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Location Choice of Academic Start-Ups – Case Study of the German Internet Sector

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Introduction and Background

Academic start-ups are a prominent form of knowledge transfer from higher education institutions (HEI) into surrounding region

- Research results and academic knowledge are used in start-ups, transformation into marketable products or processes (e.g. Fritsch 2007)

- Influence on regional innovation activity and structural change (e.g. Spehl et al. 2006)

- Academic start-up entrepreneurs settle close to alma mater HEI (e.g. Egeln et al. 2003)

Idea of regional decision makers & regional scientists:

- Academic start-ups are an instrument of structural change and regional economic development

  ➢ High public investments for support & encouragement

Research Objectives

- In what kind of regions do academic entrepreneurs remain with their start-ups?

- Are there differences between entrepreneurs who studied at different HEI types? (University U / Universities of Applied Sciences UAS)

- What role does spatial proximity to alma mater HEI play for location choice of academic start-up-founders?

➢ <u>What influence do regional factors and HEI-sided factors have on the choice of start-up location?</u>

Database

- *Gründerszene,* digital start-up data base of German internet sector, link to social networks XING, Linked-In

- **Definition of academic start-up in this research:** start-up company founded by academic entrepreneur 2 years prior to 5 years after graduation

- **Focus on German internet sector** → low market entry barriers, low demands concerning regional hard location factors

- ➤ **No information about** business success; representativeness, Berlin bias; origin of founders and the company/HEI connection

Database
Profile of a start-up-founder on *www.gruenderszene.de*

Database
Gründerszene – Factsheet

→ **Basic Database** *(BD)*: N = 1,685 companies; 1,067 founders

→ **Start-up-database:** n = 946

→ **Gender** *(BD):*
94.7% of foundations by male,   5.3% by female entrepreneurs

→ **Start-ups per HEI-Type** *(BD):* **U – 1.013;   TU – 242;   UAS – 334;**

→ **Distance start-ups→ alma mater**

→ 40.1% of start-ups in <50km distance to alma mater

→ U Ø → 271 km;   UAS Ø → 205km

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Empirical Results
Top 10 – Start-up-Locations   and   Alma-Mater-Districts

	Location of start-up	Location of alma mater
1.	**Berlin** (651)	**Berlin** (214)
2.	**Hamburg** (190)	**Munich** (127)
3.	**Munich** (167)	**Mayen-Koblenz** (124)
4.	**Cologne** (111)	**Hamburg** (109)
5.	**Karlsruhe** (25)	**Cologne** (63)
6.	**Leipzig** (25)	**Leipzig** (49)
7.	**Dusseldorf** (24)	**Karlsruhe** (43)
8.	**Frankfurt / Main** (20)	**Mannheim** (36)
9.	**Stuttgart** (12)	**Wiesbaden** (34)
10.	**Heidelberg** (10)	**Potsdam** (28)

→ **Interesting:**
→ **pull effect, e.g.**
Berlin, Hamburg

→ **push effect, e.g.**
Vallendar, Leipzig

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Basic database, n=1685

Empirical Results

Top 10 – Start-up-Locations   and   Alma-Mater-Districts
with regard to number of inhabitants (in 1,000)

	Location of start-up	Location of alma mater
1.	**Berlin** (.19)	**Mayen-Koblenz** (.59)
2.	**Munich** (.16)	**Wiesbaden** (.19)
3.	**Cologne** (.11)	**Potsdam** (.19)
4.	**Hamburg** (.11)	**Heidelberg** (.17)
5.	**Karlsruhe** (.09)	**Darmstadt** (.17)
6.	**Jena** (.07)	**Mannheim** (.15)
7.	**Heidelberg** (.07)	**Karlsruhe** (.14)
8.	**Potsdam** (.05)	**Koblenz** (.13)
9.	**Darmstadt** (.05)	**Würzburg** (.11)
10.	**Leipzig** (.05)	**Erlangen** (.1)

Berlin and Munich:

→**Most important start-up locations**

But:

Also smaller districts are good "start-up-producers"

Database

Number of start-ups and time of graduation
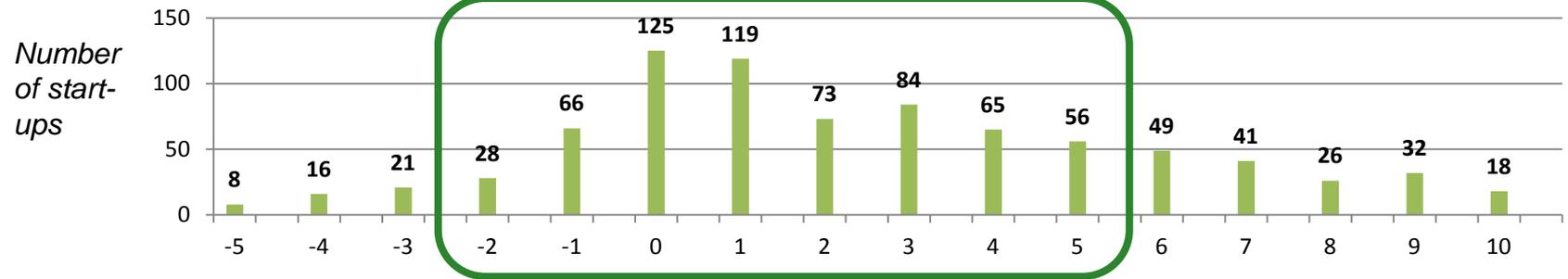
Share of regional start-ups and time of graduation
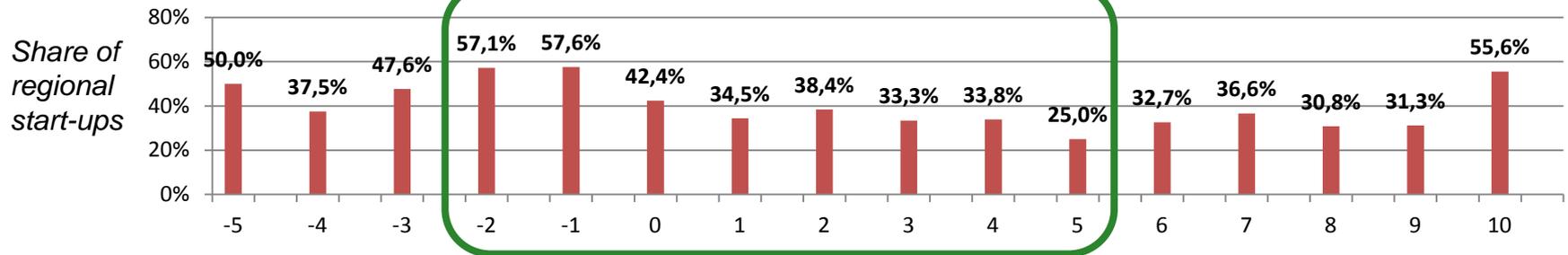
Database
Travel Distance between start-up and alma mater

Share of start-ups cumulated, % (y-axis: 0% to 100%)

Travel Distance in km (x-axis: 0 to 850)

— **Universities** (red)   **Universities of Applied Sciences** (green)   — **Technical universities** (blue)

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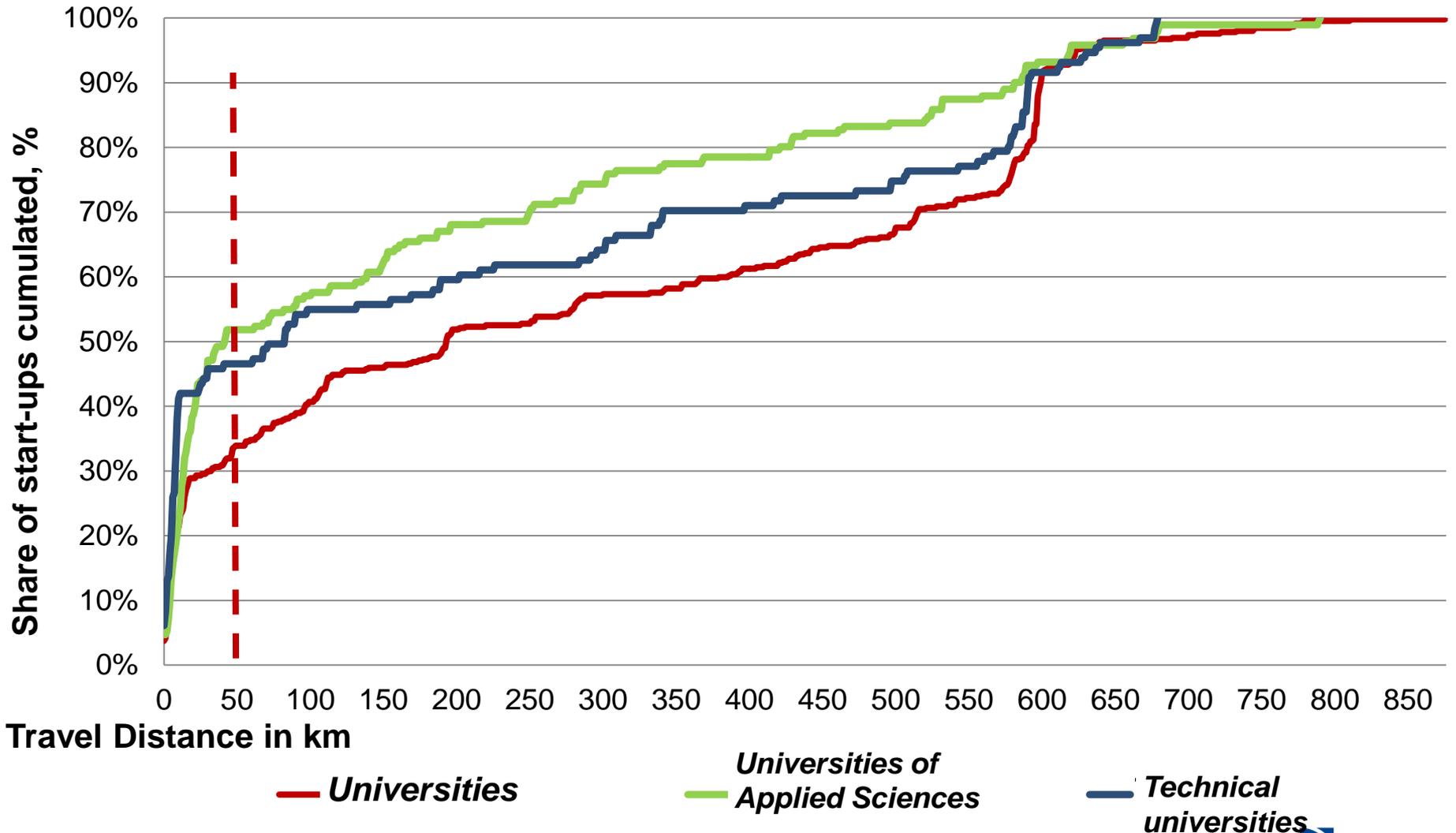
Model

What influence do regional factors and HEI-sided factors have on the choice of start-up location?

Two regression approaches, cross-sectional, OLS & Logit

- **Logit**
  - Dependent variable: Dummy distance HEI / start-ups =1 <50km

    =0 >50km
  - Which factors influence the probability that founder remains in HEI region?

- **OLS**
  - Dependent variable: Distance HEI / start-up (km)
  - The lower variable x in the HEI region, the higher the distance between start-up and HEI

Model

HEI-Sided Variables				
	Variable Description	**Year**	**Expected Sign (logit)**	**source**
Start-up culture in HEI	Financial support for alma mater HEI in any EXIST-programs	1998-2011	**+**	Kulicke et al. 2012
Size of HEI	Number of students in 1.000	2007	**+**	DeStatis
Research intensity	Third party fundings per professor	2007	**+**	DeStatis
Type of HEI	1= UAS, 0 = university	2007	**+**	DeStatis

Model

		Variable Description	Year	Expected Sign (log)	source
Regional Variables					
Population	**Degree of Agglomeration**	Ordinal variable degree of agglomeration	2007	**+**	INKAR, BBSR
Economy	**Economic performance**	GDP per inhabitant	2007	**+**	INKAR
	Sector distribution	Share of employees in the tertiary sector	2007	**+**	INKAR
		Share of employees in the internet sector	2007	**+**	BAfA
	Knowledge and innovation orientation of local economy	Share employees in R&D	2007	**+**	INKAR
		Share of employees with graduate degree	2007	**+**	INKAR
	Employment market	Share of employed inhabitants in popul. of working age	2007	**+ / −**	INKAR
Infrastructure	**Knowledge infrastructure**	Number of HEIs + scientific research institutions	2014	**+**	BMBF
	Traffic infrastructure	Ø driving time (car) to next highway access in min	2012	**−**	INKAR, BBSR
Soft location factors	**Start-up culture**	Share of self employed	2007	**+**	INKAR
		Share of small businesses with <10 employees	2007	**+**	INKAR
	Location quality from the perspective of high qualified	Index value creative class	2011	**+**	NIERS

Methodical Approach

Problem: Endogenity, Complexity

- Which regional factors cluster together? → Variable groups, model simplification

- Factor analysis on data set of all districts in GER, min. eigenvalue = 1; varimax rotation

- Internal consistency → Cronbach's alpha →
  several items propose to measure the same general construct produce similar scores,
  single variables left out to create highest internal consistency, but for each to contribute
  some unique information

Regional variables		Scale reliability coefficient
Factor 1: Modern Employment Market	GDP, share of employees in tertiary sector, share of highly qualified employees	0.9189
Factor 2: Start-up culture	Share of self-employed, share of small businesses	0.8395
Infrastructure	Ø driving time (car) to next freeway access in min	

- Standardization of variables to ensure scale homogeneity → creating factors

- Regression with robust standard errors, for logit approach including a two-dimensional cluster option (district and HEI);

Dependent variable	Dummy Distance U / Start-up =1 <50km			Distance U / Start-up (km)
	(1 - Logit) ALL			(2 - OLS) ALL
„Start-up-Dummy"	.1417 (.543)			10.16098 (.599)
Type of HEI (UAS = 1)	+			-174.4911*** (.000)
R&D-Performance (Third-party funding in 1.000€)	.0006 (.592)			-.0581 (.519)
Size of HEI (1.000 students)	+			-5.1261*** (.000)
Public Financial Support EXIST-Dummy (supported = 1)	.1195 (.686)			25.6797 (.238)
Factor 1: Employment Market	.1514 (.427)			9.307 (.396)
Factor 2: Start-Up Culture	+			-41.2282** (.002)
Infrastructure	-.0322 (.281)			-1.7093 (.599)
Constant	-1.4308* (.054)			356.1675 (.000)
N	850			850
	.2004			R² = 0.0989

*** Statistically significant at the 99% level of confidence; ** Statistically significant at the 95% level of confidence; * Statistically significant at the 90% level of confidence

Empirical Results

Propensity for start-ups to be founded within the alma mater region is significantly higher, if….

→ **…** founder studies at a **UAS**

→ **…** founder studies at **a big and well-established HEI**

→ **…** there is a **positive start-up culture**

No clear, significant influence could be identified for…

→ … public financial support of scientific institutions

→ … labor market factors

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Take-Home-Messages

- Supporting start-ups works as an instrument of regional development also in regions that are structurally weak

- …but, there has to be certain start-up culture

- …and it is more promising at UAS → allocation of public financial support

Further research potential:

- Are results different for HEI research spin-offs?

- Are our results generalyzable for other sectors?

Thank you for your attention!