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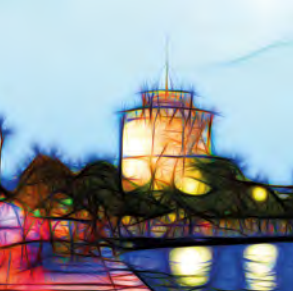

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HIGHER EDUCATION INSTITUTES-BUSINESS LINKAGES IN GREECE. THE EXPERIENCE OF COHESION POLICY 2007-2013

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It is within the context of the on-going Greek economic crisis, that policy makers and stakeholders have been widely accepting that the limits between the academic and the business community should be overcome, for instance in terms of further supporting substantial R&D networking, mobility, spin-offs, etc., and establishing institutional links between the main actors, namely higher education institutes (HEIs) and public research centers/institutes, public administration/regions and business sector, are prerequisites for improved knowledge transfer critical for restructuring domestic productive patterns and growth model. In this paper, we explore this proposition by examining the actual links established between HEIs and businesses a result of the National Strategic Reference Framework 2007-2013, the latter being the foremost public R&D financial mechanism supporting R&D activities. Empirical data was extracted from calls and projects managed by the General Secretariat of Research and Technology, while input from the Monitoring Information System dataset of the Ministry of Development had been also taken into account. Employing for the first time a micro-level analysis on R&D-related calls and projects, we show that linkages groomed on behalf of the state between the academic and business world needs to be further improved. As such, this article complements previous findings on the topic.

Keywords
Greece, HEIs-business linkages, NSRF, R&D

1. Introduction

Over a seven-year period Greece has been experiencing a deterioration of macroeconomic indicators, making it the single most hardly hit EU country. Indicatively, Greece has lost a significant part of its gross value added, while recession, weak demand and output losses have undermined job creation dynamics; unemployment rate has been ranging within markedly high levels, with youth unemployment rate still affecting more than one half of the youth labor force, thus forcing a brain drain phenomenon. It is in this context that knowledge-intensive activities have gained prominence as a motor for instigating economic growth. To this end, growing realization of the manner in which universities, public research centers/institutes (PRIs) and the private sector interact in terms of knowledge- and technology-coproduction, as well as education and the flow of human capital has become a critical point of policy intervention towards enabling economic growth. Similarly, funding

coming from EU's Structural Funds has been recognized as the main tool that can finance investment and incentivize private-level leverage in the current negative conjuncture. Standing on these two pillars, the article wishes to examine the actual interactions in terms of knowledge- and technology-coproduction between HEIs, PRIs and the private sector as a result of funding coming from the National Strategic Reference Framework (NSRF) 2007-2013. The authors wish to extend this debate by way of providing an approximation of the links established between HEIs/PRIs and enterprises in Greece as a result of this funding. We do so, by focusing on those R&D projects that necessitated the establishment of such collaborative arrangements in the NSRF's Operational research and technology relevant programs and calls during 2007-2013. To do so, data on relevant tenders and calls managed by the General Secretariat of Research and Technology (GSRT) were collected and analyzed. This analysis belongs within the wider line of research addressing the role and importance of collaborative arrangements towards enhancing the exploitation potential of research output [1, 2].

2. Historical evidence of R&D supporting activities by Structural Funds in Greece

Historically, the absence of a national programme for R&D support has been covered by funding from EU Structural Funds. The latter has been diachronically pivotal for investment and growth in Greece. The country has been a major beneficiary of EU funds, amounting to an average EU transfer between 2,4% to 3,3% of the country's annual GDP. Yet, the country channeled only small portions of these funds in R&D and innovation activities. Allocations in these matters never exceeded 2% ''in each of the 1st, 2nd and 3rd CSF'' and most probably in the 4$^{th.}$. An ''increase to 6% in the 5th CSF'' can be mostly attributed to smart-specialization strategy conditionalities [3]. During the second Community Support Framework (CSF 1994-1999), an autonomous Operational Program (OP) for Research and Technology (EPET) was included. Since then, CSFs have included research and technology support actions. In the third CSF (2000-2006), activities supporting research and technology were included in the OPs for Competitiveness (EPAN I) and for Education (EPEAEK II), respectively. 9% of EPAN I's and 6,5% of EPEAEK II's funding were actually directed towards research and technology projects, amounting to more than 700 million €[1]. All these initiatives were undertaken with the intention of contributing to the economic and productive exploitation of research results, boosting the business sector's involvement in R&D activities and applied research, and, thus, addressing the regional innovation paradox in a systemic manner.

In qualitative terms, in the CSFs of the 1990s emphasis put on regional policy in terms of national strategic planning affected the Greek research effort. Partially financed by Structural Funds, policy-making on a regional level and policy goals for research and technology strongly interacted due to a significant portion of national research policy expressed through OPs and CSFs. Despite this financial alignment, regions were involved only nominally in terms of research activities since the former had not prepared a strategy (nor detailed the strategy's elements) that would steer towards more sophisticated and knowledge-intensive productive patterns. On the contrary, the measures that were implemented regionally tended

[1] http://www.3kps.gr/2000-2006.htm

to cater for the needs of existent academic and research institutes, mainly in terms of infrastructures, largely voiced in a ‘‘bottom-up’’ manner. In the 2000-2010 period, the tendency to mix regional with research policy was mitigated, and emphasis was laid on research activities that favored applied research. Emphasis, now, was on boosting the business sector’s innovative and research performance by way of prioritizing research partnerships and intellectual property rights protection. However, as Bartzokas notes, this attempt produced mediocre results [4].

3. Higher education and business sector R&D performance in Greece. Some basic trends

Business sector’s contribution to R&D funding and performance are diachronically rather low in Greece, indicating inadequate technology diffusion throughout the economic and social fabric. Domestic production depends mainly on technology and know-how transfer from abroad and not on domestically produced knowledge, being one of the main weaknesses of the Greek innovation system. This in turn is translated to a problematic relationship between the academic communities and the business sector. Significantly low domestic demand for research and new knowledge production is widely recognized, in turn leading to a situation where Greek businesses chose to maximize their competitiveness through price-suppression methods, as opposed to investing knowledge and human capital [5]. Moreover, for the majority of companies, the quality, design, and organizational aspects appear to rank higher than the product and process aspects in their attempt to increase their innovation capability [5]. This has further deteriorated in recent years since a combination of structural problems (e.g. banking sector’s extreme stinginess in approving business loans), together with a volatile policy environment and deteriorating economic conditions and has led to a situation where businesses tend to invest in low risk activities. Closely associated is the issue of fear of business or investment failure. Greeks outrank their European peers in being very hesitant to initiate a business activity due to this fear [6].

Moreover, domestic enterprises do not participate in the so-called international value chains [7]. Greece’s inability to attract contractor-, or integrator-level global-chain business interest, in addition to the ‘‘shallowness’’ of the domestic entrepreneurship where over half of the total entrepreneurial initiatives are targeted towards final consumers, indicates that the country misses on important investment opportunities associated within the context of a global value chain [8]. The same is also true regarding the lack of trust that is observed among firms and within the productive framework. These phenomena have deteriorated during the crisis. Further, business sector’s inertia regarding knowledge intensive activities appears to be influenced by country-specific management characteristics (e.g. majority of businesses are family-owned and are very small enterprises) [6]. As a result, the orientation of business strategies to traditional economic activities has kept demand for knowledge and investments in R&D rather low [9].

On the contrary, the academic sector has been overachieving in terms of the national RTI system by way of achieving strong interactions with PRIs [10]. HEIs (universities and technological educational institutes) is the main R&D performer in Greece accounting for a significant share in total GERD, i.e. 40-45% - one of the highest among EU countries. The sector also stands as the main employer of the highly educated (PhD holders). In addition,

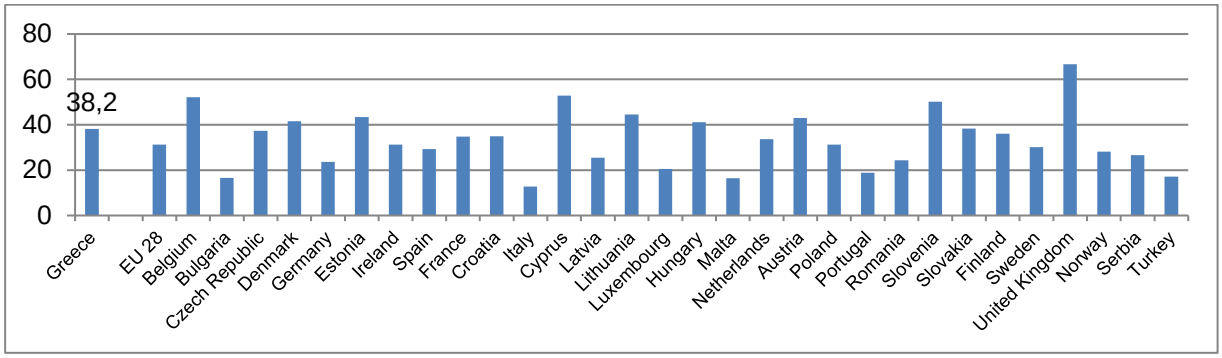
the public purse, coming from both the ordinary budget and public investment funds, has been the sector's prime funder, while funding coming from abroad (mainly the EU) ranks among the highest in the EU. Zooming in, various degrees of research and funding competence can be located between institutes and departments within HEIs. In addition, research groups do not maximize their potential through cooperation with other groups. Instead, they act in a fragmented or isolated manner [11]. Despite this, the research human capital is one of the strong points of the Greek innovation system appearing competent and competitive (especially in some fields). For example, Greek researchers have been successfully securing relatively high funds in the competitive EU Programmes – a pattern that has been made evident in more than one Framework Programmes [12], in addition to achieving high bibliometric and citation scores [13].

4. Analyzing the HEIs-business R&D linkages

In the Greek case, interactions between HEIs and business sector are rather modest, having an occasional and short term content [14]. This is the case despite the fact that the share of the R&D performed by HEIs and is funded by the business sector is higher than the EU average (2,22% and 2,90% of GERD in 2014 and 2015, respectively, compared to 1,48% of GERD in the EU in 2014) [10]. The latter argument can be accounted for by taking note that very few companies in Greece have their own R&D departments. As a result, most businesses contract such services from HEIs. Another idiosyncratic element that should be taken into consideration is that HEIs in Greece are the main R&D performers, in contrast to what is the norm in most EU countries, where the business sector dominates R&D performance and funding.

A limited business sector's contribution in research production, leads to a situation of an insufficient exploitation of knowledge production, indicatively in the form of patents or newly-set up companies [15]. Restricted access to capital, especially for new firms, due to the reluctance of financial institutions to finance innovation and risky investments is also among the factors that hinder mobilization of resources for R&D. This combination of facts reflects constraints on the demand side of the economy for research-based knowledge, at the same time that indicates the severe amount of underutilized resources, regarding human capital.

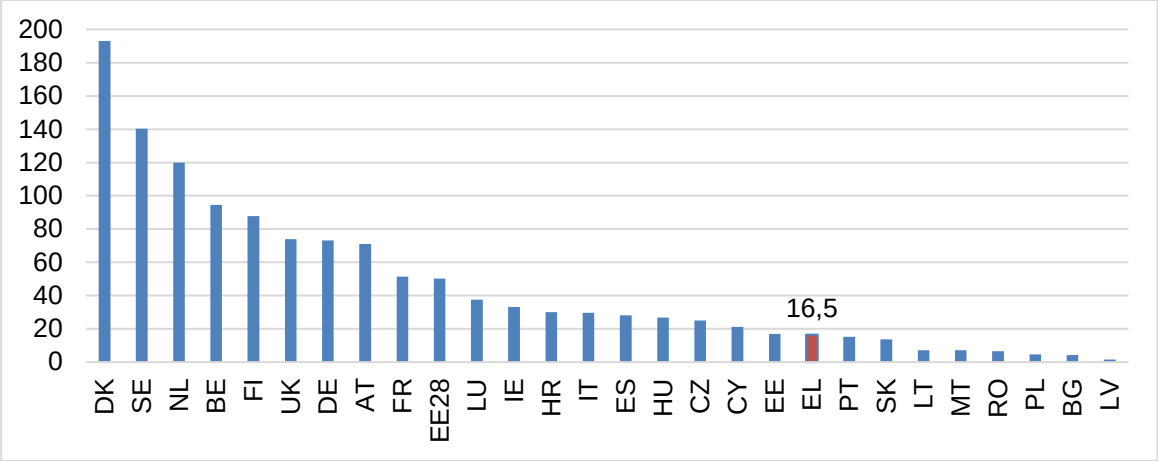
On the other hand, innovative companies are aware of their need to forge ties and collaborations for carrying out product and/or process innovation activities. Indeed, according to the 2010-2012 CIS data, a rather high percentage of these enterprises are engaged in cooperation of any type (figure 1). Collaboration with HEIs reaches only one third of these synergies.



Source: Eurostat (inn_cis8_coop)

Figure 1 Co-operating innovative enterprises 2010-2012 (% of innovative enterprises engaged in any type of co-operation)

Moreover, the level of cooperation between the main R&D performer (HEIs) and the main potential R&D user (business sector) by way of scientific co-publications in international journals is low. This implies weak knowledge flows between the two sectors (figure 2). Examining the combined research output of the academic and private sector stand as an important measure of the established knowledge networks given that scientific co-publication in international journals is an important output indicator of the two sectors capability to produce scientifically-relevant and commercially exploitable know-how. Evidently the level of co-publications in Greece significantly lags the majority of EU countries, standing at three times less than the EU average pointing to weak public-private knowledge flows.



Source: [16]

Figure 2 Public-private co-publications (per million of population)

Given the scarcity of domestic R&D funding, enterprises have been increasingly setting their eyes in the European R&D projects as a potential source of financial assistance in conducting R&D activities, in addition to establishing research partnerships and networks given their international nature. Accordingly, enterprises populate almost half of the total FP7 projects a

Greek institutional presence is recorded in. Moreover, than a quarter of enterprises have cooperated with an academic institution (HES), while almost 20% of BES participations are recorded in tandem with a government entity.

5. NSRF 2007-2013 as enabler for HEIs-business R&D synergies

As mentioned, the CSFs and NSRF have been the main way for implementing cohesion policy in Greece since the 1990s, and as such examining the R&D-relevant programs and calls can provide a comprehensive picture in terms of relevant public funding and typology of industry-HEIs linkages. During the crisis and practically after 2010, funding from EU's Structural Funds stood as the major developmental public mechanism [16]. NSRF played a critical role in increasing the research funding during the crisis, especially between the years 2013-2015, resulting in an increase of the country's R&D intensity [17]. Following the rationale of our analysis, the article lays emphasis on the synergies developed between academia and the business sector funded by the NSRF's Operational research and technology relevant programs and calls during 2007-2013.

According to programmatic objectives, these initiatives sought to enhance the interaction between the private and public sector (HEIs and PRIs) by increasing the ''entrepreneurial contribution in the research effort'', and by ''linking the RDI with the national productive nexus''. NSRF's actions that were directly or indirectly related to research, technological development, innovation and entrepreneurship amounted to almost 10% of the total budget of the programme in 2007-2013 [18], but data collected from the Monitoring Information System (Ministry of Development)-reveal that apart from calls and activities managed by the General Secretariat of Research and Technology (GSRT), higher education sector-business sector collaborations had exclusively to do with operational contracts and sub-contracts other than R&D or knowledge-intensive activities, while detailed data for funding and support schemes under the state aid mechanism were not available. Therefore, our analysis is based on input obtained from NSRF-funded GSRT calls. These calls constitute the core of the RTDI-supporting activities funded by EU's Structural Funds. The total budget for these activities amounted to 700 million € (approx. 3,5% of the total NSRF budget).

Taking into consideration data availability on specific tenders and calls, more than 40 GSRT R&D programmes were examined, representing a total budget of 500 million €. These cover a wide range of R&D actions from ''science & society'' activities and programmes supporting ''international scientific cooperation'' to activities strengthening the ''human potential'' and supporting "innovation of SMEs". These programmes can be categorized in the following manner. In more than half activities (22) only HEIs and/or PRIs were eligible to participate, while 10 allowed participation from both sectors – HEIs/PRIs and businesses. Collaboration, however, was not compulsory. These schemes represented 10% of total GSRT funding. Only 7 (out of 40+) programmes focused in supporting the uptake of research-technology-innovation activities on behalf of businesses (11% of funding). Lastly, two major funding schemes (Synergasia) explicitly sought the collaboration between HEIs/PRIs and the business sector (30% of funding) (see Table 1).

Table 1 Intersectoral focus of GSRT programmes

No.	Programme no.	Sectoral focus	Type of collaboration between HEIs/PRIs and business collaboration	% of total GSRT R&D actions (*)
1.	22+	HEIs/PRIs	Non existent	25%
2.	10	HEIs/PRIs and businesses	Optionally	10%
3.	7	Businesses	Non existent	11%
4.	2	HEIs/PRIs and businesses	Obligatory	30%

(*) For the remaining % of GSRT R&D actions, no detailed data was available.

Highlighting HEIs/PRIs and business R&D synergies, analysis focuses on the second and the fourth category of activities. Consequently, we examine 408 projects, in total[2]. Accounting for these two categories, results indicate a significant degree of collaborative arrangements having been established between HEIs/PRIs with enterprises. Collaboration is manifested in about 90% of these projects. By excluding the two ''Synergasia'' programmes, where collaboration between HEIs and/or PRIs with the business sector was a precondition in order to participate in the programme, the rate of collaborations drops to approximately 65%. In actual financial remuneration, HEIs/PRIs received more than 120 million €, while the business sector received slightly above 100 million € (out of which 60 million in the form of public spending). Again, excluding the two ''Synergasia'' programmes that had the highest budget among all GSRT calls and programmes in the NSRF 2007-2013, actual funding is reduced to 15 million for HEIs/PRIs and 16 million for businesses (of which 12 million in public spending) (see Table 2).

Table 2 GSRT activities/programmes directing both to HEIs/PRIs and businesses

Activity / programme	**HEIs & PRIs budget in collaboration with BES (thousand €)**	**BES budget in collaboration with HEIs/PRIs (thousand €)**	**Budget of projects without collaboration (thousand €)**
JTI1	568,3	1.052,6	1.933,7
Artemis JTI_1	745,4	829,8	1.196,3
Eniac JTI_1	476,2	2.204,3	453,1
Artemis JTI_2	648,9	707,1	1.374,2
Eniac JTI_2	705,9	1.123,6	0,0
Eranet_3	0,7	0,9	1.574,9
Greece-China	6.275,3	8.448,0	622,4
Greece-Israel	4.137,7	4.762,8	730,6
Greece-Germany	1.378,4	874,6	3.021,3
Synergasia_1	54.464,5	38.499,4	0,0
Synergasia_2	53.587,3	48.081,2	0,0

[2] Quantitative analysis did not take into account 'Clusters' activity (17,5 million €), due to the inability to discern HEIs/PRIs from business sector, as well as enterprises that are directly related to research teams from HEIs and PRIs.

3. Conclusions

The paper showed that innovation-related interactions as induced by NSRF's policies and financial mechanisms between HEIs and PRIs were not strong. This was shown by analyzing for the first time NSRF's R&D-related programmes and activities that were funded from GSRT. By way of examining these call, a one-sided approach towards funding research activities as opposed to innovation activities was made evident. This was made possible by way of highlighting those instances where collaboration between HEIs/PRIs and the private sector was dictated from the rules of participation. With the exception of the relevant programmes wherein collaboration between HEIs/PRIs and the private sector was deemed as a prerequisite according to the rules for participation, in all other programmes (where the issue of collaboration is left upon the will of the participants to decide) the rate of collaboration is decidedly lower. Thus, it appears that these programmes insufficiently nurture for the creation of innovation-targeted linkages. This implies sub-optimal exploitation of research and knowledge production, as well as inadequate technology diffusion throughout the economic and social fabric.

NSRF funding directed to grooming for R&D has followed by and large the pattern of previous CSFs. HEIs and/or PRIs actively seek to cooperate with businesses only in those R&D projects, where synergies were a precondition to participate, indicating the importance of legislative arrangements as a means to incentivize such collaborations.

A number of issues arise in this context. For example, funding for R&D, in general, and funding that links HEIs/PRIs and businesses, in particular, is limited (according to our analysis resources for these specific R&D synergies represent only 1% of total NSRF funding). Yet, the road to a knowledge-based economy is dependent upon the strengthening of both these instances.

Last but not least, the issue of collaboration arrangements and its sustainability beyond the scope of the specific programme is a point worth further considering. That is, the issue of the ad hoc and superficial manner in which these partnerships are formed - just to cover typical preconditions or prerequisites of the relevant call. Bringing to the fore successful collaboration schemes and analyzing the manner in which this was made possible so as to replicate, is a case for future research. While HEIs have an important role to play in respect to economic and social growth, full potential can only be accomplished with enacting collaborative arrangements in an embedded manner with the private sector [19, 20]. Towards this, orientation on behalf of the Greek state at least in terms of funding and tender orientation can be further increased.

References

1 Banal-Estanol, A., Macho-Stadler, I. & Perez-Castrillo, D. (2013). "Research Output from University-Industry Collaborative Projects", *Economic Quarterly Journal* 27(1), pp. 71-81.

2 Perkmann, M. & Walsh, K. (2009). ''The Two Faces of Collaboration: Impacts of University-Industry Relations and Public Research'', *Industrial and Corporate Change* 18(6), pp. 1-33-1065.

3 Karvounis, A. & Zaharis, N. (2016). ''Greece and Structural Funds: What do the Choices Made by Greece Regarding the Allocation of Structural Funds over the Past Three Decades Imply for the Developmental Model of the Country'', In Liargovas, P., Petropoulos, S., Tzifakis, N., & Huliaras,

A. (eds) *Beyond ''Absorption'': the Impact of EU Structural Funds on Greece,* Konrad Adenauer Stiftung, pp. 57-78.

4 IOBE & REMACO (2013). *Human Capital Development and Innovative Entrepreneurship*. Athens: Hellenic Federation of Enterprises. [In Greek].

5 Bartzokas, A. (2007). 'Country Review Greece. Monitoring and analysis of policies and public financing instruments conducive to higher levels of R&D investments', *UNU-MERIT, The "POLICY MIX" Project.*

6 National Documentation Centre (2017). *Innovation in Greek Enterprises, 2012-2014*. National Documentation Centre (under publication).

7 Tsakanikas, A., Giotopoulos, I., Korra, E. & Stavraki, S. (2016). *Global Entrepreneurship Monitor 2015-2016*, IOBE. [In Greek].

8 Lyberaki, A. (2008). ''Small and Medium Size Enterprises in Greek Manufacture: Unclear Interpretation and Policies'', in T. Giannitsis (ed.), *Greek Economy: Critical Issues of Economic Policy.* Athens: Alpha Bank, Historical Archive, pp. 275-308*.* [In Greek]*.*

9 Ioannidis, S., & A. Tsakanikas (2006). 'Entrepreneurship in Greece 2005-2006', FEIR/IOBE, Athens, October 2006. [In Greek]

10 OECD (2010). *Greece at a Glance. Polices for Sustainable Recovery* [Series: Better Policies]. Organization for Economic Cooperation and Development.

11 Sachini E., Chrysomallidis, C., Karampekios, N. & Malliou, N. (2016). *Research, Education, Innovation. Aspects of the Knowledge Triangle in Greece,* National Documentation Centre [in Greek].

12 OECD. (2009). *Review of Greece's Innovation Policy*. [Draft Final Report]. Paris: Organization for Economic Cooperation and Development.

13 Protogerou, A., Caloghirou, Y. & Siokas, E. (2010). 'The impact of EU policy-driven research networks on the diffusion and deployment of innovation at the national level: the case of Greece', *Science and Public Policy*, 37(4), pp. 283-296.

14 Sachini E., Malliou, N., Chrysomallidis, C. & Karampekios, N. (2016), *Greek Scientific Publications 2000-2014: Bibliometric analysis of Greek publications in international scientific journals*, National Documentation Centre [in Greek].

15 Komninos, N. & Tsamis, A. (2008). The System of Innovation in Greece: Structural Asymmetries and Policy Failure, *International Journal of Innovation Regional Development,* 1(1), pp. 1-23.

16 Karampekios, N., Ieromnimon, T., & Chrysomalidis, C. (2016). *High Tech Business Demographics in Greece, 2011-2015*, Athens: National Documentation Centre [in Greek].

17 European Commission (2015). *Innovation Union Scoreboard 2015.* Brussels: European Union - Publications Office.

18 National Documentation Centre (2016). *Research and Development Expenditure and Personnel in Greece in 2015.* National Documentation Centre.

19 Mitsos, A., Chrysomallidis, C., & Karampekios, N. *The Greek System of RTI*. National Documentation Centre (expected for publication in 2017).

20 Galan-Muros, V., van der Sijde, P., Groenewegen, P., & Baaken, T. (2015). Nurture over Nature: How Do European Universities Support their Collaboration with Business?, *Journal of Technology Transfer,* 42(1), pp. 185-201.

21 Herrmann, B. & Kritikos, A.S. (2013). Growing out of the Crisis: Hidden Assets to Greece's Transition to an Innovation Economy''. *IZA Journal of European Labor Studies* 14(2), pp. 2-23.