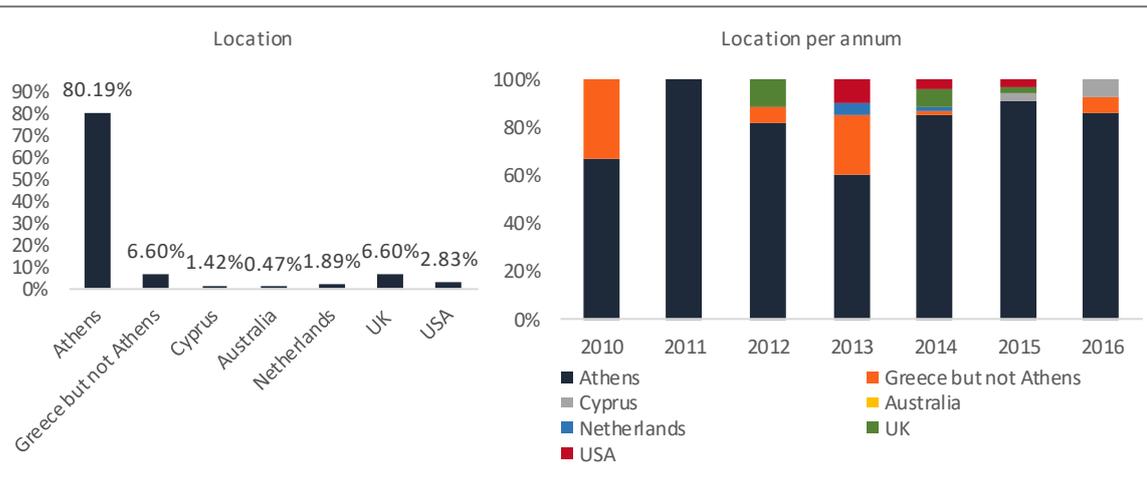
The per annum data show that among the startups established from 2012 onwards some were located in Western Europe. However, in 2016 following the imposition of capital controls the very few startups located abroad were established only in Cyprus. Notably, Cyprus was a new entry in our data base as the first startups of our data base that were located there appeared in 2015. Interestingly nine startups based in Athens had branches abroad. Six had branches in UK, two in Sweden and South Africa and one had a branch in Brazil.

2) Business Sector

The top sector by far was other categories (E-commerce, Digital Marketing, Consulting etc.), hardware-software came second and in the third category (with small differences among them) were: the creative industries, agriculture, leisure and medicine-healthcare. Interestingly, the share of all the above sectors in the GDP of Greece are far lower than their shares in the incubated startup ecosystem. It must also be noted that these sectors (with the exception of agriculture) are newcomers to the Greek business scene and one could argue off springs of the crisis years. The small share of construction can be partly explained by the fact that from being a major sector of the Greek economy before the Crisis, it received a severe blow post 2008.

Regarding change over time it is noteworthy that at the beginning of the period under review software-hardware was by far the largest business sector and in total (including it) only three sectors were important players. In contrast at the end of the period software-hardware had an equal share with the category 'other sectors' and in total six sectors had a significant presence; making therefore for more variety in incubated startups.

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Sector

Sector per Annum
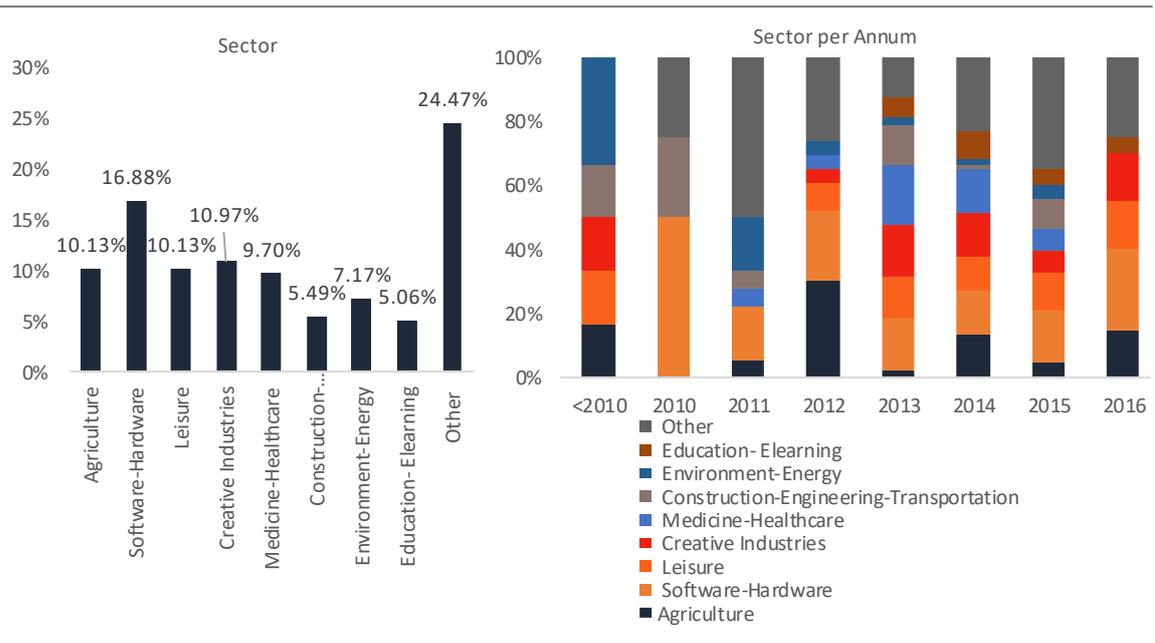
3) High Tech vs Low Tech goods

For the period as a whole low tech goods were predominant. Interestingly at the beginning of the period high and low tech goods were present in equal shares (50/50). By the end of the period the share of low tech was much higher.

High Tech vs Low Tech

High Tech vs Low Tech per annum
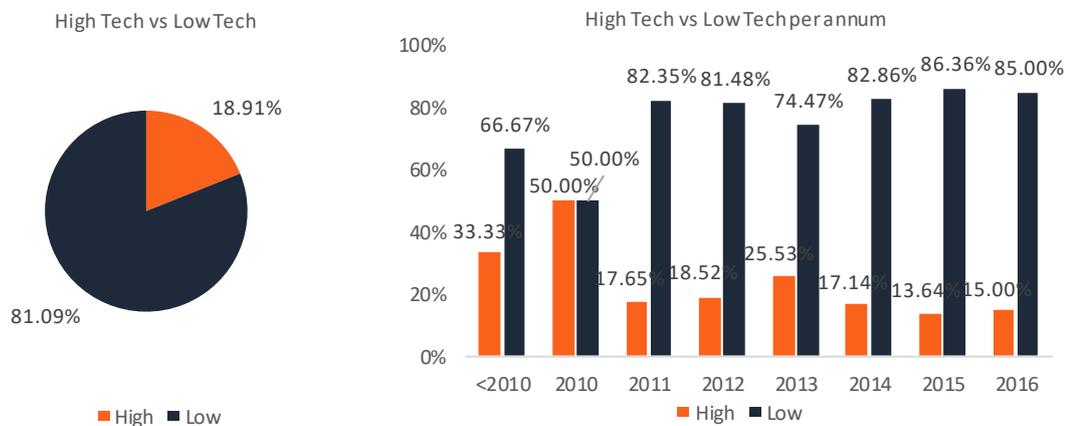
4) High Tech vs Low Tech in terms of process of production

For the period as a whole low tech process predominated, but the share of high tech processes was larger than the share of high tech goods. Interestingly as was the case with high versus low tech goods, the share of high tech processes was larger at the beginning of the period.

High Tech vs Low Tech (in Terms of Process)
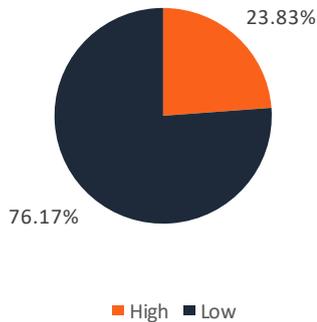
High Tech vs Low Tech (in Terms of process) per annum

5) Whether the Good offered is a Physical Product or Service

The great majority (nearly 80%) of startups offered services. This is no surprise given two facts: Firstly, Greece has been deindustrializing since the late 1970s and is largely a services based economy. Secondly, that software applications, IT are important in services, shows that Greek founders -given their high knowledge capabilities discussed above in the previous section- are able to move forward in what is a capital hungry economy with a shrinking GDP. Second in importance are products and both product and service based companies come third at a little over 10%. The basic observation to be made regarding trends over time is that at the end of the period the share of services had declined somewhat compared to 2010.

Product or Service
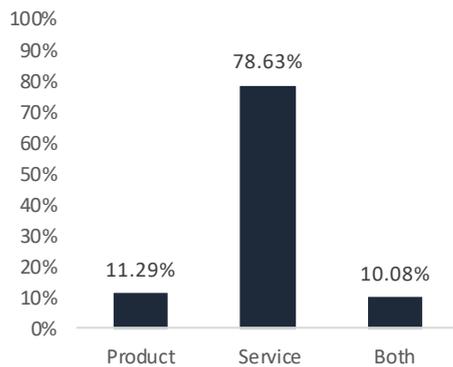
Product or Service per annum
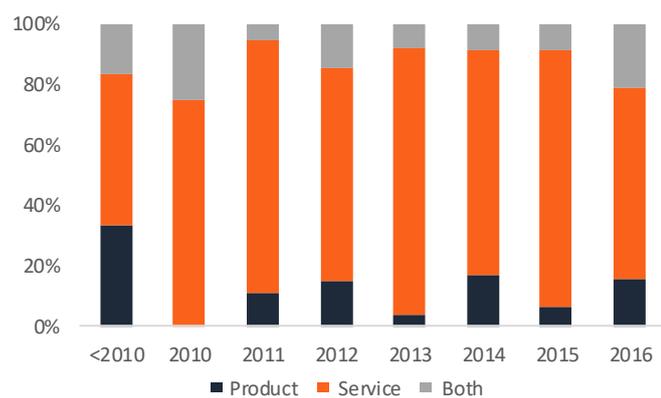
6) Whether the good offered is B2C or B2B

The term 'Good' here is meant to denote both product and services. For the period as a whole a little over half of the startups had a customer type of B2C. The category of B2B at 32% is however quite large also. The other two customer types (C2C and P2P) are miniscule in size. Interestingly the B2B and the mixed B2C/B2B were higher in the beginning of the period compared to the end.

We have to mention that due to the adaptability of startups and their continuous changing model, the customer type may change. It is common among early stage startups to observe that they have changed their customer type either because the first plan was not profitable or because they find alternative opportunities and they redesign their model. In our analysis, we took the customer type that the company had in the time of data entry.
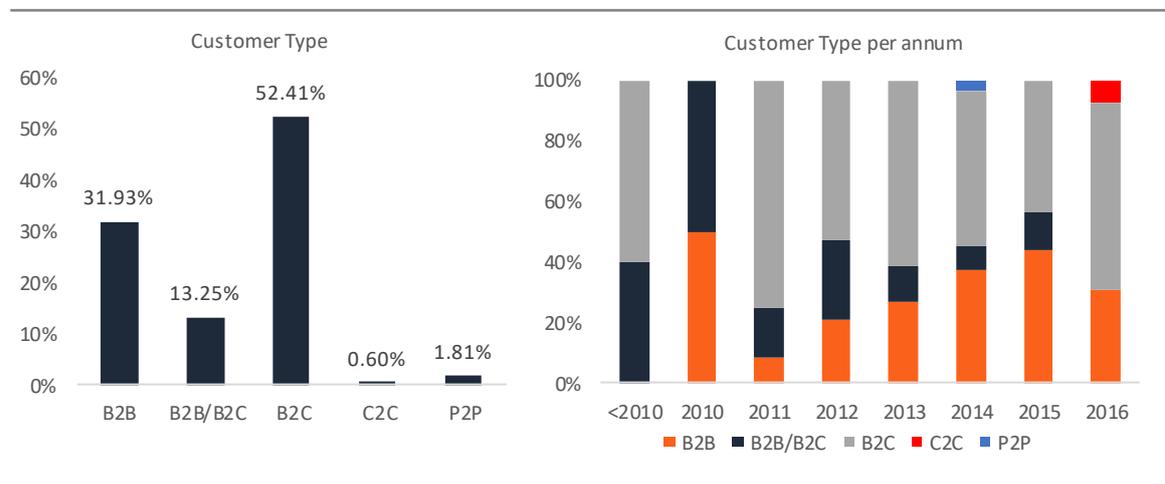
7) Whether The Startup has Customers Abroad

Nearly one third of startups had customers abroad. From 2014 onwards there was a consistent fall in the share of startups with customers abroad and by 2016 they accounted for only 25 per cent of the total.
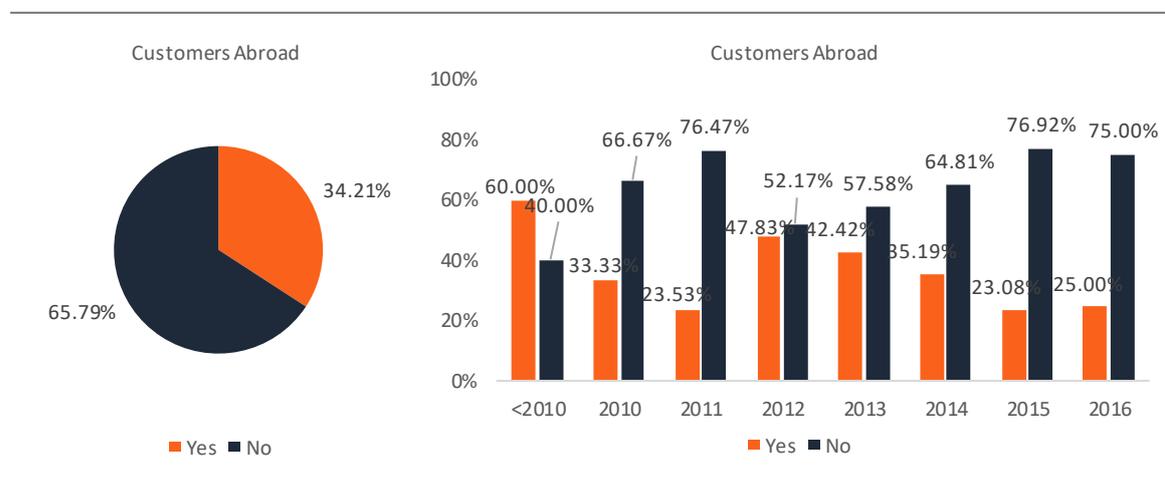
8) Number of Founders per Startup

A feature of the incubated startup ecosystem is that predominantly initiatives were set up by two individuals. Second in importance were startups with one founder and third in importance were three founder startups. This last category became less popular over time, while from 2013 onwards two founders per startup accounted consistently for over forty percent of the total.
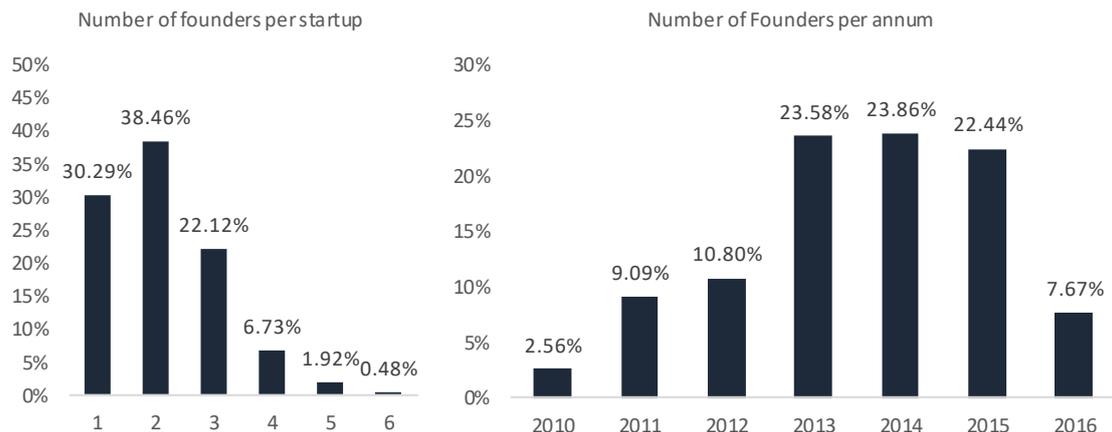
9) Whether Among the Founders of a Startup there are Relatives

Over time very few of the founding members were relatives (less than seven per cent on average).
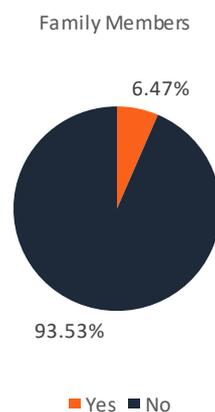
5.3 The profile of the incubee and change over time

On the basis of our statistical survey the profile of the incubated founder and startup was as follows:

The startupper was predominantly under thirty, male; and with studies (in order of importance) in the following fields: engineering; business and economics; and computer science. There was a sixty per cent probability that he had completed graduate studies.

To some extent there was versatility: Among those who had completed graduate studies for one fourth there was a digression in the field of education between undergraduate and graduate studies. In addition, there was almost a fifty percent probability that a startupper had educational expertise unrelated to his business sector (i.e. adaptability). Finally, there was a significant degree of cosmopolitanism/openness as almost one in two startuppers had experience abroad.

The initiative/ startup was predominantly established in Athens, but it was also the case that a little over one in ten was based abroad. The top sectors of startups in order of importance were: hardware-software; the creative industries; agriculture and leisure. One in five startups was high tech in terms of products and one in four was high tech in terms of process of production. The great majority of startups offered services and nearly one third had customers abroad. The largest category of customer type was B2C but B2B was quite large also. The number of founders per startup was on average two, but quite a few had three founders or more rarely even more. The share of family founders was very low throughout.

Observed trends and shifts over time. In the last two years there was a drastic drop in the establishment of startups. The imposition of capital controls in 2015 seems to have brought disruption in the upward trend in the rate of formation of early stage startups.

Regarding the distribution of socioeconomic indicators (for both startuppers and their initiatives) there were some differences in 2016 compared to 2010:

Notably, among startuppers the share of the 30-39 age group was higher (work experience became more significant); The gender gap was narrower; Economics and business degrees were more predominant while degrees in engineering were fewer (more importance given to the need of understanding the business world); The share of college graduates was higher and the share of M.Sc holders was lower (i.e lower level of knowledge resources); There was also a higher digression in the field of education between undergraduate and graduate studies; and the share of founders whose education was unrelated to the company sector was higher (greater variety in skills, greater adaptability); There was less experience abroad among founders (less internationalization).

Regarding firm specific indicators there were fewer shifts. The slight rise in the share of products at the end of the period needs to be explained as to whether it was a positive

development or not. However, it was obviously the case that at the end of the period there seemed to be some retrogression on a number of fronts: The share of high tech goods and high tech processes were lower than at the beginning of the period. This was also the case with B2B and the mixed B2C/B2B customer types **(less sophistication/lower technology base)**; and customers abroad **(less internationalization)**.

What can we make from these observations on change over time? And what was the specific impact of the 2015 imposition of capital controls on socioeconomic indicators? Apparently the imposition of 2015 capital controls acted as a catalyst: There was a partial shift away from knowledge resources, and internationalization for both founders and startups (post 2014 drops in post graduate degrees; experience abroad for the first and drops in high tech goods and customers abroad for the second) These retrogressions were probably related to the brain drain but more research is needed to reach firm conclusions as the statistical data on total migration does not allow us. The national statistical surveys (Hellenic Statistical Authority) do not give clear picture regarding the brain drain of entrepreneurs. However, we notice that for the age groups 20-25 and 35-39 there is a slight rise in the shares in the total annual brain drain. Two age groups which figure prominently in our sample (See Appendix 3) had a substantial share table below represents the brain drain effect per year[6] (Hellenic Statistical Authority)

The bottom line is that he picture is rather complex. For example, while the shares of high tech processes actually increased somewhat post 2014, it was also the case that the falling trend in customers abroad predated by one year the imposition of capital controls. In concluding, in order to get closer to understanding of the drivers of this new startup ecosystem it is necessary to continue our descriptive statistics analysis with the examination of two subgroups that hold a special position in the literature on startuppers. These are the cohort of survivor startups (as a proxy for business success) and the cohort of startups that had customers abroad (as a proxy for internationalization which is considered as a sine qua non for business success in our time).

6. Descriptive Statistics: Findings for the two selected subgroups/cohorts

6.1. The Survivor Cohort

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[6] The percentages are calculated as actual number per age group per year to the total number in the same age group during that period.

In this Section we focus on first selected subgroups: the cohort of surviving startups in 2018. We present its basic demographics and examine if and how the distribution of the socio-economic characteristics of this cohort for the period as a whole differed substantially from that for the total population of startups in our data base.

1) Basic demographics

The survivor cohort consisted of those initiatives/ startups which in 2018 were: 1) active (92 in number), 2) had changed ownership (8 in number) and 3) were frozen but for which we observed signals of potential survival (19 in number).

In total the survivor cohort consisted of 119 startups and 258 founders. Arithmetically, a little over 50% of the startups that survived were founded in 2013 and 2014.

Regarding the per annum share of survivors to the total number of startups, the two top years in order of importance were: 2016 (to be expected given its proximity to 2018 our selected year for checking survival) and surprisingly perhaps 2010 the starting date of our survey.

Survivor and Non survivor Startups in 2018
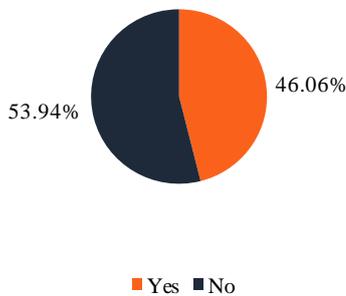
Rates of startup survival per annum
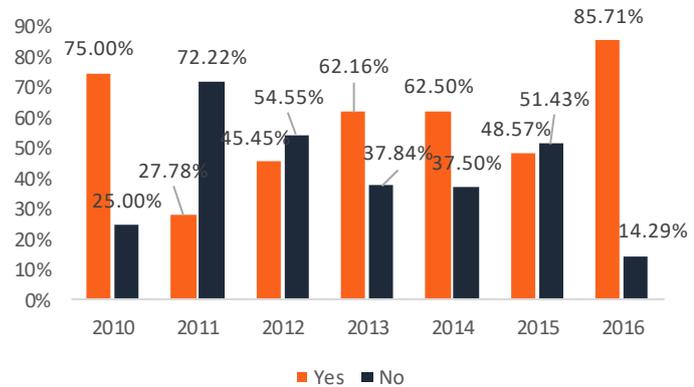
2) Socio economic indicators

Founder specific

Age distribution: in the survival cohort the share of 20-29 year old founders was lower and that of 30-39 year old founders was higher compared to the findings for the total population of founders. This finding is not surprising as it has been noted in the literature (Kauffman Foundation, 2009) that the age of entrepreneurs and the probability of success are positively related to age.

Gender distribution: There were slightly fewer women in the survival cohort group.

Level of education: In the survival cohort there was as higher presence of graduate students and holders of Masters degrees. There was also a large share of Ph.D students, post graduate researchers and Professors. Namely there was a stronger affiliation of start-ups with academia.

Fields of education: In undergraduate and graduate studies (degrees) as well there was a significantly higher presence of economics and business, science and theoretical studies and a significantly lower presence of computer science and engineering in the survival cohort.

Degree of digression in skills between undergraduate and graduate studies: It was slightly higher in the cohort group compared to the total population of founders. This suggests that within the new startup ecosystem this is a 'modern' feature that hopefully might become stronger as today a variety of skills is considered a point of advantage in terms of mindset and secures higher rates of success in career and business according to the literature.

Founders' education related to the company sector: It was noticeably higher in the cohort. This suggests that founders with a more focused mindset were probably more successful.

Experience abroad: it was higher in the cohort. It seems more logical that companies that have survived have founders with experience abroad, since they may be more familiar with trends as well as business models of companies in different country (ies).

Firm specific

Location. For the period as a whole, the share of Athenian based startups based in the cohort group was 10 % lower than what its share was for the total population of incubated startups. Indeed, if we focus on the respective share for the two last years of the period under review the share of Athens was even lower (perhaps because with the imposition of the capital controls the establishment of startups outside Greece appeared as a more attractive scenario).

Sector. The shares was significantly higher in the survivor cohort for the following sectors: education-eLearning, software-hardware and medicine–healthcare. In contrast it was significantly lower for the creative industries and the environment-energy.

High Tech-Low Tech (in terms of good) and High Tech-Low Tech (in terms of process).

The shares of high tech in goods and (especially) processes was significantly higher in the cohort group.

Product or Service. The share of pure/only service based startups was significantly lower in the cohort group.

Customer Type. The shares of B2B and C2C were significantly higher in the cohort group.

Customers abroad. The share of customers abroad was exceptionally low in the cohort group. What is indeed surprising is that the share of companies with customers abroad was almost nonexistent. How can we explain this? Further research must be done on this topic but in the meanwhile: this can to some small degree be explained by the fact that one quarter of the survivor cohort was founded in 2015 and 2016, namely at a difficult time regarding internationalization due to the imposition of capital controls.

Number of founding members per startup. The number of founding members per startup was slightly higher in the cohort group.

Number of family members. The share of family members in startups was somewhat higher in the cohort group.

In sum.

The findings for the survivor cohort regarding founder specific indicators are more or less as expected. Compared to the total population of incubated founders a larger share of founders were: mature (30-39); more educated; linked to academia; educated in economics and business, science and theoretical studies; holders of degrees related to the company sector and had experience abroad.

Regarding the findings for the firm specific indicators of the survivor cohort, compared to those for the total population of incubated founders the situation is more complex. Notably, as expected B2C customer type was lower and high tech goods and processes were higher. Whereas, the existence of more family members underlines the importance of tradition, as does the phenomenon of higher knowledge/capital resources (more founders per startup). Finally, the reasons for (and significance of) the divergence of some indicators are not so obvious (e.g. sector, lower share of pure services, customers abroad) and need to be further researched.

To close this section: survival was not a matter of chance, it was a matter of deliberate choice, being flexible and the differing weights of founder and firm specific socio-economic indicators made a difference. This finding has implications for policy making.

Socio Economic Indicators per Founder		
	General	**Survival**
Age	<20: 0,79% 20-29: 43,42% 30-39: 39,47% 40-49: 12,63% 50-59: 2,63% 60-69: 1,05%	<20: 1,32% 20-29: 39,65% 30-39: 43,17% 40-49: 12,33% 50-59: 2,64% 60-69: 0,88%
Gender	Male: 75,58% Female: 24,42%	Male: 76,71% Female: 23,29%
Level of Education	High School: 0,26% University Student: 2,90% BA/BSc: 36,94% Master: 41,16% PhD Student: 3,96% PhD: 7,65% Postgraduate Researcher: 3,17% Professor: 3,96%	High School: 0% University Student: 0,43% BA/BSc: 37,07% Master: 42,67% PhD Student: 4,74% PhD: 6,47% Postgraduate Researcher: 3,8% Professor: 4,74%
Fields of Education (BA/BSc)	Economics & Business: 25,19% Computer Science: 21,34% Engineering: 29,82% Science: 3,86% Theoretical Studies: 5,40% Other: 14,40%	Economics & Business: 28,87% Computer Science: 18,83% Engineering: 26,36% Science: 5,02% Theoretical Studies: 6,69% Other: 14,23%
Fields of Education (Master-PhD)	Economics & Business: 32,13% Computer Science: 18,77% Engineering: 25,45% Science: 3,86% Theoretical Studies: 4,88% Other: 14,91%	Economics & Business: 36,67% Computer Science: 15,83% Engineering: 21,67% Science: 5% Theoretical Studies: 5,83% Other: 15%
Variety in skills	Yes: 26,02% No: 73,98%	Yes: 26,42% No: 73,58%
Company Sector related to founder's education	Yes: 50,40% No: 49,60%	Yes: 53,04% No: 46,96%
Experience abroad	Yes: 46,95% No: 53,05%	Yes: 51,75% No: 48,25%

| Socio Economic Indicators per Startup		
	General	**Survival**

Location	Athens: 80,19% Greece but not Athens: 6,60% Cyprus: 1,42% Australia: 0,47% Netherlands: 1,89% UK: 6,60% USA: 2,83%	Athens: 72,81% Greece but not Athens: 7,89% Cyprus: 1,75% Australia: 0% Netherlands: 2,63% UK: 9,65% USA: 5,26%
Sector	Agriculture: 10,13% Software-Hardware: 16,88% Leisure: 10,13% Creative Industries: 10,97% Medicine-Healthcare: 9,70% Construction-Engineering-Transportation: 5,49% Environment-Energy: 7,17% Education-ELearning: 5,06% Other: 24,47%	Agriculture: 8,55% Software-Hardware: 19,66% Leisure: 12,82% Creative Industries: 5,98% Medicine-Healthcare: 11,11% Construction-Engineering-Transportation: 5,13% Environment-Energy: 5,13% Education-ELearning: 8,55% Other: 23,08%
High Tech-Low Tech	High Tech: 18,91% Low Tech: 81,09%	High Tech: 22,41% Low Tech: 77,59%
High Tech-Low Tech (in terms of process)	High Tech: 23,83% Low Tech: 76,17%	High Tech: 28,45% Low Tech: 71,55%
Product or Service	Product: 11,29% Service: 78,63% Both: 10,08%	Product: 11,76% Service: 73,95% Both: 14,29%
Customer Type	B2B: 31,93% B2B/B2C: 13,25% B2C: 52,41% C2C: 0,60% P2P: 1,81%	B2B: 37,65% B2B/B2C: 9,41% B2C: 48,24% C2C: 1,88% P2P: 3,53%
Customers Abroad	Yes: 34,21% No: 65,79%	Yes: 1,75% No: 98,25%
Number of Founding Members	1 member: 30,29% 2 members: 38,46% 3 members: 22,12% 4 members: 6,73% 5 members: 1,92% 6 members: 0,48%	1 member: 22,81% 2 members: 40,35% 3 members: 26,32% 4 members: 8,77% 5 members: 1,75% 6 members: 0%
Family Members	Yes: 6,47% No: 93,53%	Yes: 7,76% No: 92,24%

6.2 Customers abroad

In this Section we focus on the cohort of startups that had customers abroad. As noted above we use 'customers abroad' as an indication of extroversion and hence a proxy for internationalization. We follow the same steps of analysis as in the cohort group for survivors.

1) **Basic demographics**

This cohort in total amounted to 75 startups, out of a total population of 255, namely roughly 30 percent of the total population of our sample. About 51 per cent of the startups with customers abroad were founded in order of importance in 2014 and 2013. The two years with the highest annual shares of customers abroad were in order of importance 2010 (surprisingly) and 2012. An open question (already mentioned above) is why the shares of customers abroad faltered over time and before the imposition of capital controls?
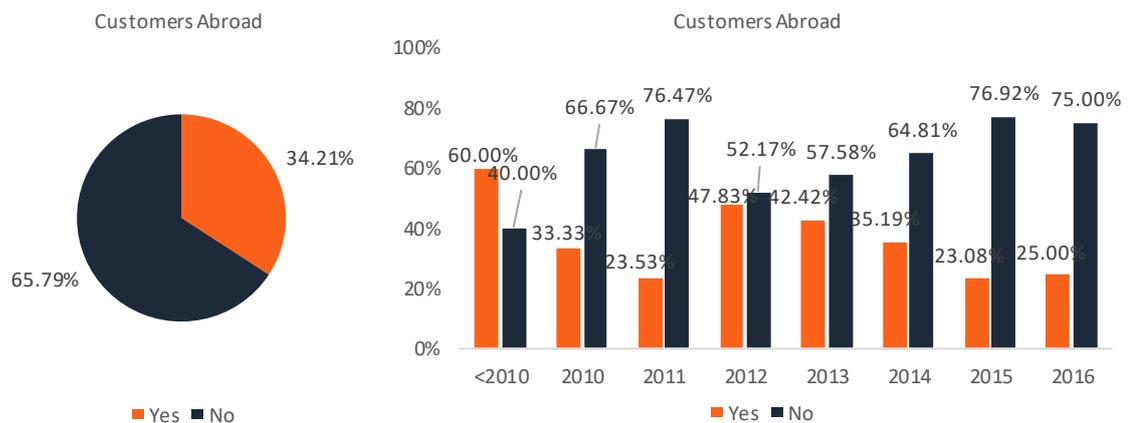
2) **Socio economic indicators**

Below we present the socio economic indicators analyzed in the previous sections and we comment on the existing differences with the total population of incubees for the period as a whole.

Founder Specific

Age distribution: More founders were in the 30-39 group, whereas in the general sample the leading age category was 20-29.

Gender distribution: The share of women was slightly lower in this cohort.

Level of education: The share of founders who were undergraduate students, held a Masters degree and professors increased.

Fields of education: More founders had undergraduate studies in economics-business and computer sciences and fewer were engineers. At the graduate level of studies the differences were in the same direction and more stark for the first and third fields.

Degree of digression in skills between undergraduate and graduate studies: There was a somewhat higher variety in skills.

Company sector related to the Founders education: There was a somewhat lower share of direct relevance of studies to the company sector.

Experience abroad: This was substantially higher which suggests that experience abroad made the process easier for founders to search for international clients.

Firm specific

Location: Far fewer startups are based in Athens and the share of Non-Athenian Greek startups was higher.

Sector: Agriculture, software-hardware and education-E-learning were higher.

High Tech-Low Tech (in terms of good) and High Tech-Low Tech (in terms of process): High tech was higher both in terms of goods and process.

Product or Service: Services were slightly higher.

Customer type: The presence of B2C was higher.

Number of founding members: There was a larger share of startups founded by three to five individuals.

Family members: There was a slightly lower share of family members.

Survival: Interestingly, the share of surviving firms within this cohort was substantially larger. This finding needs to be explored further as in the data above for the survival cohort the indicator customers abroad is miniscule in size.

In sum, the founder specific indicators of the customers abroad cohort suggest a larger presence of the 30s age group; a more open and diverse founder body and that experience abroad was substantially more significant. As for the firm specific indicators far fewer firms were located in Athens; high technology goods and production processes were more present (as is to be expected); and finally services and B2C customer types were more important. It is obvious that further research is necessary to uncover what policies might enhance those indicators that are associated with higher shares of customers abroad within the community of incubated startups.

In way of closing the discussion of the two selected cohorts our general comment is that on the whole both the founder and firm specific characteristics were more sophisticated aka advanced in these two cohorts. Let it be also underlined that.

Socio Economic Indicators per Founder	
General	Customers Abroad

Age	<20: 0,79% 20-29: 43,42% 30-39: 39,47% 40-49: 12,63% 50-59: 2,63% 60-69: 1,05%	<20: 1,56% 20-29: 37,50% 30-39: 46,09% 40-49: 12,50% 50-59: 0,78% 60-69: 1,56%
Gender	Male: 75,58% Female: 24,42%	Male: 84,44% Female: 15,56%
Level of Education	High School: 0,26% University Student: 2,90% BA/BSc: 36,94% Master: 41,16% PhD Student: 3,96% PhD: 7,65% Postgraduate Researcher: 3,17% Professor: 3,96%	High School: 0,78% University Student: 5,47% BA/BSc: 34,38% Master: 44,53% PhD Student: 3,13% PhD: 5,47% Postgraduate Researcher: 1,56% Professor: 4,69%
Fields of Education (BA/BSc)	Economics & Business: 25,19% Computer Science: 21,34% Engineering: 29,82% Science: 3,86% Theoretical Studies: 5,40% Other: 14,40%	Economics & Business: 28,68% Computer Science: 26,36% Engineering: 24,03% Science: 2,33% Theoretical Studies: 3,10% Other: 15,50%
Fields of Education (Master-PhD)	Economics & Business: 32,13% Computer Science: 18,77% Engineering: 25,45% Science: 3,86% Theoretical Studies: 4,88% Other: 14,91%	Economics & Business: 39,53% Computer Science: 20,93% Engineering: 18,60% Science: 2,33% Theoretical Studies: 3,10% Other: 15,50%
Variety in skills	Yes: 26,02% No: 73,98%	Yes: 29,27% No: 70,73%
Company Sector related to founder's education	Yes: 50,40% No: 49,60%	Yes: 46,40% No: 53,60%
Experience abroad	Yes: 46,95% No: 53,05%	Yes: 63,57% No: 36,43%

Socio Economic Indicators per Startup		
	General	**Customers abroad**
Location	Athens: 80,19% Greece but not Athens: 6,60% Cyprus: 1,42% Australia: 0,47% Netherlands: 1,89% UK: 6,60% USA: 2,83%	Athens: 52,38% Greece but not Athens: 12,70% Cyprus: 1,59% Australia: 1,59% Netherlands: 4,76% UK: 19,05% USA: 7,94%
Sector	Agriculture: 10,13% Software-Hardware: 16,88% Leisure: 10,13% Creative Industries: 10,97% Medicine-Healthcare: 9,70% Construction-Engineering-Transportation: 5,49% Environment-Energy: 7,17% Education-ELearning: 5,06% Other: 24,47%	Agriculture: 14,06% Software-Hardware:20,31% Leisure: 10,94% Creative Industries: 9,38% Medicine-Healthcare: 6,25% Construction-Engineering-Transportation: 4,69% Environment-Energy: 3,13% Education-ELearning: 7,81% Other: 23,44%
High Tech-Low Tech	High Tech: 18,91% Low Tech: 81,09%	High Tech: 21,88% Low Tech: 78,13%
High Tech-Low Tech (in terms of process)	High Tech: 23,83% Low Tech: 76,17%	High Tech: 28,13% Low Tech: 71,88%
Product or Service	Product: 11,29% Service: 78,63% Both: 10,08%	Product: 10,77% Service: 78,46% Both: 10,77%
Customer Type	B2B: 31,93% B2B/B2C: 13,25% B2C: 52,41% C2C: 0,60% P2P: 1,81%	B2B: 32,65% B2B/B2C: 10,20% B2C: 57,14% C2C: 0,00% P2P: 0,00%
Customers Abroad	Yes: 34,21% No: 65,79%	-
Number of Founding Members	1 member: 30,29% 2 members: 38,46% 3 members: 22,12% 4 members: 6,73% 5 members: 1,92% 6 members: 0,48%	1 member: 32,84% 2 members: 31,34% 3 members: 23,88% 4 members: 8,96% 5 members: 2,99% 6 members: 0,00%
Family Members	Yes: 6,47% No: 93,53%	Yes: 4,62% No: 95,38%
Survival	Yes: 46,06% No: 53,94%	Yes: 75,38% No: 23,08%

7. **Univariate Analysis[7]: Findings for the two selected subgroups/cohorts (by Spiros Paraskevas)**

Method description to identify important factors:

Under the goal of identifying relevant independent variables to this analysis outcome of interest (i.e. a startup's survival and the acquisition of customers abroad), a filter based feature selection method[8] is applied. Concretely, a filter method evaluates available predictors prior infusing these in a multivariate model. Based on this evaluation, a subset of predictors are preselected, as mostly applicable, to model the chosen dependent variables. This technique is identified as univariate, since a one on one screening process is used. The metrics chosen to perform this filter based evaluation are a) Welch's t-test (also known as unequal variances t-test) for numerical variables and b) chi-square test for categorical ones. Based on the results of these tests, the researcher can identify important variables with respect to the desired outcome.

A Welch's t-test computes the probability of the two sample means (e.g. one falling under the survived startups class and the other under the startups that failed to survive) being equal given sample variance. If the test results in a low probability (p-value) then the sample means are not equal and therefore the variable under scrutiny is useful in discriminating the objective (i.e. a startup's survival). A chi square test is the respective statistical test for the case of categorical variables. It is used to determine whether there is a <u>statistically significant</u> difference between the expected <u>frequencies</u> and the observed frequencies in one or more categories of a contingency table. In case a chi-square test results in a low p-value, this means that there is a low probability that the observed difference in frequencies, of survivals vs non survivals, for the different values of the variable under check is attributed to randomness. Therefore, it should be expected that similar survival rates are to be seen in the future.

Put simply, the resulting p-values of both mentioned tests express the probability of the variable under check being relevant to the outcome of interest.

7.1. Survival

A startup survivor profile is as follows: a startup that develops in the sectors of education/eLearning, leisure/tourism, software/hardware and medicine/healthcare domains. A startup that has more than one or two founding members regardless of age

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but certainly of higher education level. Undergraduate or postgraduate studies in Economics & Business is a boosting factor. Founders experience abroad is a must have and so is female presence in the team. Moreover, a startup that has succeeded in acquiring customers abroad is a definite survival signal.

Three important factors to a startup's survival:

a. Business Sector

The following graphs as well as the chi square statistical test suggests that different business sectors have different survival rates:
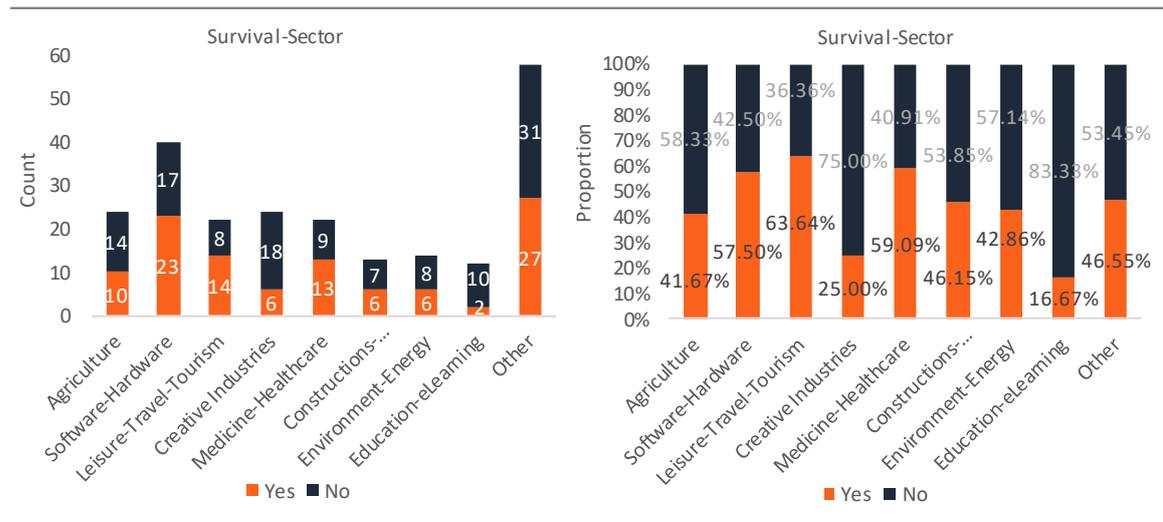
Pearson's Chi-squared test (X-squared = 15.898, df = 8, p-value = 0.04386)
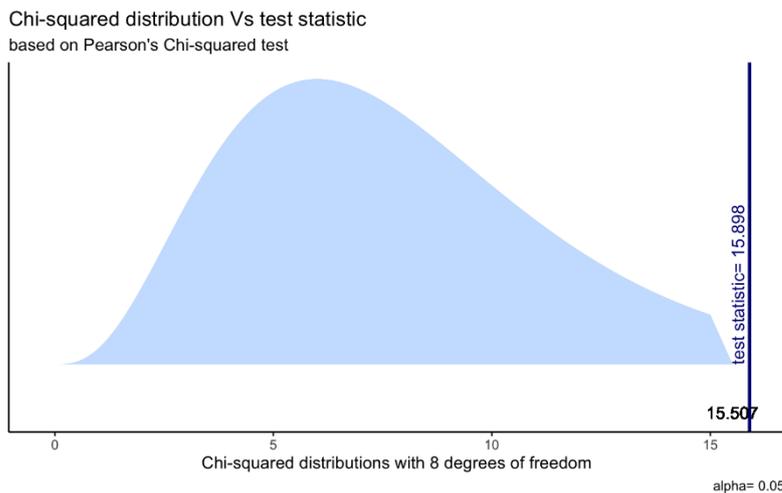
The observed p-value suggests that the probability of a startup's business sector being irrelevant to survival is very low. Venturing in different business sectors imply different survival probabilities. Optimistic survival chances are observed in a) Education / e-Learning, b) Leisure - Travel - Tourism, c) Medicine - Healthcare and d) Software - Hardware. On the other hand, poor survival chances should be expected for ventures in a) Creative Industries, b) Agriculture and c) Environment - Energy.

b. Founders' Gender
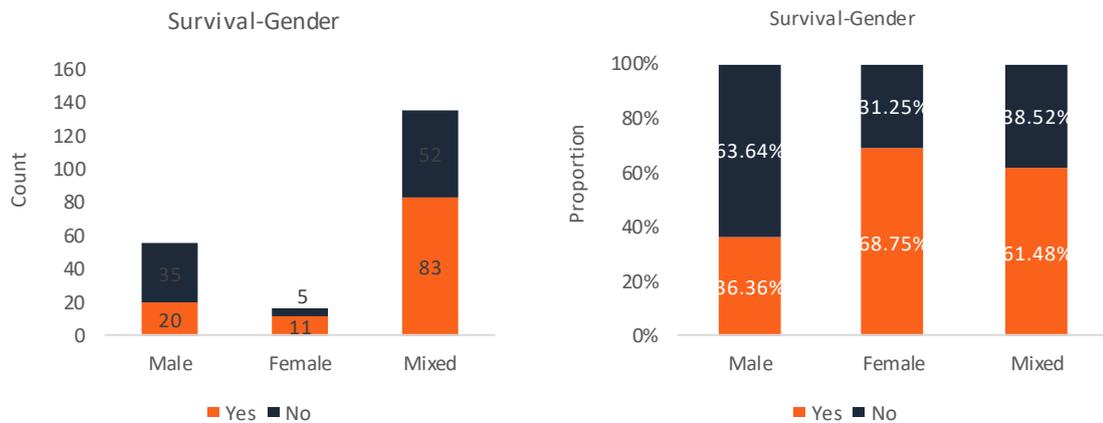
Pearson's Chi-squared test (X-squared = 11.238, df = 2, p-value = 0.003628)
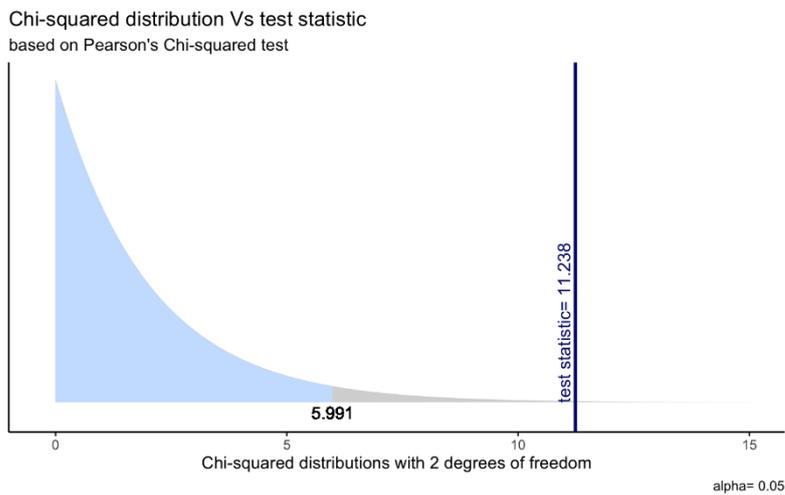
The observed p-value suggests that the probability of a startup's founders' gender mix being irrelevant to survival is very low. Otherwise put, the probability of such observed frequencies being attributed just to luck is very low. Therefore, female presence should be considered as a must for survival.

c. HQ in Greece or Abroad

Survival-Location / Survival-Location
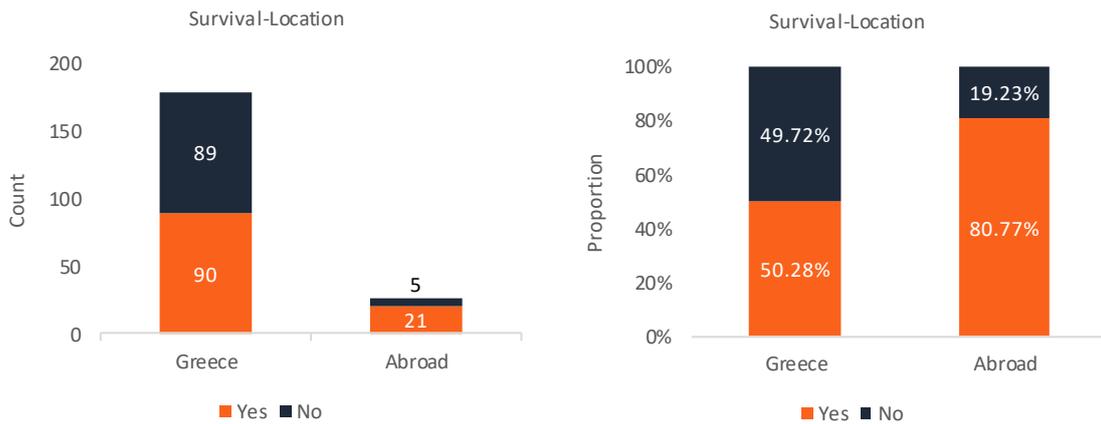
Pearson's Chi-squared test with Yates' continuity correction (X-squared = 7.3168, df = 1, p-value = 0.006831)
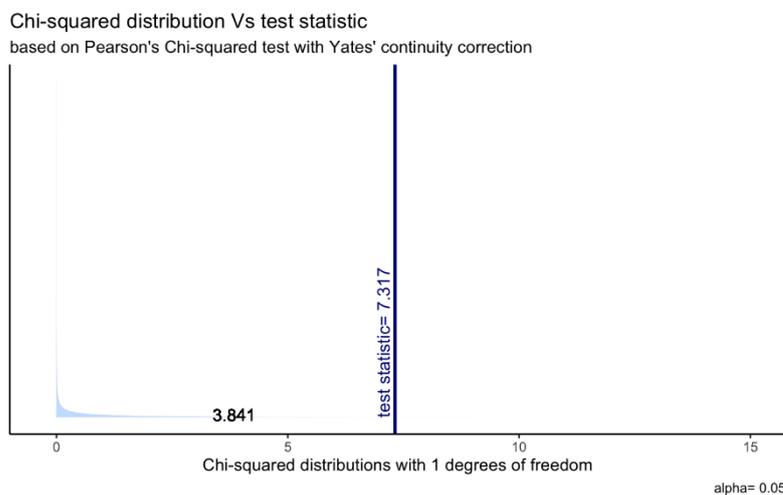
Chi-squared distribution Vs test statistic
based on Pearson's Chi-squared test with Yates' continuity correction

The observed p-value suggests that the probability of a startup's HQ location (Greece vs Abroad) being irrelevant to survival is very low. Startups that hold their 1st HQ abroad display impressively higher survival results.

7.2. Acquiring customers abroad

A startups profile with propensity in acquiring customers abroad is as follows: a startup that has a head quarter abroad, has more than one or two founding members with post graduate studies in Economics and Business that have digressed from their educational path and have experience abroad.

Three important factors to a startup's survival:

a. Experience abroad
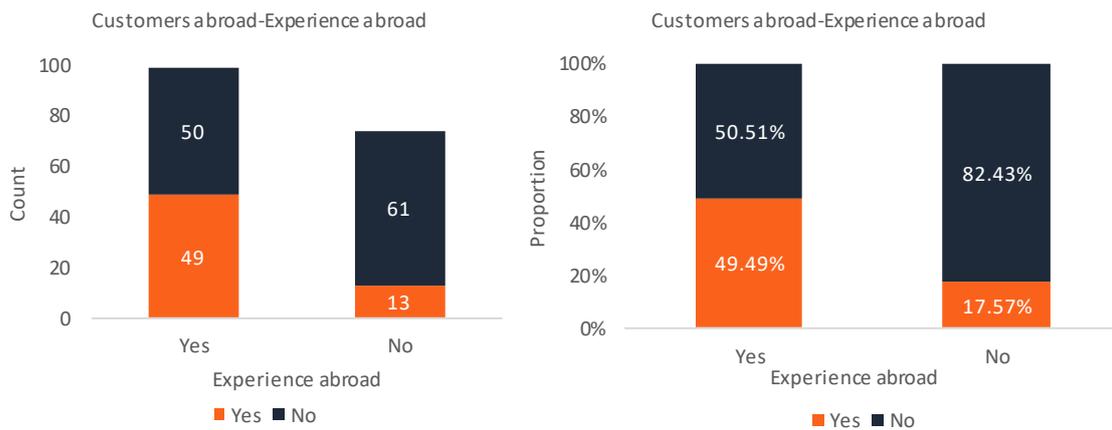
Pearson's Chi-squared test with Yates' continuity correction (X-squared = 17.41, df = 1, p-value = 3.013e-05)
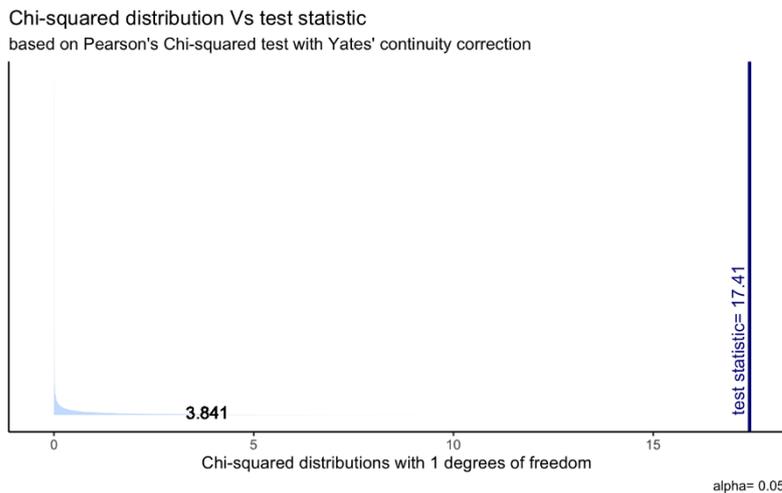
The observed p-value suggests that the probability of a startup's founders' having experience abroad being irrelevant to acquiring customers abroad is very low. Startups with founders having experience abroad display significantly higher propensity in acquiring customers abroad.

b. 1st HQ location Greece vs abroad

Customers abroad-1st HQ Location (Greece-Abroad)

	Greece	Abroad
No	119	
Yes	41	22
		2

Customers abroad-1st HQ Location (Greece-Abroad)

	Greece	Abroad
No	74.38%	8.33%
Yes	25.63%	91.67%
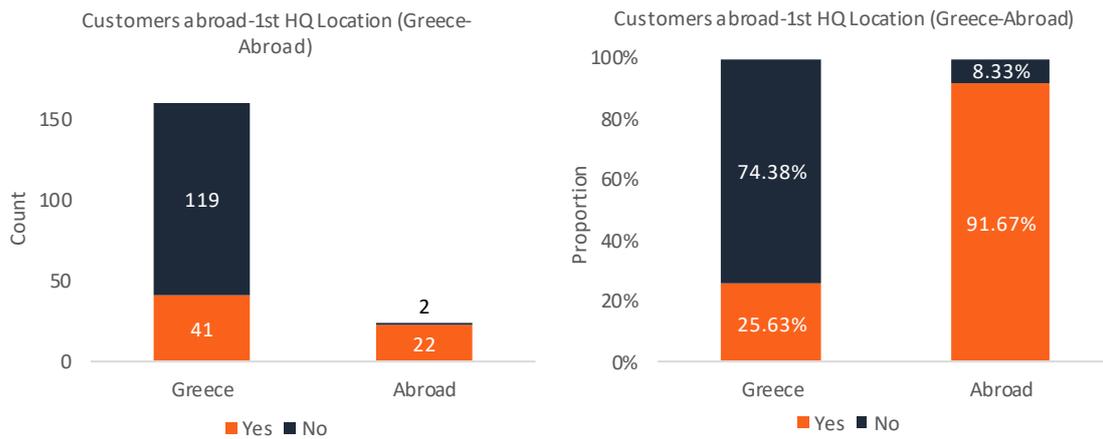
Pearson's Chi-squared test with Yates' continuity correction (X-squared = 37.546, df = 1, p-value = 8.928e-10)

Chi-squared distribution Vs test statistic
based on Pearson's Chi-squared test with Yates' continuity correction

3.841

test statistic= 37.546

Chi-squared distributions with 1 degrees of freedom

alpha= 0.05
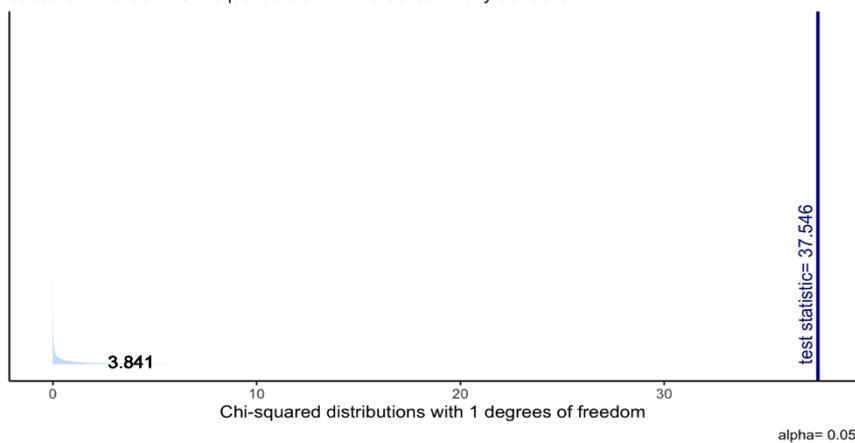
The observed p-value suggests that the probability of a startup's HQ location (Greece vs Abroad) being irrelevant to acquiring customers abroad is very low. Startups that hold their 1st HQ abroad display impressively higher customers from abroad acquisition results.

c. Number of Founders

Customers abroad-Number of Founders (left: Count chart with Yes/No bars; values 18/32, 20/48, 17/26, 6/6, 2/2, 0/1 for founders 1–6)

Customers abroad-Number of Founders (right: Proportion chart; 36.00%/64.00%, 29.41%/70.59%, 39.53%/60.47%, 50.00%/50.00%, 50.00%/50.00%, 0.00%/100.00%)
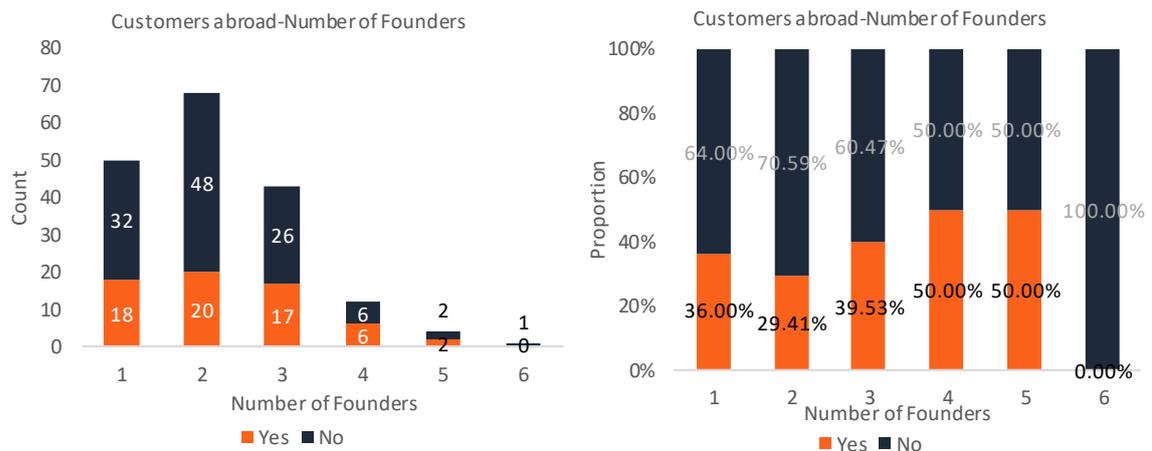
Chi-squared test for given probabilities (X-squared = 7.7869, df = 3, p-value = 0.05063)

Chi-squared distribution Vs test statistic
based on Chi-squared test for given probabilities

test statistic= 7.787

7.815

Chi-squared distributions with 3 degrees of freedom

alpha= 0.05
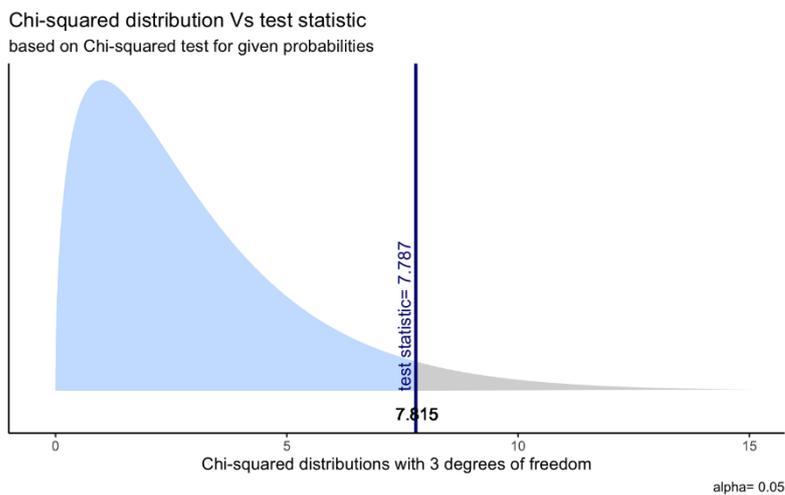
The observed p-value suggests that the probability of a startup's number of founding members being irrelevant to acquiring customers abroad is very low. Startups with more than one or two founding members display higher propensity in acquiring customers from abroad.

Concluding this univariate analysis, it is noted once more that this is a preliminary phase.

8. Bringing together the findings of the descriptive statistics and univariate analysis on the two subcohorts

It is apparent that the startups belonging to the survival and customers abroad subcohorts were not there by chance- they displayed specific features according to our descriptive statistics and the univariate analysis.

The survival subcohort

The basic findings of the descriptive statistics for this subcohort (in comparison to the total population of our data base) show that:

1) A larger share of founders were: mature (30-39); more educated; linked to academia; educated in economics and business, science and theoretical studies; holders of degrees related to the company sector and had experience abroad.

2) Among start-ups there was: a lower presence of the B2C customer type; and a higher presence of high tech goods and processes, family members and knowledge/capital resources.

According to the univariate analysis the three most important findings regarding the survival subcohort were in order of importance that: business sector selection mattered (different business sectors had different survival rates); and having a female member in the founding team and headquarters abroad were seminal for survival.

The customers' abroad sub- cohort

The descriptive statistics findings shows that compared to the total population of the data base:

1) Regarding founders: there was a larger presence of the 30s age group; a more diverse founder body and that experience abroad was substantially more significant.

2) As for the firm specific indicators: far fewer firms were located in Athens; high technology goods and production processes were more present (as is to be expected); and finally services and B2C customer types were more important.

According to the univariate analysis the three most important findings regarding the customers abroad subcohort were in order of importance, having: headquarters abroad, founders with experience abroad and a 'large' number of founders.

In sum, there is some coincidence in attributes between the survival and customers abroad subcohorts and the two diverse analytical methods are partly complementary highlighting different aspects of these two 'winner' subcohorts.

9. Epilogue

On the basis of detailed descriptive statistics and univariate analysis (by Spiros Paraskevas) we have examined in detail the features of early stage incubated startuppers in Athens at a critical time period.

Our purpose has been to understand the key drivers of this emerging ecosystem as an entity and in particular the forces making for the subcohorts of the startups group defined by business success (aka survival) and internationalization (aka customers abroad). Our findings are presented in summary form in Sections 5.3. and 8.

At the moment, as we are preparing for our next stage of research we would like to share certain observations resulting from these first findings from our data base analysis.

Firstly, the emergence of a novel nexus of 'visionaries' and (to use the terminology of GEM report "opportunity" driven entrepreneurship. In Greece traditionally business is oriented towards the domestic market, low technology processes and products/ services But this ecosystem which we have observed, though small in size diverged from this pattern …within the sea of despair in the country and deepening deindustrialization this enclave was a breath of fresh air and an emblem of hope.

Secondly, the existence of an entrepreneurial oriented sophisticated/well educated pool of talent in Greece committed to high value/opportunity driven entrepreneurship that actually in part ameliorates that large brain drain during the crisis as it has formed links with neo-high knowledge emigrants abroad.

Thirdly, the high flexibility of this ecosystem and its ability to detect and unlock new opportunities. Following the imposition of capital controls there was a slowdown in startup births and pivoting in terms of headquarters while in the years following our period of study there was an upturn in startup births as the economic climate improved, and as a result, more than 150 startups from the selected incubators were born.

Finally, we would like to note that certain findings are informative for policy makers. Among them we would like to pinpoint the stronger links with academia in the survival subcohort as well as the larger presence of female founders in this group. Also, policy making should be informed by the fact that agricultural startups had a low survival rate and this is something the country cannot afford given the huge food deficit trade.

Regarding the customers abroad cohort among the most interesting findings are that fewer startups had their headquarters in Athens, there was a larger presence of the 30s age group and a higher presence of high technology goods and processes.

As we are writing the final words of this paper Greece, like the whole world is experiencing the tragic covid-19 pandemic. This tragic development arrived at a

moment when the country was on an upward path exiting the ten year crisis. What can contemporary startuppers learn from our study? The need for flexibility in a time of rising nationalism and what are the keys for 'internationalization (a much desired objective of policy makers).

Our next step moving forward is clearly defined as we have already started data collection and discussing the methodology pivoting. We are expanding our data base so as to include incubees from all the incubators operating in Athens in the time period examined 2010-2016 and we are also moving towards enhancing our quantitative methodology with a multivariate analysis.

Of course we cannot cover everything and a number of questions remain unanswered. Hopefully other researchers might turn to interesting questions such as mapping in detail the moves towards digitalization, sources of funding for early stage startuppers, types of innovation and business models.

APPENDIX 1

What were the socioeconomic features of early stage startuppers and their initiatives before 2010?

Within the total population of incubated startups in total 3% (i.e. six) were founded before 2010. Founders were basically under 30 years of age. They were all male, college graduates and a few were Ph.D holders. Predominantly they were engineers and scientists. These six startups were basically founded by one -or at the most two individuals. The predominant sector was agriculture and the share of products in total goods was higher than what was the case thereafter. These were basically B2C and there was no pure B2B company.

The share of high tech goods and high tech processes were higher than what was the case at the end of the period.

Before 2010 companies were exclusively team based.

APPENDIX 2

Gender Entrepreneurship

Age

- 20-29: Male 41.32%, Female 54.12%
- 30-39: Male 41.67%, Female 35.29%
- 40-49: Male 13.54%, Female 10.59%
- 50-59: Male 3.47%, Female 0.00%

Postgraduate Studies

- Male: Yes 62.15%, No 37.85%
- Female: Yes 52.75%, No 47.25%

Experience Abroad

- Male: Yes 42.77%, No 47.08%
- Female: Yes 36.19%, No 44.76%
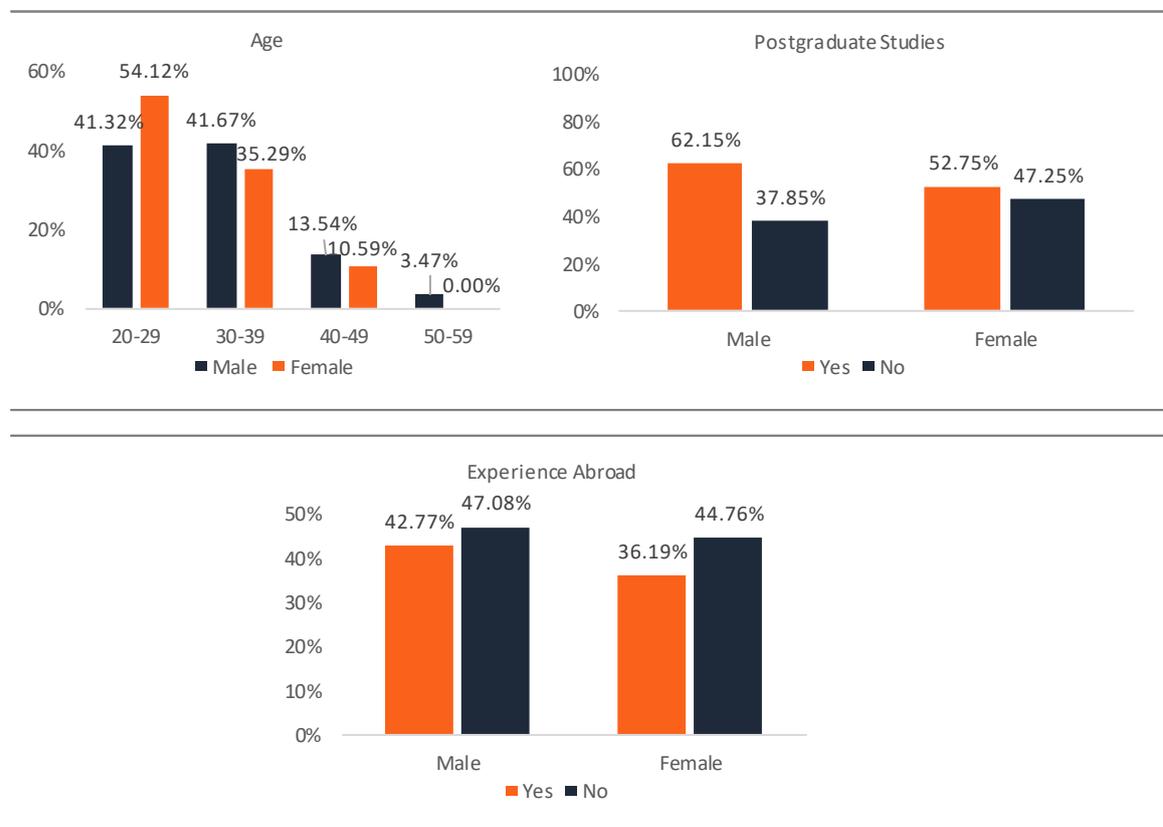
APPENDIX 3

Brain Drain - Greece (Data from Hellenic Statistical Authority)

Actual Number per Age Group per year/total number in the same age group				
Year	20-24	25-29	30-34	35-39
2010	9.95%	9.93%	8.81%	7.26%
2011	12.83%	14.34%	14.24%	14.30%
2012	16.04%	17.34%	18.27%	18.53%
2013	15.41%	16.89%	17.51%	17.35%
2014	15.76%	13.26%	13.74%	13.66%
2015	16.21%	13.68%	14.18%	14.09%
2016	13.79%	14.57%	13.25%	14.81%

Actual Number per Age Group				
Date	20-24	25-29	30-34	35-39
2010	9,462	13,998	8,962	5,139
2011	12,203	20,210	14,480	10,117
2012	15,258	24,435	18,583	13,107
2013	14,656	23,812	17,810	12,274
2014	14,988	18,688	13,974	9,662
2015	15,418	19,282	14,418	9,969
2016	13,115	20,532	13,470	10,475
Total	95,100	140,957	101,697	70,743

APPENDIX 4
Comparison of Greek Studies on the Startup Ecosystem (The papers are sorted in chronological order starting with the most recent)

Number	Author and title of article/report	Data base	Time period covered	Basic questions - Main Categories	Other comments	Overlapping Points
1	IOBE- Tsakanikas A., Giotopoulos I., Valavanioti E. & Stavraki S. (2019)-" Annual Entrepreneurship Report 2018-2019"	Global Entrepreneurship Monitor	2018-2019	A) Characteristics of early stage entrepreneurship B) The domestic business environment: National Experts' Survey C) The role of the structural characteristics of the financial system from a business development perspective	Academic	Yes, slight overlapping (Characteristics of early stage entrepreneurship) Very Detailed
2	Found.ation, EIT Digital & Velocity Partners (2019) "Startups in Greece: Re-mapping the investments landscape"	Not specified	Not specified	A) General Data for the Greek Economy B) Description of Equifund C) Characteristics of Companies that received funding through Equifund D) Comparison of Pre-Seed and Seed Stage Startups in Greece and Europe (Country, Gender, Size, Focus, Sector) E) Funding F) Mapping of Incubators, Accelerators, Co-Working Spaces and Competitions-Hackathons G) Top 10 funded startups H) Profile of Early Stage Startups	Non-Academic	Yes, slight overlapping (Mapping, profile of early stage startups) Very Detailed
3	Chris Gasteratos-Marathon VC (2019) "The Greek Startup Industry: Investments and Exits, 2010-2018"	301 firms 268 VCs	2010-2018	A) Investment Amounts B) Investment Rounds C) Investments amounts per stage D) Investment rounds per stage E) Investment rounds per geography F) Investment amounts per Geography G) Average price per seed round H) Geographical allocation of Greek startups I) Investment rounds source J) Amounts raised source K) Acquisitions and IPOs	Brief Survey	Yes, slight overlapping (geographical allocation of Greek Startups)
4	Chris Gasteratos-Marathon VC (2018) "Greek Founders Attributes"	143 firms (raised Financing) 175 founders 110 firms	2010-2017	A) Tech vs Non-Tech B) Education Level C) Education Level vs Startup Success D) Starting Age E) Work Experience vs Startup Success F) Previous Role G) Previous Role vs Startup Success	Brief Survey	Yes, slight overlapping (High Tech vs Low Tech, Education Level, Starting Age)

Number	Author and title of article/report	Data base	Time period covered	Basic questions - Main Categories	Other comments	Overlapping Points
5	BCG-Antoniades V., Giakoumelos M., Petkakis T. & Zacharia Z. (2018) "Greece's Startup Ecosystem"	Used data from several sources	mainly 2012-2018	A) A snapshot of the Greek Startup Ecosystem B) Problems that Startups face in Greece C) BCG's Vision for the Greek Startup D) Introducing Policies to strenthen the Startup Ecosystem E) How the policies will achieve their scope	Non-Academic, Policy-Oriented	No overlapping Very Detailed
6	Chris Gasteratos-Marathon VC (2017) "Investments in Greek Startups"	137 firms	2010-2016	A) Number of Investments Rounds B) Aggregate Investments C) Acquisitions	Brief Survey	No overlapping
7	Vlachopoulou, M., Ziakis, C. & Petridis, K. (2017), ICT Innovation Hub, "Startups: Characteristics and their interaction with the Greek startup ecosystem in Greece"	121 firms	Not specified	**General Information** A) Number of Founders B) Number of Employees C) Legal Entity D) Location & Reasons of Choice E) Sectors F) Location of Clients G) Time Frame **Characteristics of Startups** A) Motivation of creating a startups B) Startups and Business Plan C) Origin of the Idea D) Patentization of the idea E) Education of Founders F) Education of Employees G) Funding Sources H) Types of Collaborations I) Difficulties during Initiation **Reasons of Success of Startups in Greece** A) Comparative advantages of startups B) Characteristics of Founders C) Funding D) Support E) Education F) Government Support G) Prospects of Success	Brief Survey	Yes, Overlapping (Number of Founders, Number of Employees, Location, Sectors, Education of Founders)

Number	Author and title of article/report	Data base	Time period covered	Basic questions - Main Categories	Other comments	Overlapping Points
8	Stavros Lampropoulos (2015) "The startup ecosystem in Greece: An empirical investigation."	77 firms	2016	A)Number of Founders B)Age of Founders C)Age and Level of Education D)Professional Experience per Age E)Origination of the Idea F)Average Number of Employees per Year G)Participation in Supporting Structures H)Evaluation of Supporting Structures I)Funding J)Funding Sources K)Evaluation of Greek Startup Ecosystem L)Reasons that Impede the Development of Startups	Academic Workshop Presentation	Yes, slight Overlapping (Number of Founders, Age, Level of Education)
9	Nikos Kanellos (2013) "Exploring the characteristics of knowledge-based enterpreneurs in Greece"	100 firms	2000-2010	A) Year of establishment B) Number of Employees C) Number of Founders D) Highest Educational Attainment of Founders E) Founders' last Occupation Before Firm Establishment F) Main Areas of Expertise of Founders G) Factors Influencing Firm Formation H) Sources of Funding for Setting up the Company	Academic (Article)	No overlapping (Different time period)
10	Vliamos, S. & Tzeremes, N. (2012) "Factors Influencing Entrepreneurial Process and Firm Start-Ups: Evidence from Central Greece"	164 firms - Central Greece	2005-2007	A) Factors determining entrepreneurial process and firms' formation B) Background of the Entrepreneur C) Problems Entrepreneur faced to startup business D) Description of Process	Academic	No overalapping (only Central Greece)

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   1.2. Hellenic Statistical Authority, https://www.statistics.gr/en/home/
   1.3. EU Startups, https://www.eu-startups.com/

2. **Incubators-VCs**
   2.1. Acein, https://acein.aueb.gr/

2.2. Aephoria.net, http://www.aephoria.net

2.3. Athens Startup Business Incubator, http://www.theathensincube.gr/

2.4. Corallia, http://www.corallia.org/en/

2.5. EGG, https://www.theegg.gr/el

2.6. Ekinisi Lab, http://ekinisilab-sev.gr/

2.7. Equifund, https://equifund.gr/

2.8. Industry Disruptors, http://industrydisruptors.org/

2.9. Innovathens, https://www.innovathens.gr/

2.10. Invent ICT, http://inventict.gr/

2.11. Iqbility, https://www.iqbility.com/

2.12. Marathon VC, https://marathon.vc/blog/greek-founders-attributes

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2.14. Marathon VC, https://marathon.vc/blog/greek-startup-industry-en

2.15. Metavallon, https://metavallon.vc

2.16. Microsoft Innovation Center, https://www.microsoft.com/el-gr/mic

2.17. STARTUP HEATMAP EUROPE, https://www.eu-startups.com/

2.18. MIT Enterprise Forum of Greece, https://www.mitefgreece.org/

2.19. NBG Business Seeds, https://www.nbg.gr/el/nbgseeds

2.20. Orange Grove, https://orangegrove.eu/

3. Other Sources

The following electronic sources have also been mined in order to gain information on the incubated startups and their initiatives in order to proceed in a thorough analysis using Facebook, LinkedIn and selected articles in the Press.

3.1. Facebook, https://el-gr.facebook.com/

3.2. LinkedIn, https://www.linkedin.com/

Selection of more than 100 articles from:

3.3. Emea, https://emea.gr/

3.4. Epixeiro, https://www.epixeiro.gr/

3.5. Fortune Greece, https://www.fortunegreece.com/

3.6. Huffington Post Greece, https://www.huffingtonpost.gr/

3.7. Kathimerini, https://www.kathimerini.gr/

3.8. Startupper, https://startupper.gr/