



Does exposure to university research matter to high-potential entrepreneurship?

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Background

Literature rife with references to the “newly” acquired entrepreneurial role of universities (Franklin, Wright, Lockett, 2001; Wright et al, 2007; D’Este et al, 2010).

New independent firms possible “missing link” between available knowledge and economic growth (Acs, Parson, Tracy, 2008).

Founders’ characteristics are important resources to competitive advantage of new entrepreneurial ventures. The cognitive base and educational background of founders is considered an important factor for innovation (Arvanitis and Stucki, 2012).

Over the past three decades the share of scientifically educated workforce has been rising in almost all European countries.



Increased share of Ph.D. holders (2000 and 2009)

Countries	2000	2009
Switzerland	2.40%	3.40%
Sweden	2.50%	3.00%
Portugal	1.00%	2.70%
Finland	1.90%	2.50%
Germany	2.00%	2.50%
Slovakia	0.60%	2.20%
United Kingdom	1.40%	2.10%
Austria	1.40%	2.00%
Australia	1.30%	1.90%
Netherlands	1.50%	1.60%
Denmark	1.10%	1.60%
Norway	1.00%	1.60%
United States	1.30%	1.60%
Slovenia	-	1.50%
OECD	1.00%	1.50%
France	1.20%	1.50%
NewZealand	0.80%	1.40%
Greece	0.20%	1.40%
Czech Republic	0.60%	1.40%

Countries	2000	2009
Ireland	0.90%	1.40%
Russian Federation	-	1.40%
Israel	0.90%	1.30%
Belgium	0.90%	1.30%
Italy	0.40%	1.30%
Canada	0.80%	1.20%
Korea,	0.70%	1.20%
Japan	0.60%	1.10%
Spain	0.90%	1.00%
Hungary	0.50%	0.90%
Estonia	-	0.80%
Poland	0.80%	0.80%
Iceland	0.40%	0.70%
Brazil		0.40%
Turkey	0.20%	0.40%
Mexico	-	0.20%
Chile	-	0.20%
Indonesia	-	0.10%



Definitions

Types of academic entrepreneurship: narrow definition, broader definition (Shane, 2004; Wright et al, 2009; Franzoni and Lissoni, 2009; Goel and Grimpe, 2012; Hayter, 2011)

We adopt a broader definition based on company founders with prior exposure to academic research (Ph.D. holders)

Examine new ventures created by Ph.D. holders as a form of Knowledge-Intensive Entrepreneurship.



Research question

Do new ventures founded by persons who have been previously exposed to academic research differ in behavior and structure from other KIE ventures?

Our conjecture is that exposure of company founders to university research affects entrepreneurial incentives and behavior in ways that reflect higher levels of creation and use of scientific and technological knowledge and market niche specialization.



Data: were collected in the context of the AEGIS Project funded by the EU under the FP7

Survey data on :

4004 newly established firms (2001-2007)

Ten European countries

- France, Germany, Italy, United Kingdom
- Denmark, Sweden
- Greece, Portugal
- Croatia, Czech Republic

18 sectors in three broad sector groups

- High and medium-high tech manufacturing
- Medium-low and low tech manufacturing
- Knowledge-intensive services

AEGIS: Advancing Knowledge-Intensive Entrepreneurship and Innovation for Economic Growth and Social Well-being in Europe



Distribution of firms across major sector groupings

	Ph.D Founder (N=323)		Non-Ph.D Founder (N=3681)	
	# of firms	% of firms	# of firms	% of firms
High-tech sectors	50	15.5%	373	10.1%
Low-tech sectors	45	13.9%	1434	39.0%
Knowledge-intensive business services	228	70.6%	1874	50.9%
Total	323	100%	3681	100%



Education qualification of employees: the vast majority of firms with Ph.D. founders employ university graduates

	Firm type					
	Ph.D Founders			Non-Ph.D Founders		
Employees' educational qualification	# of firms	% of firms	Avg. number of employees per firm	# of firms	% of firms	Avg. number of employees per firm
bachelor degree	294	91%	8.17	2305	63%	5.22
graduate degree	205	63%	5.81	1446	39%	3.71
PH.D degree	226	70%	2.17	212	6%	1.84



Firms employing Ph.D holders per sector group: companies with Ph.D. founders prevail

Sector group	Ph.D Founders			Non-Ph.D Founders		
	# of firms	% of firms	Avg. number of Ph.D holders per firm	# of firms	% of firms	Avg. number of Ph.D holders per firm
High-tech	35	70.0%	2.23	25	6.7%	2.24
Low-tech	30	66.7%	1.73	57	4.0%	1.77
KIBS	161	70.6%	2.24	130	6.9%	1.79



Factors affecting firm formation

	Ph.D Founders	non-PhD Founders	t-test (observed differences)
Factors	Average rating	Average rating	
Work experience in the current activity field	4.34	4.31	n.s
Technical/engineering knowledge	4.07	3.81	***
Design knowledge	3.03	3.04	n.s
Market knowledge	3.98	4.06	n.s
Networks built during previous career	3.85	3.73	n.s
Availability of finance	3.37	3.33	n.s
Opportunities in a public procurement initiative	1.97	2.10	***
Existence of a large enough customer	3.04	3.27	***
Opportunity deriving from technological change	3.23	2.95	***
Opportunity deriving from a new market need	3.42	3.26	***



Funding: own financial resources is the prominent funding source for firm establishment

Firm type				
	Ph.D Founders		Non-Ph.D Founders	
Funding sources	Count of firms using a specific source	% of firms	Count of firms using a specific source	% of firms
Own financial resources	287	91%	3303	92%
Family member	29	9%	337	9%
Previous employer	14	4%	78	2%
Venture capital	35	11%	142	4%
Bank	60	19%	1018	28%
National government or local authorities	31	10%	250	7%
EU funds	9	3%	103	3%
Other sources	27	9%	150	4%



Average percentage of funding per funding source

	Firm type	
	Ph.D. Founders	non-Ph.D Founders
Funding sources	Average % funding	Average % of funding
Own financial resources	76.99	79.49
Family member	34.10	43.27
Previous employer	45.36	43.94
Venture capital	61.11	40.73
Bank	45.13	51.98
National government or local authorities	32.48	34.36
EU funds	27.78	34.51
Other sources	62.11	57.08



Success factors: R&D, networking with other firms and scientific actors more important factors for companies with Ph.D. founders

	Ph.D Founders	non-Ph.D Founders	T-test (observed differences)
Factors	Average rating	Average rating	
Capability to offer novel products/services	3.76	3.68	n.s.
Capacity to adapt the products/services to the specific needs	4.23	4.22	n.s.
Capability to offer expected products/services at low cost	3.00	3.29	**
R&D activities	3.59	2.88	**
Establishment of alliances/partnerships with other firms	3.26	2.92	**
Capability to offer high quality product/services at a premium price	3.89	3.72	n.s
Networking with scientific research organizations	3.00	2.18	***
Marketing and promotion activities	3.22	3.23	n.s

Critical factors for both cases: market focus and offering novel products



Main strategy: offering of unique product and services prevails for both firm types

	Ph.D Founders (N=323)		Non-Ph.D Founders (N=3681)	
	Number of firms	% of firms	Number of firms	% of firms
Offer standardized products and services at low cost	31	9.6%	608	16.5%
Offer unique products and services	199	61.6%	2148	58.4%
Exploit opportunities in new market niches	93	28.8%	925	25.1%

Sources of knowledge: companies with Ph.D. founders assign lesser role to suppliers and higher importance to internal sources



Knowledge sources	Ph.D Founders	Non-Ph.D Founders	T-test (observed differences)
	Average rating	Average rating	
Clients or customers	4.40	4.41	n.s.
Suppliers	2.82	3.41	**
Competitors	3.22	3.28	n.s.
Public research institutes	2.45	2.07	***
Universities	2.67	2.07	***
External commercial labs/R&D firms/technical institutes	2.22	2.02	***
In-house R&D	3.84	3.22	***
Trade fairs, conferences and exhibitions	3.08	2.94	n.s.
Scientific journals and other trade or technical publications	3.21	2.84	n.s.
Participation in nationally funded research programmes	2.27	1.86	***
Participation in EU-funded research programmes	2.11	1.85	***



Innovation: 3 out of 4 firms with Ph.D. founders have introduced a new or significantly improved product in the last 3 years

Firm type	Innovators	Non-innovators
Ph.D Founders (N=323)	75%	25%
non-Ph.D Founders (N=3681)	63%	37%



Innovation per sector group

	Firm type			
	Ph.D founders (N=241)		non-Ph.D founders (N=2307)	
Sector group	# of firms that innovate	% of firms that innovate	# of firms that innovate	% of firms that innovate
High-tech	37	86%	258	68%
Low-tech	46	75%	973	63%
KIBS	158	72%	1076	61%



Innovation: firms with Ph.D. founders are more capable of introducing radical product innovations

Radicalness of innovation	Firm type			
	Ph.D founders		non-Ph.D. founders	
	# of firms	% of firms	# of firms	% of firms
No Innovation	82	25%	1374	37%
New-to-firm	49	15%	825	22%
New-to-market	102	32%	1002	27%
New-to-world	90	28%	480	13%
Total	323	100%	3681	100%



Intellectual property protection: firms with Ph.D. founders use all IP methods more extensively

	Firm type	
	Ph.D. founders	non-Ph.D. founders
<i>Protection methods</i>	<i>% of firms</i>	<i>% of firms</i>
Patents	31.5%	15.0%
Trademarks	49.8%	40.2%
Copyrights	34.9%	26.7%
Confidentiality agreements	79.7%	52.2%
Secrecy	58.5%	38.5%
Lead-time advantages on competitors	59.8%	53.1%
Complexity of design	57.7%	44.5%

Firms, in general use more informal or semi-informal methods of protection



Firm performance: firms with Ph.D. founders outperform firms with non-Ph.D. founders

Firm performance	Firm type	N	Mean	t-test (observed differences)
% Sales in International market	Ph.D. founders	323	26.04	***
	non-Ph.D founders	3681	13.43	
Avrg. Growth Sales (quartile)	Ph.D. founders	301	5.77	**
	non-Ph.D founders	3361	5.25	
Avrg. Growth Employment (quartile)	Ph.D. founders	306	2.29	**
	non-Ph.D founders	3391	2.08	



Concluding remarks (1)

At first look, young European companies whose founders have been exposed to academic research indicate, in the aggregate, a fair degree of similarity in behavior to those whose founders have not had the same exposure.

Important similarities between the two groups of companies include:

- Market focus and offering novel products or services are the critical factors for creating and sustaining competitive advantage;
- Main company strategy is to offer unique products and services followed at some distance by exploiting new market niches;
- Clients are the most important source of knowledge.



Concluding remarks (2)

More careful cross-examination reveals for the former group of firms (Ph.D founders) a picture of:

- Extensive dependence on university graduates and post graduates as employees
- More reliance on venture capital funding (risk-taking)
- Higher dependence on internal R&D and external scientific and research networks as sources of knowledge
- Higher innovative performance especially in terms of new-to-the-world products
- Increased awareness of intellectual property protection
- Better firm performance in terms of growth and international sales