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Contribution of the nurseries of Spanish companies in the labor market

Contribución de los viveros de empresas españolas en el mercado de trabajo

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Abstract

Policies to promote employment are indispensable in the economic situation of Spain, a country with high unemployment rates. The aim of this article is to analyze the contribution to the market of business incubators in Galicia (Spain); it is therefore necessary to measure the creation of businesses, employment and survival rates, and analyze the efficiency of the resources used by the incubators to achieve said objectives. The efficiency of the subsidies granted to entrepreneurs to create employment was also researched. The results show that incubators are an instrument that creates wealth through the creation of businesses and employment. Regarding the efficiency of the subsidies granted to entrepreneurs for the creation of employment, there is no contribution to the increase in the creation of employment for those that receive it, though without it there would be a decrease in the creation of employment and an increase in job insecurity, which justifies its existence.

JEL Classification: M13, R11, O11, O43.
Key words: Business incubators, creation of employment, creation of companies, business survival rates, public resources and grants.

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Resumen

En la situación económica con altas tasas de desempleo en España, las políticas de fomento del empleo se vuelven imprescindibles. Con este artículo se pretende analizar la contribución al mercado de trabajo de los viveros de empresa en Galicia (España), siendo necesario medir la creación de empresas, empleo y tasas de supervivencia, analizando además, la eficacia de los recursos empleados por los viveros para la consecución de dichos objetivos. La eficacia de las subvenciones otorgadas a los emprendedores para la generación de puestos de trabajo fue también investigada. Los resultados muestran que los viveros son un instrumento que genera riqueza, a través de la creación de empresas y generación de empleo. Respecto a la eficacia de las subvenciones a los emprendedores para la creación de empleo, no existe una contribución al incremento de la generación de empleo en los que la reciben, aunque sin ellas habría un decremento en la creación de puestos de trabajo y un incremento en la precariedad laboral, lo que justifica su existencia.

Códigos JEL: M13, R11, O11, O43.
Palabras Clave: viveros de empresa, creación de empleo, creación de empresas, tasas de supervivencia empresarial, recursos públicos y subvenciones.

Introduction

The 2008 economic crisis, which originated in the United States, had international effects. As we can observe in Figure 1, and according to data from the National Statistics Institute (INE for its acronym in Spanish), Spain went from having an unemployment rate of 8.24% in 2007 to 24.46% in 2014, reaching an all-time high in 2013 of 26.1%. Although it seems that the economy is beginning to recover, there has been an increase in the unemployment rate of 197% within a period of 8 years. This entails a weakness in an analysis of the Spanish economy.

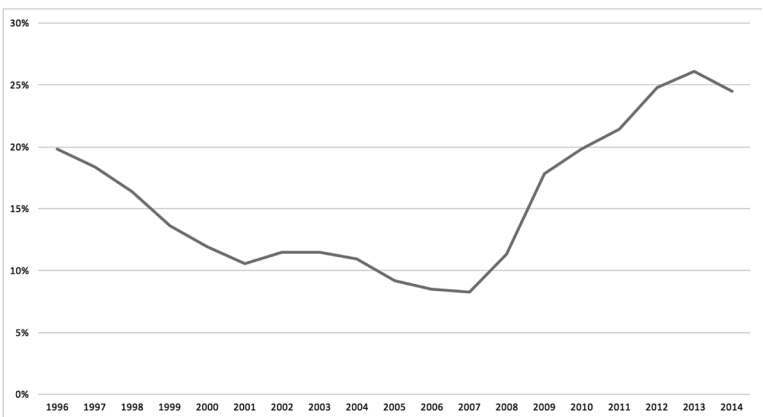

Figure 1. Evolution of the Unemployment rate in Spain (1996 – 2014)
Source: Based on data from the INE (2015a)

Galicia is no exception to the global situation experienced in recent years, reaching an unemployment rate of 20.9% in 2014, thus having increased by 175%, with an all-time high of 22.1% in 2013, which implies a small correction in the rate (Graph 2).

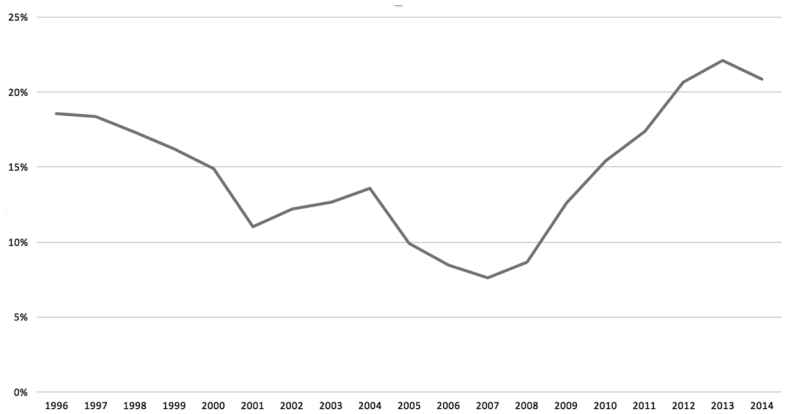

Figure 2. Evolution of the Unemployment Rate in Galicia (1996 – 2014)
Source: Based on data from INE (2015a)

As can be observed, despite the recovery in recent years, unemployment rates continue to be very high, and finding themselves in an economic recession, companies are reluctant to hire new personnel. As such, entrepreneurship becomes a highly attractive alternative, given that it is a way to try to generate income.

There are many uncertainties associated with being an entrepreneur, given that the creation of a business has significant inherent risks, thus the support systems for entrepreneurship become necessary tools.

In this article, we will try to justify the use of a support system—this being the business incubators in the Galician community—; namely, we will study the contribution of the business incubators to the job market. To this end, we will approximate the concept of business incubator through the contributions of various authors, and will briefly outline the main objectives. Their contribution to the job market will be observed through data obtained through surveys applied to the different Galician incubators; furthermore, we will use these surveys to understand the influence of the resources and subsidies in the creation and improvement of employment opportunities. Finally, we will summarize the results of the study in our conclusions.

Review of the literature

An incubator can be conceived in different manners because it covers various utilities. Thus, the literature that comprises this subject is very broad, as different authors have written about it. However, there is no universal definition for the concept of business incubator, since each author has contributed their part when contextualizing this tool. Hence, we will review a couple of the most important definitions.

For Martínez (1987), incubators are installations where spaces are temporarily set up for R&D entrepreneurship activities, and are usually close to an academic institution and/or research center. Along the same line is the definition by the COTEC foundation (1993, 1998), which considers incubators to be institutions that enhance the creation of companies, and whose service extends to activities such as innovation consultancy and the training of entrepreneurs. Velasco (1995) claims that these are spaces where business activities in the first stages of productive development can be carried out, as they provide technical assistance and support for the corporate constitution; furthermore, the public or private sectors finance them, since it is an industrial development policy. Finally, we have the definition of the European Business Incubation Centres Network (2009), which considers incubators to be installations created and promoted in a specific area, whose objective is the development of the projects of the SMEs, usually financed by the public sector, as it can be considered a contribution to the local and regional development. Since the 21st century, incubators are perceived as institutional environments that are not only essential for the economic growth and prosperity of businesses in a particular sector of a country, but which also contribute in a direct and indirect manner to the national development (Perdomo Charry, Arias Pérez and Lozada Barahona, 2014).

Despite having analyzed only a couple of the definitions presented by some authors in their works, the following have also contributed with their own definition: Smilor and Gill (1986); Camacho (1998); Quintas et al. (1992); Barrow (2001); Rice (2002); Hackett and Dilts (2004); Hansson, Husted and Vestergaard (2005); NBIA (2007); UKBI (2007); Bergek and Norrman (2008); Ferreiro and Vanquero (2011). These authors support the aforementioned definitions, as such we can define an incubator as a space where entrepreneurs establish themselves in the first stages of life of the project to make use of the services and functions that it provides. Incubators are organizational forms, frequently created with the support of agencies for economic development (Marlow and McAdam, 2011).

Despite the fact that the definitions date to later years, the first business incubator was created in Batavia in 1959 (New York), thus it was then that business incubators began to emerge (Aerts, Matthyssens and Vandenbempt, 2007). From this point onward, their dissemination through the USA was quick. Particularly, the case of the Silicon Valley industrial park and the Stanford Research Park stands out, both created by the Stanford University, with the latter being a technological park that has the aim to promote the transfer of technology developed in the university area towards the creation of businesses. However, it was until the 70s, twenty years later, that public action was taken regarding this issue, thanks to programs such as the EDA and NSF, which sought economic development and the creation of new businesses. The success achieved with them promoted the use of incubators as tools to strengthen economic growth.

In Europe, incubators appeared mainly in England thanks to the British Steel Corporation and the European Union, whose joint action caused the implementation of initiatives that favored the creation and sustainment of businesses, as well as the creation of new jobs (Rice, 2002).

At the start of the 1980s, the European Commission, with the support of the universities that used incubators for the development of the spin-off, encouraged the creation of business and innovation centers, marking the products and services created by its research centers. Furthermore, it was then that the National Business Incubator Association (NBIA) was created, causing the large promotion of business incubators.

From 1990 to current date, community programs that aim to eliminate the obstacles for business development, creation and sustainment of businesses, and which support the capacity to undertake and create new jobs have been developed. Incubators have a fundamental role in the economic development process of the localities, because they provide the instruments and services necessary to accelerate the growth and success of business projects at the reach of the entrepreneurs (Cerdán Chiscano, Jiménez Zarco and Torrent-Sellens, 2013).

Originally, incubators only offered a physical space for businesses to install themselves, share basic administrative equipment, obtain information regarding permits, patents, loans, receive support and counsel regarding management and marketing techniques, enjoy basic services at a low cost, and find access to capital (Gatewood, Ogden and Hoy, 1985; Peterson, 1985; Allen, 1985). Nevertheless, with the passage of time, the services offered have expanded to the point of turning incubators into reinforcements for the creation of viable businesses, to develop competitive capabilities, and take advantage of synergies; thus, becoming instruments with relevance to the economy in general and the creation of jobs (Autio and Klofsten, 1998; Rice 2002). This goes in agreement with the essence of the incubators, since these were used by businesses in order to have a great potential to create jobs, revitalize the local economy, market new technologies, and strengthen the regional and national economy (NBIA, 1997).

In general, the objective of the incubators is the promotion of businesses so that they are able to persist and compete in the market (Hannon, 2005). Vaquero and Ferreiro (2011) consider the search for the ideal framework for the creation, development, and maturity of the business experiences of a particular zone to be essential.

There is a distinction between the objectives pursued according to whether the incubator is of first generation or of new economy. Thus, first-generation incubators have the objective of promoting the emergence of entrepreneurs in specific areas, as well as the economic development of the territory; however, the new economy incubators specialize in new technology businesses and tend to be managed by the private sector (Marimon and Alonso, 2005).

In line with the above, we have compiled a set of essential objectives developed by the business incubators, among which stand out: promoting the diversification of offered products; improving the opportunities for the creation of new businesses—especially those that develop their activity in innovative areas—; strengthen and revitalize the business fabric and its contribution to the economic growth and employment; offer a work environment that adds value to the businesses found within it, both due to the image of its installations, and to the offered benefits; advise and train businesses; incentivize the development of new business initiatives, both of new businesses as well as of new product lines of already existing businesses; diversify the economy of a territory or region and bolster its economic development (Ferreiro, 2008).

Thus, the union between entrepreneurs and investors is done through the incubators regarding the transmission of information, new ideas, and projects. For this, a series of services and functions are presented, which can be observed in Tables 1 and 2.

Table 1
Functions developed by the bussines incubators

Functions carried out by the business incubators
Temporary support for new business initiatives by making available installations and specialized consultancy.
Consolidation of new businesses, minimizing the technical and economic costs at the start of the activity.
Strengthening of the entrepreneurial capacity in an adequate environment.
Business development through the creation of institutions that group common interests, with the consequent cost saving.
Improvement of the relations between the public and private research centers and between the businesses themselves.
Favor the development of business projects.
Increase the success rate of the small and medium enterprises, especially when they are more vulnerable.
Contribution to the creation of jobs.
Training for entrepreneurs to improve their capabilities and competitiveness.
Contribute to the local and regional development.

Source: Vaquero and Ferreiro (2010a); COTEC (1998); European Business Incubation Centers Network (2009); NBIA (2007); UKBI (2007).

Table 2
Services offered by the incubators

Services offered	Specifications
Logistic and administrative services	▪ Warehouses, offices or polyvalent modules (with a surface adapted to the needs of the incubators and at lower prices than those in the market). ▪ Meeting rooms and common areas. ▪ Shared photocopier, fax, scanning and internet connection services. ▪ These services are offered for a limited period of time.
Business consultancy	▪ Information and consultancy on the best legal structure of the company, applicable support and subsidies, and other consultancy and business management services.
Business training	▪ Training actions for the employees. ▪ Monographic seminars and sectorial meetings. ▪ Training for the entrepreneurs to improve their capabilities and competitiveness.

Source: Vaquero and Ferreiro (2010b); COTEC (1998); NBIA (2007); UKBI (2007).

Methodology

The objective of this article is to analyze the extent to which the business incubators contribute to the economic development. To this end, the results of these centers must be quantified, such as the number of businesses and jobs created and the discontinuation rate of the companies. Given that Spain has a broad problem with unemployment, we have focused on the impact that the incubators have in the creation of jobs in Galicia and its region. However,

the business initiative centers consume resources, and as such the efficiency relation between the resources of the incubators (which depend largely on the public sector) and the creation of businesses, and particularly employment, was analyzed. The second objective departs from the view that almost 81% of businesses receive subsidies for the creation of jobs, thus questioning whether these create more jobs than those that do not receive these subsidies. Therefore, the objective is not only to analyze the contribution of the business incubators, but also the efficacy of the resources used for the creation of jobs.

The methodology is based on quantifying the creation of businesses, jobs, and their survival. For this purpose, surveys have been applied to all the incubators of Galicia. The impact they have on the territory has been analyzed, as they are regional development policies. To analyze the efficacy of the resources of the incubators and the degree of achievement of the objectives, at a statistical level, Pearson's correlation has been analyzed, as well as its significance, along with regressions, between the resources used by the incubators and the creation of businesses and jobs. To analyze the efficacy of the subsidies to the entrepreneurs for the creation of jobs, a Unifactorial Analysis of Variance was used through the statistic F, and using Levene's test which reports whether the statistic complies with the assumption of equal variances. Thus, through independent samples, the creation of jobs is compared by business activity between the entrepreneurs of the business incubators that have received subsidies for the creation of jobs and those that have not.

This methodology is different from the one used by Ferreiro et al. (2015), where the total resources used in the business incubators were analyzed using an econometric model. Said resources were used to finance the space and professionals to serve the entrepreneurs that create businesses, jobs, and that pay taxes. In Ferreiro and Rodriguez (2015), the influence of the public resources was analyzed through another model of structural equations, given the dependence of the business incubators on the public subsidies. In Ferreiro and Camino (2016), the analysis on whether the investments by the public sector in this type of installations is recovered through tax collection and whether it is profitable to do so is done through the Fiscal method. In this article, the objective and the methodology are directed towards analyzing the impact on the creation of jobs and whether it complies with said objective through the business incubators.

All methodologies have limitations. Not all businesses, nor all jobs created are due to business incubators, as some business initiatives would have developed and survived without the incubator. Considering that the mortality rate until the fourth year of the businesses in Spain is of 46.3% (INE, 2015b), it means that 53.7% of businesses would have survived even outside the incubator. Given that the survival rate of businesses located in the Galician incubators is of 90.8% until the fourth year, it can be assumed that 37.1%[3] of the businesses that emerge from the incubators are directly related to this type of business creation instrument. This fact has been taken into consideration when analyzing the impact of businesses and jobs created, or when calculating the impact of unemployment per area or region. That said, when analyzing the relation and efficacy of the resources used by the business incubators, we understand that both the total resources consumed as well as their total contribution need to be used as input for there to be a logical correlation between resources consumed and the contributions. On the other hand, when the governments grant a subsidy for the creation of jobs, in general, they do not do so according to whether a business is in an incubator or not. Therefore, to analyze

[3] Is the difference between the survival rate of the companies in business incubators and that of businesses in general.

the profitability of the subsidies in the creation of jobs we cannot focus only on the business initiatives that hypothetically survive thanks to the business incubators, given that our sample size and object of analysis are all of the business activities located in the business incubators.

There are other limitations, given that the information capture has been based on what was declared on the surveys by the entrepreneurs (56.1%) and the business incubators (100%), (Ferreiro et al., 2015) as there isn't any official source nor association that indicates something as basic as the total number of incubators in Galicia and their location. As such, large efforts have been required to collect all the necessary information to test this model, though it is now an asset to have this information regarding the incubators available. Another restriction is that the methodology focuses on the resources consumed compared against three contributions (businesses created, employment and survival rates), but there are other not considered variables that influence the contribution of the incubators, such as the dissemination of the entrepreneurial culture, the consultancy to businesses that did not demanded space in the incubators, etc. Time is another limitation; the 2009-2014 period was measured here, though this does not mean that the results cannot be different in other periods. Furthermore, it must be noted that the analysis is carried out in Spain, a country that is very sensible in the subject of employment due to its high unemployment rates.

Contribution to the job market

The current economic situation, along with the high unemployment rates in Spain, has led to the search of new alternatives for the creation of jobs. The incubators have the following objectives: the creation of businesses; the creation of jobs; social cohesion, avoiding economic relocation; economic growth and development, stimulating the economic boost in the area where these develop; the development of job networks, strengthening networking and business collaboration; the improvement of the business survival rates; and the increase of tax collection (Autio and Klofsten, 1998; Colombo and Delmastro, 2001; Lalkala, 2002; Rice, 2002; Totterman and Sten, 2005; Hughes, Ireland and Morgan, 2007; NBIA 2007; McAdam and McAdam, 2008; Uribe and De Pablo, 2009; Scillitoe and Chakrabarti, 2010; Thierstein and Wilhem, 2011; Vaquero and Ferreiro, 2011, 2014; Bollingtoft, 2012; Ferreiro, 2014).

Lewis (2001) confirms the aforementioned stating that the incubators are a promotional tool for the creation of new businesses. This assertion is reinforced by the existence of 900 incubators that created more than 19,000 businesses and thereby 245,000 jobs in 2002 in the United States (Scaramutzzi, 2002). In the European case, Germany is the country with the highest number of incubators, followed by France and the United Kingdom (Fernández, Blanco, Alonso, Santos, González-Blanch, Romero and González, 2011). Spain is not exception to the phenomenon of the incubators, since it is estimated that there are around 300 of them, with Catalonia being the autonomous community with the highest percentage of incubators, followed by Andalusia, Madrid and Valencia (Vaquero and Ferreiro, 2014). However, despite not being in the top four, Galicia had 22 business incubators in 2014 with a strong territorial concentration, Ourense has the highest percentage of incubators in the whole community, followed by A Coruña, Santiago de Compostela and Lugo.

As can be observed in Table 3, in 2014 the incubators contributed to the creation of jobs with the foundation of 1,150 business and 3,498 jobs, having a 3.06% increase compared to the previous year in the business incubators. As previously mentioned, 37.1% of the activity is

directly related to business incubators, which would increase to 427 businesses and 1,298 jobs.

The business incubators that have contributed the most to the creation of jobs are the Tecnopole (1,098), which is technological; the Foundation of the Businesspeople Confederation of Lugo-Initiatives by Lugo (475); UNINOVA-USC (441), which is also technological, linked to the University of Santiago de Compostela; furthermore, CIE A Granxa (252), the Vigo Chamber of Commerce (187), and CIE Mans (160) also show a high number of created jobs. Nevertheless, despite these being the leading incubators, all of them contribute to the job market with the creation of jobs.

Table 3
Indicators regarding the creation of businesses, jobs and abandonment rates (2014)

Incubator	Businesses created	Jobs created	Abandonment rate (accumulated)
A Coruña Chamber of Commerce	20	83	7.3%
Ferrol Chamber of Commerce	26	51	12.1%
Lugo Chamber of Commerce	13	15	8.4%
Ourense – Fernando Fontán Chamber of Commerce	36	69	15.4%
Pontevedra – Eladio Portela Chamber of Commerce	18	22	7.9%
Santiago de Compostela Chamber of Commerce	75	128	9.8%
Vigo Chamber of Commerce	79	187	11.9%
Vilagarcía de Arousa Chamber of Commerce	20	43	13.0%
Business Experimentation and Development Center – Fundación Empresa Universidad Gallega (CEDE-FEUGA)	54	107	14.3%
Business and Innovation Center (CEI NODUS). City Council of Lugo	33	94	12.6%
Business and Innovation Center (CIE) A Granxa – Fernando Conde Montero-Ríos Vigo	94	252	10.9%
CIE of Terras do Avia O Ribeiro	7	23	6.0%
CIE of the city council of Coles Ourense	23	54	6.0%
CIE of the city council of Ourense	14	30	6.9%
CIE Mans Coruña	51	160	7.9%
CIE Seara Eume	3	8	0%
CIE Tecnopole Ourense	343	1,098	9.9%
Municipal Center for Businesses (CME Iglexario A) Coruña	20	43	5.5%
Foundation of the Businesspeople Confederation of Lugo-Initiatives for Lugo	67	475	6.7%
Business Incubator of the Businesspeople Confederation of Ferrol	9	22	7.5%
OTRI-University of A Coruña	31	93	12.9%
UNINOVA-University of Santiago de Compostela	114	441	8.5%
Total /average (rates)	**1,150**	**3,498**	**9.2%**
Total /average (rates) due to the business incubators	**427**	**1,298**	**9.2%**

Table 4 shows a comparison between the jobs created in total and directly in the Galician business incubators, the unemployment by areas, and a relation between the jobs created and the regional unemployment. However, this data ought to be carefully interpreted, as we cannot confirm that all the jobs created are net increases given that we do not know the previous situation of the entrepreneurs and of the people hired by them. Despite this limitation, it seems logical to think that without the business incubators, the number of unemployed people would increase by 2.03% compared to the current figure, fruit of the 3,498 jobs created in the incubators. However, if we consider the jobs created directly by the action of the incubators, the impact of a decrease in the number of unemployed would be of 0.76%, which represents 1,298 jobs. If we focus on the first three geographical areas where the incubators operate, the jobs created increase to 2,511 which implies not increasing the number of unemployed regarding the existing total by 6.66%, of which 931 jobs and a percentage of 2.47% would be directly attributed to the business incubators.

Table 4
Jobs created through the business incubators, by region (2014)

Region	Nº of jobs created by the incubators	% s/total incubators	Regional Unemployment	Job incubators / Regional unemployment
Ourense	1,251	35.76%	13,210	9.47%
Lugo	584	16.70%	10,352	5.64%
Santiago	676	19.33%	14,138	4.78%
Vigo	439	12.55%	46,848	0.94%
Bergantiños	83	2.37%	7,304	1.14%
O Ribeiro	23	0.66%	1,351	1.70%
A Coruña	296	8.46%	35,386	0.84%
Ferrol	73	2.09%	16,237	0.45%
O Salnés	43	1.23%	12,342	0.35%
Eume	8	0.23%	2,116	0.38%
Pontevedra	22	0.63%	12,631	0.17%
Total	**3,498**	**100%**	**171,915**	**2.03%**
Total net increase[5]	**1,298**	**37.11%**		**0.76 %**
Total of the first three regions	**2,511**	**71.78%**		**6.66 %**
Total net increase[6] of the first three regions	**931**	**26.62%**		**2.47 %**

Following the analysis of the creation of jobs, it is also interesting to study the relation between the businesses and the creation of jobs. We can observe in Table 5 that Pearson's

[5] Those that manifested both their business and the creation of jobs to be outside the business incubator would be excluded as job creation.

[6] Those that manifested that their business and the creation of jobs would be outside the business incubator, but within the first three regions, would be excluded as job creation.

correlation coefficient between the creation of businesses and the creation of jobs is of 0.966 (2009) and 0.959 (2014), with a very high significance in both cases.

Table 5
Correlations between the creation of businesses and the creation of jobs for the accumulated data from 2009 and 2014

		Accumulated Jobs 2009	Accumulated Jobs 2014
Accumulated Businesses 2009/2014	Pearson's Correlation	0.966***	0.959**
	Sig. (bilateral)	0.000	0.000
	N	21.000	22.000

*** The correlation is significant at a level of 0.001 (bilateral).

Influence of the resources of the incubators in the creation of jobs

All organizations that perform any activity require economic resources to carry it out. Therefore, the influence of resources in the creation of jobs in the incubators is analyzed below. By doing a regression analysis between the resources of the incubators and the creation of jobs, a Pearson correlation coefficient of 0.627 can be observed, which when squared is equal to R^2=39.3%, making the resources of the incubators in 2009 explain the creation of jobs in said percentage, with a significant regression, as can be observed in Table 6.

Table 6
Regression between the resources of the Galician incubators and the creation of jobs with accumulated data up to 2009

Model summary

Model	R	R squared	Corrected R squared	Standard error of the estimate
1	0.627[a]	0.393	0.361	29.56397

a. Predictive variables: (Constant), Resources09

Coefficients[a]

Model		Non-standardized coefficients		Typified Coefficients	t	Sig.
		B	Standard error	Beta		
1	(Constant)	10.438	10.328		1.011	0.325
	Resources09	0.000	0.000	0.627	3.506	0.002

a. Dependent variable: Employment09

Nevertheless, in the case of 2014, as indicated in Table 7, the resources of the incubators go on to explain the 32.7% of the creation of jobs, with this datum being statistically significant.

Table 7
Regression between the resources of the Galician incubators and the creation of jobs with accumulated data up to 2014

Model	R	R squared	Corrected R squared	Standard error of the estimate
1	.572[a]	.327	.293	206.09369

[a] Predictive variables: (Constant), Resources_incubators

Coefficients[a]

Model		Non-standardized coefficients		Typified coefficients	t	Sig.
		B	Standard error	Beta		
1	(Constant)	-14.688	70.946		-.207	.838
	Resources_incubators	.002	.001	.572	3.118	.005

a. Dependent variable: Job_incubators

Relevance of the subsidies in the creation of jobs

There are different ways to obtain financing. One of them is the subsidies received through the public sector at sunk cost, whose objective is the activation of the economy and in particular those granted for the creation of jobs. Thus, the percentage of business incubators with subsidies in their financing is of 80.56%.

Some authors think that this is not a positive situation, but quite the contrary. Urbano and Vecina (2001) state that these subsidies depend excessively on the political cycles. Similarly, Nueno (2009) states that the creation of jobs and competitiveness does not depend on the subsidies but on productivity, given that an entrepreneurial project must be viable from a technical, economic and financial point of view, so subsidies do help but are not a key factor.

A Unifactorial Variance Analysis was applied to observe the influence of subsidies, comparing the creation of jobs between entrepreneurs that did receive subsidies and those who did not. It is possible to observe in Table 8 that the employment average between those that received subsidies (3.81 jobs) and those who did not (3.82) is practically the same, being statistically significant (t=0.011; p=0.991).

With the displayed results, the entrepreneurs that have received subsidies do not create more jobs than those who did not received them, coinciding with the ideas of some of the authors we have mentioned.

Nevertheless, we must be cautious with the comparison as it could lead to the conclusion that, given that the entrepreneurs who do not receive subsidies create the same number of jobs than those who do receive them, therefore the aforementioned subsidies are not needed. We must not forget that those who do not receive it represent 19.44%, and as such it would be necessary to analyze the impact it would have among the 80.56% collective that does receive it. Of those who received subsidies for the hiring of personnel, 90.7% stated they would not have created jobs without said subsidies. On the other hand, the subsidies require certain conditions: to respect the professional category and to maintain the jobs for 3 years with undefined contracts.

Table 8
Comparison of jobs created between the entrepreneurs who received subsidies and those who did not (2009)

Statistical Groups					
	Subsidies	N	Average	Average deviation	Average standard error
Job	Not received	28	3.8214	5.93828	1.12223
	Received	116	3.8103	4.28529	0.39788

Independent samples test										
		Levene's test for equality of variances		T test for the equality of averages						
		F	Sig.	t	gl	Sig. (bilateral)	Average difference	Standard error of the difference	95% Confidence Interval of the Difference	
									Inferior	Superior
Job	Equal variances have been assumed	0.012	0.913	0.011	142	0.991	0.01108	0.97807	-1.92237	1.94454
	Equal variances have not been assumed			0.009	34.08	0.993	0.01108	1.19068	-2.40843	2.43060

In conclusion, it is an objective fact that in Galicia the entrepreneurs of the business incubators who have not received subsidies for the hiring of personnel have created the same employment rate per activity; and that those who receive subsidies represent 81.1% and, for the most part, they express that they would not have created jobs without said subsidies.

Conclusions

The main conclusion achieved deals with the relevance of the business incubators as mechanisms for the creation of jobs in the current crisis. Due to these incubators, 1,150 businesses and 3,498 jobs were created in the Autonomous Community of Galicia (Spain) in 2014, with an abandonment rate of 9.2%, when the average outside the incubators is of 46.3% in Spain. Even only taking into account the contributions of the businesses presented to be directly linked to the incubators, the data would be of 427 businesses and 1,298 jobs.

Within the incubators that create the greatest number of jobs are the so-called technological, Tecnopole and UNINOVA – USC, but it cannot be concluded that these contribute more than the generalist incubators managed by the businesspeople confederations or Chambers of Commerce.

Another conclusion is that the jobs created in the business incubators would decrease the number of unemployed by 2.03% in the regions where these exist, and by 0.76% if we only

consider those exclusively created by the actions of the incubator. In the main areas where incubators can be found, these ratios would be around 6.66% and 2.47%, respectively.

The correlation of 96.6% between the creation of businesses and jobs evidences the importance of business promoting policies to fight against unemployment.

A crucial question is the efficacy of the resources of the business incubators used for the creation of jobs, observing that the regressions between jobs and resources both for 2009 and 2014 are positive and significant. Therefore, we can conclude that the resources of the business incubators are a relevant factor for the creation of jobs in the incubators, given that the incubators with greater resources created a greater number of jobs.

On the other hand, Table 8 shows that the businesses that benefit from public subsidies have an average employment within the same ratio as those that have not received any sort of public support. Nevertheless, it cannot be categorically asserted that subsidies are unnecessary, since 90.9% of those who receive them stated that they would not create employment without this support. On the other hand, receiving subsidies carries with it certain requirements, such as the employment lasting three years and payment according to the training of the hired professional.

Among the main limitations of this research is the absence of official data specific to these entrepreneurial initiatives centers. Furthermore, there is a temporal limitation, as the work is directed at a period of crisis, which can substantially change if the effects of the incubators are studied in a different economic context. This research work is based on quantitative data, and thus the conclusions are conditioned by the available information.

Finally, as future lines of research, we recommend studies regarding the measurement of the efficacy of business incubators and subsidies in other regions of the world, and then a comparison of the results. It would also be interesting to carry out the study in Galicia once more in a couple of years, in order to see if results similar to the ones in this research are obtained.

References

Aerts, K., Matthyssens, P. & Vandenbempt, K. (2007). Critical role and screening practices of European business incubators. *Technovation*, 27(5), 254-267. doi.org/10.1016/j.technovation.2006.12.002

Allen, D. (1985). An entrepreneurial marriage: business incubators. *V Congreso Anual Balson Collage Entrepreneurship Research*. Wellesley, Maryland.

Autio, E. & Klofsten, M. (1998). A comparative study of two European business incubators. *Journal of Small Business Management*, 36(1), 30-43.

Barrow, C. (2001). *Incubator: A realist's guide to the world's new business accelerators*. West Sussex, UK: John Wiley & Sons Ltd.

Bergek, A. & Norman, C. (2008). Incubator best practice: A framework. *Tecnnovation*. https://doi.org/10.1016/j.technovation.2007.07.008

Bollingtoft, A. (2012). The bottom-up business incubator: Levergae to nerworking and cooperativon practices in a self-generated, entrepreneurial-enabled environment. *Technovation*, 32 (5), 304-315 doi.org/10.1016/j.technovation.2007.07.008

Camacho, J. (1998). Incubadoras o viveros de empresas de base tecnológica: La reciente experiencia europea como referencia para las actuales y futuras iniciativas latinoamericanas. *XII Congreso Latinoamericano sobre espíritu empresarial*. Costa Rica.

Cerdán Chiscano, M., Jiménez Zarco. A.I. & Torrent-Sellens, J. (2013). Valorando los programas de apoyo al emprendedor en las incubadoras de empresas en Cataluña. *Revista Venezolana de Gerencia,* 18(63), 408-433.

Colombo, M. G. & Delmastro, M. (2002). How effective are technology incubators?: Evidence from Italy. *Research Policy,* 31(7), 1103–1122. https://doi.org/10.1016/s0048-7333(01)00178-0

COTEC (1993). *Conceptos básicos de referencia para el estudio de la innovación tecnológica*. Madrid: Fundación COTEC.

COTEC (1998). *Libro Blanco. El sistema español de innovación. Diagnóstico y recomendaciones*. Madrid: Fundación COTEC.

Fernández, P., Blanco, F.J., Alonso, M.A., Santos, M., González-Blanch, Romero, A. & González, L. (2011). *El papel de los viveros de empresas en la creación de empleo*. Universidad Rey Juan Carlos. Disponible en: http://www.madrid.org/edupubli/cgi-bin/WPUB_BD.exe?ACCION=RecogerPDF&CDDEPTNO=09&CDTEXP=PU&CDAEXP=2012&CDNEXP=51&CDDIGITO=5&CDESTADO=3&NMORDEN=2

Ferreiro, F. (2008). Los viveros de empresas de Galicia: Una manera de emprender. *XXII Congreso AEDEM*. Salamanca.

Ferreiro, F. (2014). *Los viveros de empresas en Galicia: Una estrategia generadora de riqueza*. Tesis doctoral, Universidad de A Coruña.

Ferreiro, F., Del Campo M., Camino, M. (2015). Analysis of business incubators in Galicia through the «Integral Model of economic profitability». *Investigaciones Regionales — Journal of Regional Research*, (33), 7-31.

Ferreiro, F. & Rodriguez, G (2015). Análisis de la eficacia de los recursos empleados en los viveros de empresas gallegas. *Información Comercial Española*. Ministerio de Economía y Competitividad. (90), 257-276.

Ferreiro, F. & Camino, M. (2016). Análisis cuantitativo de los centros de iniciativas empresariales medido a través del método de la balanza fiscal: el caso gallego. *Revista Galega de Economía*. 25 (1), 61-75.

Gatewood, B; Ogden, L. & Hoy, F. (1985). Incubator centers: Where they are and where are they going. *V Congreso Anual Babson College Enterpreneurship Research*. Maryland: Wellesley.

Hackett, S. y Dilts, D. (2007). Inside the black box of business incubation: Study B-scale assessment, model refinement and incubation outcomes. *Journal of Technology Tansfer*, 33(5), 439-471. https://doi.org/10.1007/s10961-007-9056-9

Hansson, F., Husted, K. & Vestergaard, J. (2005). Second generation science parks: from structural jockeys to social capital catalysts of the knowledge society. *Technovarion*, 25(9), 1039-1049. https://doi.org/10.1016/j.technovation.2004.03.003

Hughes, M., Ireland, R. D. & Morgan, R. E. (2007). Stimulating Dynamic Value: Social Capital and Business Incubation as Pathway to Competitive Success, *Long Range Planning*, 40, 154–177. https://doi.org/10.1016/j.lrp.2007.03.008

INE (2015a). *Tasa de paro en España. Encuesta de Población Activa*. Disponible en: http://www.ine.es/dyngs/INEbase/es/operacion.htm?c=Estadistica_C&cid=1254736176918&menu=ultiDatos&idp=1254735976595

INE (2015b). *Tasas de empresas desaparecidas. Demografía armonizada de empresas*. Disponible en: http://www.ine.es/inebmenu/mnu_empresas.htm

Lalkaka, R. *et al* (2002). Technology business incubators to help build an innovation-based economy. *Journal of Change Managament*. 3(2), 167-176. https://doi.org/10.1080/714042533

Lewis, D.A., (2001). *Does technology incubation work? A critical review*. Disponible en: /http://www.eda.gov/ImageCache/EDAPublic/documents/pdfdocs/ lewis_5frutgers_5frept_2epdf/v1/lewis_5frutgers_5frept.pdfS.

Marimón, F. & Alonso, J. M. (2005). Viveros de empresa en Cataluña. Tradicionales y especializados. *Boletín económico del ICE*, 2860, 31-46. Disponible en: http://repositori.udl.cat/bitstream/handle/10459.1/1802/BICE_2860_.pdf?sequence=1

Martínez, A. (1987). Gestión y planificación de los parques tecnológicos. *Economía Industrial*, 258, 103-111.

McAdam, M. y McAdam, R. (2008). High tech start-ups in University Science Park incubators: the relationship between the start-up's lifecycle progression and use of the incubator's resources. *Technovation*, 28(5), 277–290. https://doi.org/10.1016/j.technovation.2007.07.012

Marlow, S. y McAdam, M. (2011). Analysing the influence of gender upon high technology venturing within the context of business incubation. *Entrepreneurship Theory and Practice*, 36 (4), 655-676. https://doi.org/10.1111/j.1540-6520.2010.00431.x

NBIA (1997). *National Business Incubation Association publications*. Disponible en: www. nbia.org

NBIA (2007). *National Business Incubation Association publications*. Disponible en: www. nbia.org

Perdomo Charry, G., Arias Pérez, J.E. & Lozada Barahona, N.E. (2014). Business incubator research: a review and future directions. *Pensamiento y Gestión*, 37, 41-65. https://doi.org/10.14482/pege.37.7020

Peterson, J. (1985). Creating jobs by creating businesses: the role of business incubators. *National Council for Urban Economic Development*, Washington.

Rice, M. (2002). Co-production of business assistance in business incubators. An explanatory study. *Journal of Business Venturing*, 17, 163-187. https://doi.org/10.1016/s0883-9026(00)00055-0

Scaramuzzi, E. (2002). *Incubators in developing Countries: Status and Development Perspectives*. Washington, D.C.: The World Bank.

Scillitoe, J.L. & Chakrabarti, A.K. (2010). The role of incubator interactions in assisting new ventures. *Technovation*, 30 (3), 155–167. https://doi.org/10.1016/j.technovation.2009.12.002

Smilor, R.W. & Gill, M.D.J., (1986). *The new business incubator: Linking talent, technology, capital, and know-how*. Toronto: Lexington Books.

Thierstein, A. & Wilhelm, B. (2001). Incubator, technology and innovation centres in Switzerland: Features and policy implications. *Entrepreneurship and Regional Development*, 13(4), 315-31. https://doi.org/10.1080/08985620110074469

Totterman, H. & Sten, J. (2005). Start-ups. *International Small Business Journal*, 23 (5), 487-511. https://doi.org/10.1177/0266242605055909

UKBI (2007). *What is business incubation*? Disponible en: http:// www.ukbi.co.uk.

Uribe, J. & De Pablo, J. (2009). Aproximación al modelo europeo de viveros de empresas. Estudios de casos. *Boletín Económico del ICE*, Ministerio de Industria, Turismo y Comercio, 2973, 41-48. Disponible en: http://www.revistasice.com/cachepdf/BICE_2973_41-47__A4788D5907107CB2218273DEDCB66C2E.pdf

Vaquero, A. & Ferreiro, F. (2010a). Los viveros en Galicia: Un análisis de su funcionamiento. *XII Congreso Hispano-Luso*. Ourense.

Vaquero, A. & Ferreiro, F. (2010b). *El papel de los viveros de empresa en Galicia como agentes de promoción económica y generación de empleo*. Santiago de Compostela: Xunta de Galicia. Consellería de Traballo e Benestar.

Vaquero, A. & Ferreiro, F. (2011). Los viveros gallegos como instrumento de desarrollo local: Situación actual y líneas de mejora. *Revista Galega de Economía*, 20(1), 1-23.

Vaquero, A. & Ferreiro, F. (2014). Experiencias regionales en viveros de empresas. *Revista de Estudios Regionales*. Universidades Públicas de Andalucía.

Velasco, B. (1995). Incubadoras de Empresas, Incubadoras de Negocios. *Memorias VI Seminario Latinoamericano de Gestión Tecnológica*, pp. 299-302. Santiago de Chile.