
Public investment in business incubators, is it better than doing nothing?

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Abstract: The objective of the article is to measure the impact caused by business incubators on the region of Galicia (Spain) in relation with the birth of new companies, the generation of new job posts and the payment of taxes derived from that activity and, particularly, the net creation of businesses attributable to the incubators. To analyse the profitability of the public investment made in business incubators, two methods are applied: the 'fiscal balance' method and the 'integral model of profitability of public resources'. The first measures what has been invested by public administrations and compares it to the fiscal income obtained from the business activity generated in business incubators. The second method, based on structural equations, correlates the public resources invested with the creation of companies, the generation of employment and tax collection. In both cases, the period under study is from 2009 until 2013.

Keywords: business incubators; public resources; creation of companies; employment; JEL codes: R38, R53.

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1 Introduction

Since the beginning of the economic crisis in 2008, there has been a clear increase in the creation of business incubators on a European level. The European Commission, through the European Initiative 2020 (European Commission, 2013, 2014), as well as national governments, regard this initiative as a means of boosting economic activity and of promoting the creation of employment. In times of economic crisis, public investment is subject to austerity measures; consequently, it is all the more necessary to assess the efficiency and efficacy of the uses of public resources.

Business incubators have proved to be more effective than other economic development programs, such as the attraction and creation of businesses (Markley and McNamara, 1994; Sherman, 1998, 1999; Sherman and Chappell, 1998; Lewis, 2001), including the attraction of foreign firms (European Business and Innovation Centre Network, 2013) and also to be a good instrument to stimulate business activity (Wenneker and Thurik, 1999), even though it is not actually clear whether companies leaving incubators generate much employment (Segal et al., 2005; Hackett and Dilts, 2004a). Moreover, as Hackett and Dilts (2004a) pointed out, since early research in the 90s, there has been very little progress regarding the economic and fiscal impact of business incubators, an issue that well deserves further research.

Additionally, as Spain is one of the countries that has adopted this type of initiative wholeheartedly, due to the high rate of unemployment that the Spanish economy has been experiencing over the last two decades, which represented 18.2% in the first quarter of 2017 (Spanish Statistical Office, 2017), the results of this research might be of particular interest in this case.

Ultimately and even though business incubators seem to be a promising alternative for promoting local development, it still remains necessary to verify if they are an efficient tool, especially in the present-day context; besides, given the fact that some of the firms would have been created in any case (Culp, 1996; Ferreiro and Vaquero, 2010), is this public investment better than doing nothing? This is an extremely relevant question, given that virtually all business incubators in Galicia receive public funding and that this situation can also be extrapolated to a national level; we must therefore ask whether it is effective and efficient to subsidise this type of facility with public money. In order to do this, it is necessary to find out if it is profitable to allocate public funds to business incubators and, at the same time, to quantify the return on this investment by means of the creation of new businesses and employment and also via greater tax revenue. The present study focuses on these questions, in order to determine if the commitment to support business incubators is the best option for Public Administrations (PAs) and if so, whether the outcome would have been the same regardless of the public funds.

Furthermore, the results obtained from the present work will be of great international interest because many countries, such as the US (Mian, 2014), Brazil (Chandra et al., 2014), France (Gabarret et al., 2014) or Belgium (Vanderstraeten et al., 2014), often make use of business incubators for local and regional development and because these facilities have been widely established in order to promote entrepreneurship and economic growth.

In order to answer this question, this paper is organised as follows. Section 2 presents a state of the art review, followed by a summary of methodological aspects and finally, results are presented and discussed.

2 Framework

Business incubators first appeared in the US at the end of the 1960s (Aerts et al., 2007). Since then, these kinds of programmes have not only grown significantly in quantitative terms but they have also evolved to offer remarkably diverse types of incubation (Dee et al., 2012). In fact, despite having been one of the first research areas in this field, the issue of definitions and taxonomies has been a recurrent topic over the last 50 years (Hackett and Dilts, 2004a).

Currently, there is no consensus in the literature about how to organise the typologies of business incubators and so occasionally, terms such as business incubator, accelerator, research park, science park, technology innovation centre, etc., are used interchangeably (Hackett and Dilts 2004b; Phan et al., 2005). The truth is that even incubators with similar objectives can have different structures (Bergek and Norrman, 2008). This makes research all the more challenging, because it conditions the comparability of the results and makes it necessary to specify in detail the object of study.

The concept of business incubators is subject to several interpretations. Camacho (1998) defines them as a place where new entrepreneurs are offered a complex and integrated system of activities and services, which supports the creation and development of innovative and independent activities. Martínez (1987) points out that these facilities are generally close to an academic and/or research institution, where temporary spaces are available for the undertaking of research activities and the development of prototypes. Voisey et al. (2006) indicate that they are non-profit facilities which enable the creation of jobs, economic growth and the commercialisation of innovation generated in higher education institutions. The UK Business Incubation (2007) defines incubators as places where a dynamic business development process is offered, satisfying the wide variety of demands that companies have in their first years of existence, reducing the percentage of failures, increasing the level of sales and generating a higher level of employment. In Chan and Lau (2005) it is pointed out that the provision of space has been identified by entrepreneurs as one of the most profitable characteristics of business incubators. The European Union (2009) identifies incubators as support organisations for entrepreneurs and small companies. There are more definitions by Abetti (2004) and Totterman and Sten (2005) in Finland; Colombo and Delmastro (2002) and Von Zedtwitz and Grimaldi (2006) in Italy; Wynarczyk and Raine (2005) and Hughes et al. (2007) in the UK; Voisey et al. (2006) and Voisey et al. (2013) in Wales; Mac Adam and Marlow (2007) and Mac Adam and Mac Adam (2008) in Ireland and the UK and Schwartz and Hornych (2008) and Schwartz (2009) in Germany, Jenssen and Havnes (2002) in Norway and others such as those by COTEC (1993, 1998), Velasco (1995), Juncar et al. (1995) in Spain.

Since the 1980s and as local and regional governments began to increasingly use business incubators as a tool to promote development, there has been a marked increase in academic investigation. Hackett and Dilts (2004a) identify five main research fields. As a result, the first studies, in the mid-1980s, focus on the development of incubators and, in particular, on their definition and characterisation. A second field refers to studies into the configuration of incubators, analysing aspects such as the components of the system of incubation or selection processes. The third is focused on analysing how incubated companies are developed inside the incubators. The fourth field deals with impact studies, not only in terms of proposed units and analysis measures, but also in terms of the influence of incubators on the success of companies. Finally, a fifth field centres on the application of several formal theories (transaction cost economics, network theory, entrepreneurship economics, etc.) to incubators and businesses.

The present study is clearly focused on the fourth line of article. The wide range of determining factors in the analysis (scope and definition of the object of the study, geographical location of the programs, maturity of companies, technological intensity, etc.) has meant that the impact measures used in the studies are also rather diverse. Thus, for example, Aerts et al. (2007) and Swartz (2012, 2013) have considered survival ratios, Hartmann and Masten (2000), Lerner (2000), Löfsten and Lindelöf (2002) and Salvador (2011) have taken into account the growth of incubated companies and Lindelöf and Löfsten (2004), Lofsten and Lindelof (2002), Phillips (2002) or Scillitoe and Chakrabarti (2010) have approached the transfer of knowledge and/or technology and networking. Patents have been considered in the articles of Phillips (2002) and Rothaermel and Thursby (2005), whereas Wallsten (2000) and Yang et al. (2009) include the analysis of RandD expenses. Bruneel et al. (2012) analyse the role of third generation incubators, which, besides space, offer support to entrepreneurs, such as coaching and a greater access to risk capital.

Especially relevant for our study are those articles that deal with the benefits for the community (Hackett and Dilts, 2004a). In Markley and McNamara (1994), Sherman (1998, 1999), Sherman and Chappell (1998), the role of incubators is analysed in relation to economic efficiency and fiscal returns.

The European Business and Innovation Centre Network (2013) conclude that a lot of innovation stems from the activity of business incubators. One of the relevant conclusions that comes from this line of article is the greater economic efficiency of the investment in incubators, as opposed to the alternatives for local development, such as the attraction of foreign firms. Nevertheless, direct comparisons with other types of schemes are difficult to make, one reason being that incubators usually combine many features of other schemes, (e.g., the provision of advisory services) and/or are closely linked to them (CSES, 2002). In any case, since then, little has been added to this field, despite the fact that it well deserves additional research (Hackett and Dilts, 2004a).

However, the need to make a distinction between gross and net impact has been pointed out (CSES, 2002; Tavoletti, 2013); but to the best of our knowledge, no specific attempts have been carried out. To this respect, the fact that many entrepreneurs state that they would have created their company even if the incubator had not existed (Culp, 1996; Ferreiro and Vaquero, 2010) suggests that one of the ways to distinguish between total and net impact of business incubators is by distinguishing those firms that would have been generated in any case and those that would not exist without the incubator. Some of the most cited papers in this field, for example CSES (2002) in the case of Europe, or several publications by the National Business Incubation Association in the US, such as Molnar et al. (1997) or Knopp (2007), lack this distinction and therefore overestimate public income, generated employment, etc. Given that public economic support will continue to be vital for the maintenance of incubators in the foreseeable future (CSES, 2002; Ferreiro and Vaquero, 2010) an increasingly precise analysis of the efficiency of this expense seems to be a relevant task.

Furthermore, there is no general consensus regarding the impact of business incubators, be it measuring their effect on survival rates – according to Woywode (2004) and Tamásy (2005) it is the minimum criteria of success – or the development of incubated companies, the effect of the incubation period, the impact on the tendency to develop patents, etc. (Dalziel, 2012). Additionally, empirical results raise some doubts as to the impact of incubation on long-term firm survival (Cheng and Schaeffer, 2011; Dee et al., 2011; Schwartz, 2013); this makes it necessary to contextualise our object of study, in so far as the specific conditions (role of the State, survival rates, etc.) that exist in the territorial and temporal area of the study.

Attention should also be drawn to those papers that question business incubators, given that according to Nueno (1996), some companies are located in incubators merely to obtain grants and public subsidies. Tamásy (2005) has also raised some issues about this type of assistance and Urbano and Veciana (2001) criticise that these initiatives are so conditioned by political agents.

Finally, it is not only necessary to assess the efficiency of public spending on business incubators, but also to discriminate the net economic and fiscal impact of this investment, especially when public funding is severely restricted, but at the same time it is expected to remain vital for business centres in the foreseeable future.

3 Methodology

The effects on the economy and population of an affected region or local area brought about by changes in policies and programs or by resource or industrial development projects are substantially interesting for decision makers (Leistriz, 1998). Such effects usually include economic impacts (including changes in local employment, business activity, earnings and income) and fiscal impacts (Leistriz, 1994), which can be defined as the modifications to local government revenues and expenditures that stem from economic changes (Shaffer, 1989). Two methods have been adopted in this article to address this issue: the ‘fiscal balance’ method and the ‘integral model of the profitability of public resources’.

The first consists in quantifying from a static and dynamic point of view (for one year and for a period of five years, respectively, the latter being the maximum length of stay allowed in business incubators), how much PAs invest in business incubators and how much is collected through taxation and social security contributions from the entrepreneurial activity generated by the companies born and developed in the incubators. Unlike other studies looking into the situation in Spain, that are of a more descriptive nature, such as Marimón and Alonso (2005), Fernández et al. (2011), Blanco (2012), Blanco et al. (2016) or Sentana (2016), this work also includes an econometric analysis. The applied methodology is based on the ‘autonomous regions fiscal balance’ model (Institute of Fiscal Studies, 2008) and on the ‘guide to cost-benefit analysis of investment projects’ (European Commission, 2003). An adaptation suited to business incubators (Ferreiro and Camino, 2016) has also been chosen, keeping in mind the contributions that the Autonomous Regions make to the incubators, over a specific period and not only those aimed at financing investments, but also those used to cover running costs.

Furthermore, this work takes into account the tax revenue obtained by the Autonomous Regions. Consequently, in so far as direct taxes, this work bears in mind the revenue generated by corporation taxes (CT), given that more than two thirds of the entrepreneurs located in Galician business incubators have been set up as companies (Ferreiro, 2014) and also the amounts obtained by means of Personal Income Taxes, which is the taxation method chosen by entrepreneurs who have not set up a company. Revenues obtained thanks to national insurance contributions are also taken into account, not only those collected through the special scheme for self-employed workers (SSSEW), which includes more than 91% of contributors, but also those from the General Social Security Scheme. Revenues from value added tax (VAT) are not included, as this is passed on to the consumer and, therefore, not paid by the entrepreneurs; other types of taxation are also overlooked due to their limited revenues.

In order to be able to introduce the dynamic perspective, the net present value of the investment will be taken into account. It will therefore be possible to assess not only the resources consumed by the entrepreneurs during their time at the incubator as of 2009, but also the entrepreneurs’ contributions via their taxation payments. The following expression will be used:

$$VAN = \sum_{t=1}^n \frac{V_t}{(1+k)^t} - I_0$$

where I_0 is the investment, V_t is the cash flow in year t , k is the interest rate used to compare the investment and n the number of years of the investment. In order to carry out

this exercise, several considerations were taken into account. First of all, a five year period was contemplated for the contribution of the entrepreneurial activities, which is a very prudent setting, given that the majority of businesses leaving the incubators have a much longer lifespan. Secondly, the survival rates for the businesses from each facility were used. Thirdly, it was considered that resources were to be applied over the companies' average length of stay at each incubator. Fourth, the rate of occupation of each business initiative centre is deemed to be constant. And finally, a 5% discount rate is used, similar to the criteria used in the EU to analyse the profitability of investment projects (European Commission, 2003).

The second instrument defines six variables, that reflect the resources of the incubators (public resources, staff and surface) compared to the generated output (companies and employment generated and tax collection). Using a structural equation model, it will be possible to see that there are significant relationships between the variables of the model and if the investment of public resources in entrepreneurial initiative centres is justified.

The variables employed in the model (all of which refer to 2009 and on) were: *VanRecPub*, which measures the net present value of the public financial resources invested in the incubators during the companies' stay; *PlantTotal*, which includes the incubators' estimated human resources dedicated to assisting companies; M^2 , which quantifies the space at the incubators dedicated to the companies; *EmprTot*, which measures the total number of companies created for a maximum period of five years as of 2009; *EmplTot*, which measures the total employment created for a maximum period of five years as of 2009 and finally, *VanIngFisc*, which establishes the total tax revenue for the Autonomous Regions from the companies and the employment generated in the business incubators over five years.

The aim of this model is to determine the influence of the public resources invested in the business incubators on the space they offer to entrepreneurs and on the advisory services, measured using the assigned human resources. Thanks to this type of input, new companies and employment will be created, which will contribute in the way of taxes. Therefore, the objective is to demonstrate if there are positive relationships between the aforementioned variables and to what degree.

To carry out this paper, all Galician incubators were visited and questionnaires were filled in not only by the incubator staff, but also by the incubated companies. The response rate from both the incubators and the entrepreneurs was really high (100% and 56.1%, respectively), which guarantees the trustworthiness of the results. This made it possible to obtain the quantitative information regarding all of the public resources invested in business incubators and the total number of staff and space available to the entrepreneurs. In so far as the generated output, the total number of companies and employment created is known; a more complicated issue was tax revenue data, as this information was provided by the entrepreneurs themselves. The response rate in this case was 56.1% and the rest was estimated.

Table 1 Income and expenses of business incubators in Galicia-Spain in Euros (2009)

<i>Incubator</i>	<i>Entrepreneurs</i>	<i>Grants from PA</i>	<i>Staff</i>	<i>Operatives</i>	<i>Amortisations</i>	<i>Total</i>
A Coruña Chamber of Commerce	12,000	82,932	40,800	42,465	11,667	94,932
Ferrol Chamber of Commerce	22,140	79,060	44,000	32,200	25,000	101,200
Lugo Chamber of Commerce	7,200	42,800	20,000	20,000	10,000	50,000
Ourense-Fernando Fontán Chamber of Commerce	18,360	48,636	25,000	20,000	21,996	66,996
Pontevedra-Eliadio Portela Chamber of Commerce	4,620	57,713	48,000	6,000	8,333	62,333
Santiago de Compostela Chamber of Commerce	49,386	71,980	84,000	20,000	17,367	121,367
Vigo Chamber of Commerce	45,600	61,237	58,000	25,000	23,837	106,837
Vilagarcía de Arousa Chamber of Commerce	2,808	13,025	5,000	5,000	5,833	15,833
CEDE-FEUGA	20,232	45,101	22,000	20,000	23,333	65,333
CEI NODUS, Lugo Council	17,568	272,432	110,000	80,000	100,000	290,000
CIE A Granxa-Fernando Conde Montero-Ríos	168,724	190,960	122,829	118,662	118,192	359,683
Terras do Avia CIE	2,448	50,885	22,000	23,000	8,333	53,333
Coles Council CIE	0	32,100	6,600	18,000	7,500	32,100
Ourense Council CIE	14,425	215,776	172,478	31,057	26,667	230,201
CIE Mans	148,200	33,133	125,000	33,000	23,333	181,333
CIE Seara	8,086	102,161	68,522	9,904	31,821	110,247
CIE Tecnópole	14,735	295,350	121,250	90,000	98,835	310,085
Foundation of the Confederation of Businessmen of Lugo-Initiatives by Lugo	40,702	129,598	118,000	27,000	25,300	170,300
Business incubator of the Confederation of Businessmen of Ferrol	12,840	27,450	25,000	13,950	1,360	40,290
OTRI-University of A Coruña	7,875	67,200	30,000	28,408	16,667	75,075
UNINOVA-University of Santiago de Compostela	133,000	215,327	110,660	171,000	66,667	348,327
<i>Total sum</i>	<i>750,949</i>	<i>2,134,856</i>	<i>1,379,139</i>	<i>834,626</i>	<i>672,040</i>	<i>2,885,805</i>

Source: Compiled by the authors from the surveys carried out in Galician incubators and Ferreiro (2014)

4 Economic and fiscal impact of business incubators in Galicia

In 2014 there were 21 incubators operating in Galicia, located mainly in the largest cities. These types of initiatives have been supported by the Chambers of Commerce and Industry (38%), town halls (22%), businessmen associations (14%) and foundations (10%). Less than 7% is held by other owners (Ferreiro and Vaquero, 2010).

Table 2 Financial autonomy and economic independence ratios of incubators in Galicia-Spain (2009)

<i>Incubators</i>	<i>Financial autonomy</i>	<i>Economic independence</i>
A Coruña Chamber of Commerce	12.6%	14.5%
Ferrol Chamber of Commerce	21.9%	28.0%
Lugo Chamber of Commerce	14.4%	16.8%
Ourense-Fernando Fontán Chamber of Commerce	27.4%	37.7%
Pontevedra-Eladio Portela Chamber of Commerce	7.4%	8.0%
Santiago de Compostela Chamber of Commerce	40.7%	68.6%
Vigo Chamber of Commerce	42.7%	74.5%
Vilagarcía de Arousa Chamber of Commerce	17.7%	21.6%
CEDE-FEUGA	31.0%	44.9%
CEI NODUS. Lugo Council	6.1%	6.4%
CIE A Granxa-Fernando Conde Montero-Rios	46.9%	88.4%
Terras do Avia CIE	4.6%	4.8%
Coles Council CIE	-	-
Ourense Council CIE	6.3%	6.7%
CIE Mans	81.7%	447.3%
CIE Seara	7.3%	7.9%
CIE Tecnópole	4.8%	5.0%
Foundation of the Confederation of Businessmen of Lugo-Initiatives by Lugo	23.9%	31.4%
Business incubator of the Confederation of Businessmen of Ferrol	31.9%	46.8%
OTRI-University of A Coruña	10.5%	11.7%
UNINOVA-University of Santiago de Compostela	38.2%	61.8%
<i>Average</i>	<i>26.0%</i>	<i>35.2%</i>

Source: Vaquero and Ferreiro (2013)

The financing of incubators is the key to their development and proper functioning, above all in times of crisis, as potential investors are reluctant and unwilling to invest in risky innovation projects (Sauner-Leroy, 2004); therefore, the support of the public sector will continue to be key to sustaining these initiatives (CSES, 2002). In the case of Galicia, the financing of an incubator is carried out through several public and private organisms (Government of Galicia, provincial councils, business associations, foundations, councils, universities, private entities). In 2012, the main contributors to Galician incubators were the FEDER funds (30.5%), councils (16.7%) and the Government of Galicia (13.3%).

Therefore, the influence of public resources on the survival of these business initiative centres must be taken into account, as this not only takes place in Galicia but also in the most important Autonomous Regions of Spain, such as Catalonia and Madrid (Vaquero and Ferreiro, 2015). Table 1 summarises the income and expenses of incubators in Galicia. Table 2 presents the financial autonomy and independence ratios of Galician incubators. As can be seen, business incubators are greatly dependent on public financing.

Table 3 Contribution of Galician business incubators (2013)

<i>Incubators</i>	<i>Companies created (accumulated)</i>	<i>Employment generated (accumulated)</i>	<i>Abandonment rates (accumulated)</i>
A Coruña Chamber of Commerce	18	81	7.3%
Ferrol Chamber of Commerce	24	50	12.1%
Lugo Chamber of Commerce	12	15	8.4%
Ourense-Fernando Fontán Chamber of Commerce	33	67	15.4%
Pontevedra-Eladio Portela Chamber of Commerce	16	21	7.9%
Santiago de Compostela Chamber of Commerce	68	124	9.8%
Vigo Chamber of Commerce	72	181	11.9%
Vilagarcía de Arousa Chamber of Commerce	18	42	13.0%
CEDE-FEUGA	49	104	14.3%
CEI NODUS. Lugo Council	30	91	12.6%
CIE A Granxa-Fernando Conde Montero-Ríos	85	245	10.9%
Terras do Avia CIE	6	22	6.0%
Coles Council CIE	21	52	6.0%
Ourense Council CIE	13	29	6.9%
CIE Mans	46	155	7.9%
CIE Seara	3	8	0.0%
CIE Tecnópole	311	1.065	9.9%
Foundation of the Confederation of Businessmen of Lugo-Initiatives by Lugo	18	42	5.5%
Business incubator of the Confederation of Businessmen of Ferrol	61	461	6.7%
OTRI-University of A Coruña	8	21	7.5%
UNINOVA-University of Santiago de Compostela	28	90	12.9%
Chamber of Commerce of A Coruña	104	428	8.5%
<i>Total /average (rates)</i>	<i>1.044</i>	<i>3.394</i>	<i>9.2%</i>

Source: Compiled by the authors from the surveys made in Galician incubators and Ferreiro (2014).

Table 4 Tax collection obtained in Galician incubators and public resources (2009)

Incubator	VAT charge	Corporate tax	Social security	PII	Total income with VAT	Total income without VAT	Public resources
A Coruña Chamber of Commerce	278,480	25,850	326,002	139,709	770,041	491,561	82,932
Ferrol Chamber of Commerce	109,185	11,208	108,902	47,211	276,506	167,321	79,060
Lugo Chamber of Commerce	31,888	5,600	40,340	11,885	89,714	57,826	42,800
Ourense-Fernando Fontán Chamber of Commerce	337,382	32,166	174,247	111,788	655,583	318,201	48,636
Pontevedra-Eladio Portela Chamber of Commerce	44,011	8,000	35,777	12,563	100,351	56,340	57,713
Santiago de Compostela Chamber of Commerce	224,743	61,200	238,794	145,012	669,749	445,006	71,980
Vigo Chamber of Commerce	353,226	11,400	265,839	152,363	782,828	429,602	61,237
Vilagarcía de Arousa Chamber of Commerce	9,600	585	37,403	25,031	72,618	63,018	13,025
CEDE-FEUGA	189,779	4,040	97,667	44,975	336,462	146,682	45,101
CEINODUS, Lugo Council	282,314	4,800	150,379	78,661	516,154	233,840	272,432
CIE A Granxa-Fernando Conde Montero-Ríos	659,368	37,427	378,087	282,414	1,357,297	697,929	190,960
Terras do Avia CIE	17,808	3,000	70,973	15,338	107,119	89,311	50,885
Coles Council CIE	26,648	3,758	16,614	7,522	54,542	27,894	32,100
Ourense Council CIE	73,029	2,000	84,634	37,050	196,712	123,683	215,776
CIE Mans	387,946	16,900	234,348	129,092	768,286	380,340	33,133
CIE Seara	46,559	1,098	38,523	16,978	103,157	56,598	102,161
CIE Tecnópolis	1,372,136	115,003	1,160,736	561,949	3,209,825	1,837,688	295,350
Foundation of the Confederation of Businessmen of Lugo-Initiatives by Lugo	116,143	41,250	204,253	78,401	440,047	323,904	129,598
Business incubator of the Confederation of Businessmen of Ferrol	15,040	2,814	66,745	24,886	109,486	94,446	27,450
OTRI-University of A Coruña	161,458	3,675	247,202	144,336	556,671	395,213	67,200
UNINOVA-University of Santiago de Compostela	374,318	11,848	478,341	194,739	1,059,246	684,928	215,327
Total sum	5,111,061	403,622	4,455,807	2,261,903	12,232,392	7,121,332	2,134,856
Average	243,384	19,220	212,181	107,710	582,495	339,111	101,660

Source: Ferreiro (2014)

The direct impact in terms of both firms and jobs created is presented in Table 3, although this is not the sole objective of business incubators, because in order to be fully efficient, these facilities must be able to develop companies that stand the test of time. This is no simple task, given that innovative companies tend to be more willing to take risks and can have higher rates of early mortality than other companies if they are not protected (Colombo and Delmastro, 2002). In the Galician case, the data shows that incubators comply with this objective, as their abandonment rates are lower than 11%. However, despite the fact that the data already seem to indicate the efficient use of business incubator resources, the present article will verify if this tendency remains constant by using the two methods of analysis: the ‘fiscal balance’ model and the ‘integral model of profitability of public resources’.

4.1 *The ‘fiscal balance’ approach*

Using the ‘fiscal balance’ method, it is possible to analyse the profitability of the public resources that are invested in incubators, in order to invigorate business and the economic development of Galicia, by means of the activity of said companies and the employment created therein generating tax revenues and contributions. As mentioned above, the application of this evaluation method is based on the comparison between the resources invested by PAs in the creation and maintenance of incubators and the returns received via taxes and social contributions paid by the incubated companies and their employees. The aforementioned taxes are mainly personal income tax (PIT), VAT, corporation income tax (CIT), social contributions to the social security (SCSS) and local taxes, environmental taxes, etc.

Table 4 shows the income generated by the companies and the volume of employment created in Galician incubators and, in the last column, the public resources invested. These results reveal the total impact of the public resources invested, given that all the incubators have generated notably higher revenues for the public treasury than the public resources consumed. Therefore, according to the data obtained by this method, it is possible to confirm the economic profitability of the public resources in most Galician incubators.

Table 5 Results of PAs from Galician business initiative centres (2009)

<i>Concept</i>	<i>Quantity</i>	<i>Average</i>	<i>% of total resources</i>
<i>Total public resources invested</i>	<i>2,134,856</i>	<i>101,660</i>	<i>100.0%</i>
Tax on business profit	403,622	19,220	18.9%
Social Security	4,455,807	212,181	208.7%
Personal income tax (PIT)	2,261,903	107,710	106.0%
<i>Total income of public administrations</i>	<i>7,121,332</i>	<i>339,111</i>	<i>333.6%</i>
<i>Result</i>	<i>4,986,476</i>	<i>237,451</i>	<i>233.6%</i>

Source: Compiled by authors based on Ferreiro (2014)

Without taking into account the entrepreneurs’ output VAT, as it does not ensue from the action of the incubator, the quantity collected via taxes and contributions was 7 million euros against almost 2 million euros of public resources that were employed. Analysing every incubator independently, the data reveal the higher revenue from the Tecnópole Business Initiative Centre (1,837,688 euros) and from A Granxa (697,929 euros) with

public resources of 295,350 Euros and 190,960 euros, respectively. On the other hand, the public resources invested in the incubators CIE Coles and in the Pontevedra Chamber of Commerce have hardly been covered. Table 5 shows tax collection compared to invested public resources.

Furthermore, this method is applied over time and under the following five assumptions;

- 1 The contribution of these entrepreneurial activities has been presented over a five year period, a very prudent scenario as most companies in Galicia have a lifespan of more than five years, given the high survival rate of the companies that leave incubators.
- 2 The company survival rates from each centre are applied.
- 3 The length of stay of the entrepreneurs is the average at every incubator, so that the resources are considered over the companies' average length of stay at every incubator.
- 4 The rate of occupation of each business initiative centre supposedly remains constant, which in 2009 was 71%.
- 5 A 5% discount rate is established, the same as used in the EU to analyse the profitability of investment projects (European Commission, 2003).

The results for the period 2009–2013 can be seen in Table 6. It is worth noting that the total income is 29.7 million euros, which means a net result of 23.5 million euros and an average profitability of 383% over the invested resources; these results are better than in the static analysis, because by taking into account a five year period, the invested resources increased in lesser proportion than the generated public revenue.

Table 6 Results of PAs from Galician business initiative centres (2009–2013)

<i>Code</i>	<i>Concept</i>	<i>Quantity</i>	<i>Incubator average</i>	<i>Average incubator and year</i>	<i>% Average incubator and year/resources</i>
A	Net Present Value (NPV) public income from the activity of the incubators	29,667,673	1,412,746	282,549	483.0%
B	NPV public expenses destined to incubators	6,142,022	292,477	58,495	100.0%
C	NPV result = A–B	23,525,651	1,120,269	224,054	383.0%
D	NPV public income derived from a bigger survival rate in the incubators	12,105,587	576,457	115,291	197.1%
E	NPV net result = D–B	7,121,332	339,111	67,822	115.9%

Source: Compiled by authors based on Ferreiro (2014)

However, not all the public income obtained from the business activity can be linked to the existence of the incubator, as some entrepreneurial activities would have been developed and would have survived without being in the incubator. To obtain the net result, public income must be recalculated in relation to survival rates. Taking into

account that the mortality rate of companies in Spain is 46.3% (Spanish National Statistics, 2015), 53.8% of the companies would have survived even if they had not been in the incubator. It is known that the success rate in Galician incubators is 90.8%, therefore it can be considered that 37.1% of the companies that leave the incubators are directly linked to this type of business development initiative.

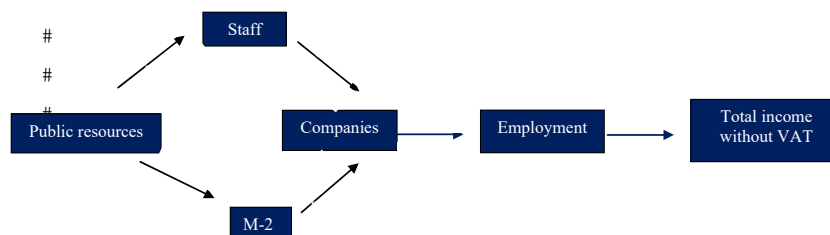
In Table 6, under code D, the data show that the public income derived from a higher survival rate in the incubators, for the period 2009–2013, would be 12.1 million euros and the net result 7.1 million euros, which means a profitability of 115.9% over the total invested public resources. Therefore, it is possible to confirm that the net direct impact of incubators on public income is higher than without supporting this type of initiative.

4.2 *The integral model of the profitability of public resources invested in Galician business incubators*

It has been proved that business incubators in Galicia are profitable for the public administration. Nevertheless, this profitability criterion should not be the only gauge to evaluate their impact, but it is indeed a useful reference. The inverse question is still to be answered: are public contributions relevant to the performance of incubators? The answer is ‘yes’, according to the literature – CSES (2002) or Dee et al. (2011).

In Vaquero and Ferreiro (2014), the results obtained from the analysis of business incubator profitability are analysed under the model of ‘consumed resources-generated wealth’, in which the contributions of business incubators in Galicia are analysed. In the aforementioned research, it was concluded that those incubators with more resources had generated a higher number of companies, employment and survival rates. Ferreiro et al. (2015) also indicated the profitability of the incubators’ total resources, but did not distinguish between public and private resources. However, these methods did not answer the specific question about the efficiency of the public resources. Therefore, what follows is an analysis of the efficiency of public funds invested in Galician business incubators using the ‘integral model of public resources profitability’, which combines both methods: ‘fiscal balance’ and ‘consumed resources – generated wealth’ by means of structural equations for the period 2009–2013.

Figure 1 Integral model of profitability of public resources (2009–2013) (see online version for colours)



Source: Compiled by authors

As Figure 1 indicates, there is a strong correlation between most of the variables that were analysed, confirming what has been said throughout this article, on the basis of the different models and data obtained from the incubators (Table 7). As a result, a highly

significant influence can be observed between the public resources received by the incubators and the staff and total surface of the facilities, which at the same time have a direct influence on the number of companies created by the centres and on tax revenue.

Table 7 Statistics of the integral model of the profitability of business incubators (2009–2013)

<i>Statistics</i>	<i>Values</i>	<i>Interpretation</i>
χ^2	6.260	$p = 0.510$. Significant if > 0.05
lg	7.000	
	0.894	< 3 good fit
GFI	0.902	= 1 perfect fit
CFI	1.000	= 1 perfect fit
RMSEA	0.000	= 0 perfect fit

Source: Compiled by authors

Furthermore, as expected, there is a strong relationship between the number of companies created and the employment generated, because the greater the number of companies, the greater their demand for human resources. Ultimately, all this contributes to an increase in income, because there is a strong positive correlation between the number of jobs created by the entrepreneurs located in the incubators and the revenues collected by the public sector. Therefore, the data obtained from incubators as well as from the statistics have demonstrated the profitability and efficiency of these facilities and also that public resources are essential for the incubators to carry out their activity effectively and create companies, employment and greater fiscal revenue.

5 Discussion

Investing in business incubators is profitable. The results show that business incubators can be efficient, not only in terms of achieving socially worthwhile results (company survival, generating employment, etc.) which would not have come about otherwise, but also in terms of generating additional revenues for the autonomous regions. To this regard, the result is better than if there had been no intervention.

The economic literature from the end of the 80s and beginning of the 90s already indicated the positive fiscal impact of public investment in business incubators. However, this line of analysis has since been underdeveloped and as a result there is very little evidence to show if this impact can be maintained over time and in different economic, social and technological contexts. Furthermore, one of the main criticisms regarding this type of analysis is that it just measures the intended effects and does not compare them with unintended ones (Tavoletti, 2013); more specifically, it does not consider what would have occurred if the business incubators did not exist. To this regard, the present work quantifies the net effect generated by the investment in business incubators, not only for the administration but also for society, offering a robust analysis of the fiscal impact, which is hardly dealt with in the literature.

The result obtained is relevant not only in order to evaluate the efficiency of existing incubators, but also to promote new facilities. Nevertheless, two aspects should be taken into consideration: first of all, that the results depend on the context to a large extent and,

secondly, that different objectives cannot be assessed with the same indicators and/or criteria

Based on the aforementioned results, it is clear that business incubator, which have grown in number considerably since the 1990s in order to fulfil different objectives (Rennie, 1993), could be strengthened by the Autonomous Regions if their significant return were taken into account. However, although this work proves that under certain conditions the return for the public sector could possibly be greater than the investment made; it also reveals that this scenario is not always the case. In fact, the final result is linked to the cost of creation of new businesses and employment, which is relatively low on an international scale. Analysing the number of companies and employment created and resources invested, it is estimated that every company created by Galician incubators has cost the public treasury about 8,500 euros and every job has cost more than 2,600 euros, the total (public and private) cost being 11,497 and 3,550 euros respectively (Vaquero and Ferreiro, 2013, 2014). This result reveals high efficiency, since the cost of every job created is much lower than that observed with other alternatives. Furthermore, the mean cost of creating a job through the European BIC system was 14,534 euros (9,196 from public sources). Comparing other European countries, such as Italy, the cost per job created is over 38,000 euros with a public sector investment representing 68% of the total cost. In Spain, the cost per job created is much lower (4,900 euros) but the public financial contribution is similar (66% of the total cost). In Portugal the public sector investment represented 68% of the 22,800 euros needed to create a job (EBN, 2013, 2015). Although these differences seem to indicate the efficiency of Galician incubators from a comparative perspective, they also correspond to the existence of differences in the characteristics of programmed content, such as diverse objectives in the actual concept of business incubators (Riddle et al., 2010) or to variables of a contextual nature.

In fact, it should be kept in mind that business incubators are considered to be idiosyncratic reflections of local conditions (Allen and McCluskey, 1990), what works successfully in certain places, does not work in the same way in different environments (Tavoletti, 2013). In this sense, even though those findings point out that BI can be eventually efficient; their specific performance will rely on the adaptation of the design and management to the local environment. So, sometimes different designs or even different tools may be more adequate for promoting entrepreneurship and/or local development.

In short, this work contributes to the literature dealing with business incubators, providing new evidence regarding the incubators' ability to contribute to the generation of positive net tax impacts for the Autonomous Regions. And given that public support will still be crucial to the running of business incubators (CSES, 2002; Ferreiro and Vaquero, 2010) and, furthermore, keeping in mind that public incubators represent a more favourable environment for innovative initiatives with a greater risk level (Nam, 2000), profitability can be used as an indicator of the usefulness of business incubators and of territorial entrepreneurship (Mazzucato, 2015) in Autonomous Regions by means of this type of instrument.

6 Conclusions

In times of crisis and economic instability, not only companies but also governments must carefully assess any initiative undertaken in order to improve economic indicators.

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It is of the utmost importance to create activities capable of generating employment that at the same are profitable for society. Business incubators are one of these tools, because they are facilities that meet the needs of new entrepreneurs and offer them support and advice, as many authors have confirmed.

Our research has proved that business incubators are not only an adequate instrument for promoting local development, but also for generating additional incomes for the public treasury. Therefore, there are sufficient grounds to recommend these policies, given that their contribution to society is higher than the public resources needed to run them.

The research carried out for this paper reveals the high level of public subsidies that have been awarded to business incubators in Galicia (6.1 million euros between 2009 and 2013), which in practice represents a low rate of financial independence (26%); therefore, it is necessary to question whether this type of local development initiative is profitable or not. Using the 'the fiscal balance' method, it has been possible to establish that the public administration revenue – for the period 2009–2013 – amounts to 29.7 million euros; this means that the net profit over the invested resources is 383%. Furthermore, using the 'the integral model of public resources', it has been demonstrated that thanks to public investment, it is possible to set up new companies (1,044) and generate jobs (3,394), which are of a permanent nature, given the high survival rate of these businesses (90.8%); this means, as mentioned above, that the public revenue is greater than the public investment. Consequently, the data confirms the economic and social profitability of the use of public resources in Galician business incubators.

Nevertheless, as those outcomes are conditioned by contextual factors, like the general survival rate of firms or the cost of creating a new job (that not only depend on the efficiency of the incubator, but also on the economic environment), in every specific case it would be necessary to examine the feasibility of creating a business incubator.

Additionally, even though these results may be helpful in the policy making process, they are limited by the geographical scope and the variables selected; therefore, further research is necessary, taking into account different regions and the impact of different variables on the models (the dynamism of the region, the services offered by the incubator, etc.), as well as the causes of efficiency and their impact on the outcomes, etc., in order to strengthen the assessment.

Finally, this paper makes it possible to answer the initial objective as to whether public investment is better than doing nothing. Based on the descriptive and econometric analysis carried out, the conclusion reached is that it is in fact profitable to invest public resources in business incubators in Galicia (Spain) and this result is useful in terms of international studies, given the strong implementation of this type of instruments in many countries for local and regional development.

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