

The Role of Universities in Regional Innovation: What Implications for Peripheral Regions?

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**The Role of
Universities in
Innovation and
Regional Development**



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Universities and regional innovation

- Growing number of universities in the world
 - 26328 universities covered by latest CSIC ranking
 - 32% of world student-age population went to university in 2012, up from 14% in 1992. In 54 countries, a majority went to university (The Economist 2015)
 - No. of universities nearly doubled from 1980 to 2010 (Valero and van Reenen 2016)
- Universities more central in innovation policy
 - Shift to the knowledge economy
 - Increasing focus on R&D as a source of competitiveness
 - Return of the linear model?
- Central role for universities in regional innovation policy models
 - Triple helix, regional innovation systems, learning regions, smart specialisation, etc.
- New models of universities emphasize regional role
 - Mode 2 university, entrepreneurial university, engaged university

How do universities affect regional innovation?



- Production of new knowledge with economic value
 - Commercialisation (patenting, licensing, spin-offs)
 - Collaboration with firms (joint projects, contract research, consulting)
 - Informal knowledge exchange (networking, ad-hoc advice)
- Education of regional workforce
 - General competence development
 - Targeted skills training for existing or new industries
 - Attracting talent to the region
- Production of new knowledge with social or political value
 - Solving grand societal challenges
 - Collaboration with policy-makers
 - Informal knowledge exchange with policy-makers



The impact of universities is often local

- Knowledge spillovers from university research are localised
 - Higher patenting in US states with more university R&D (Jaffe 1989; Audretsch and Feldman 1996)
 - Doubling of universities in a region associated with 4% higher GDP pc (Valero and van Reenen 2016)
- University-industry collaboration often within the region
 - 55-63% of US firms' research funding spent within 100 miles (Mansfield and Lee 1996)
 - Half of university-industry collaborations in Brazil within 82.4 km (Garcia et al. 2015) and in the UK within 148 km (D'Este and Iammarino 2010)
- Firms in some industries tend to cluster near top universities
 - Knowledge and high-tech start-ups in Germany (Audretsch et al. 2005)
 - Pharmaceuticals in the UK (Abramovsky and Simpson 2011)
 - High-tech plants in the US (Woodward et al. 2006)
- Graduates often stay in the region after their studies
 - 40-70% of graduates in UK stay in region of university (Faggian and McCann 2009)
 - 45% of Dutch graduates stay in same NUTS 2 region, and 65% in same NUTS 1 region (Venhorst et al. 2011)
 - 48% of Finnish graduates who move to study still living in study region 10 years after graduation (Haapanen and Tervo 2012)

Spikiness of scientific research



Where does this leave peripheral and less-developed regions?



- Geographical dispersion of universities
 - Most countries have at least one university
 - Majority of regions also have a university in the region
- Quality of universities differs widely
 - Research quality
 - Education quality
 - Engagement with society
 - What is the relationship between the three?
- This is partly self-reinforcing
 - Matthew effect in science funding
 - Network and peer learning effects in students
- Increasing emphasis on universities and R&D in innovation policy may exacerbate rather than even out uneven spatial impacts of globalisation



University-industry collaboration in peripheral regions



- Research on university-industry collaboration mainly interested in core regions and leading university regions
 - Much less is known about how firms in peripheral regions collaborate with universities
- Some argue that the role of universities is marginal in peripheral regions (Brown 2016)
 - Few entrepreneurial spillovers
 - Risk of institutional capture and policy lock-in if university becomes too dominant
- Firms in peripheral regions collaborate more at a distance
 - Compensate for lack of local knowledge spillovers by collaborating more at other scales (Grillitsch and Nilsson 2015; Jakobsen and Lorentzen 2015)
 - Little research on long-distance university-industry collaboration



Some unanswered questions

- What are the drivers of university-industry collaboration in peripheral regions?
 - Is there a difference between firms collaborating with nearby and those collaborating with distant universities?
 - Is the decision to collaborate driven by characteristics of the university or of the firm?
- How does university-firm collaboration affect innovation in peripheral regions?
 - Does collaboration with nearby and distant universities have different effects on innovation?
 - Does the effect of local collaboration depend on the quality of the university?

Norwegian city regions

Large cities

Regional population

Oslo 

1.3 mill

Mid-sized cities


Regional population

Bergen 

410.000

Stavanger 

340.000

Trondheim 

275.000

Small cities

Regional population

Drammen 
169.000

Fredrikstad 
153.000

Kristiansand  UNIVERSITETET I AGDER
137.000

Tønsberg 
137.000

Skien 
128.000

Haugesund 
109.000

Sandefjord
92.000

Hamar 
91.000

Small cities


Regional population

Ålesund 
88.000

Arendal  UNIVERSITETET I AGDER
82.000

Tromsø 
76.000

Gjøvik 
71.000

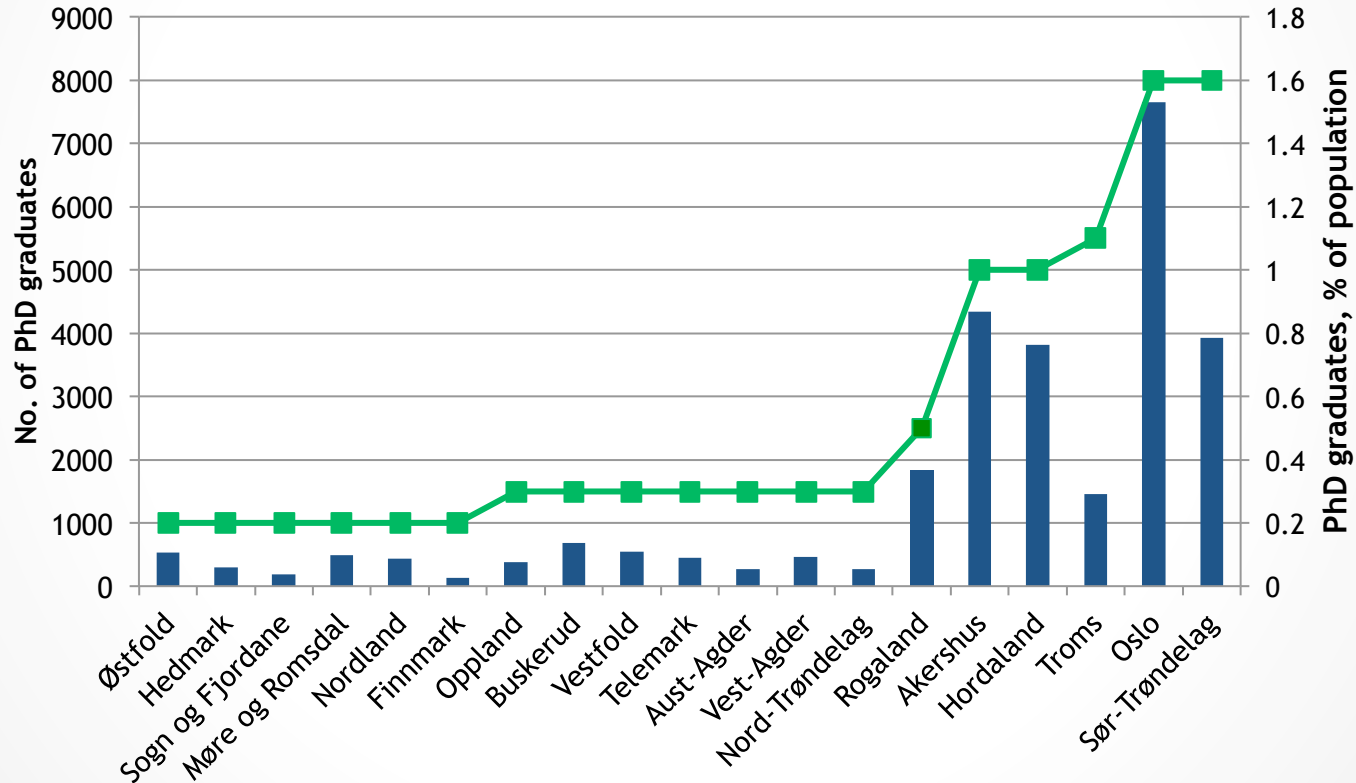
Molde 
58.000

Moss
53.000

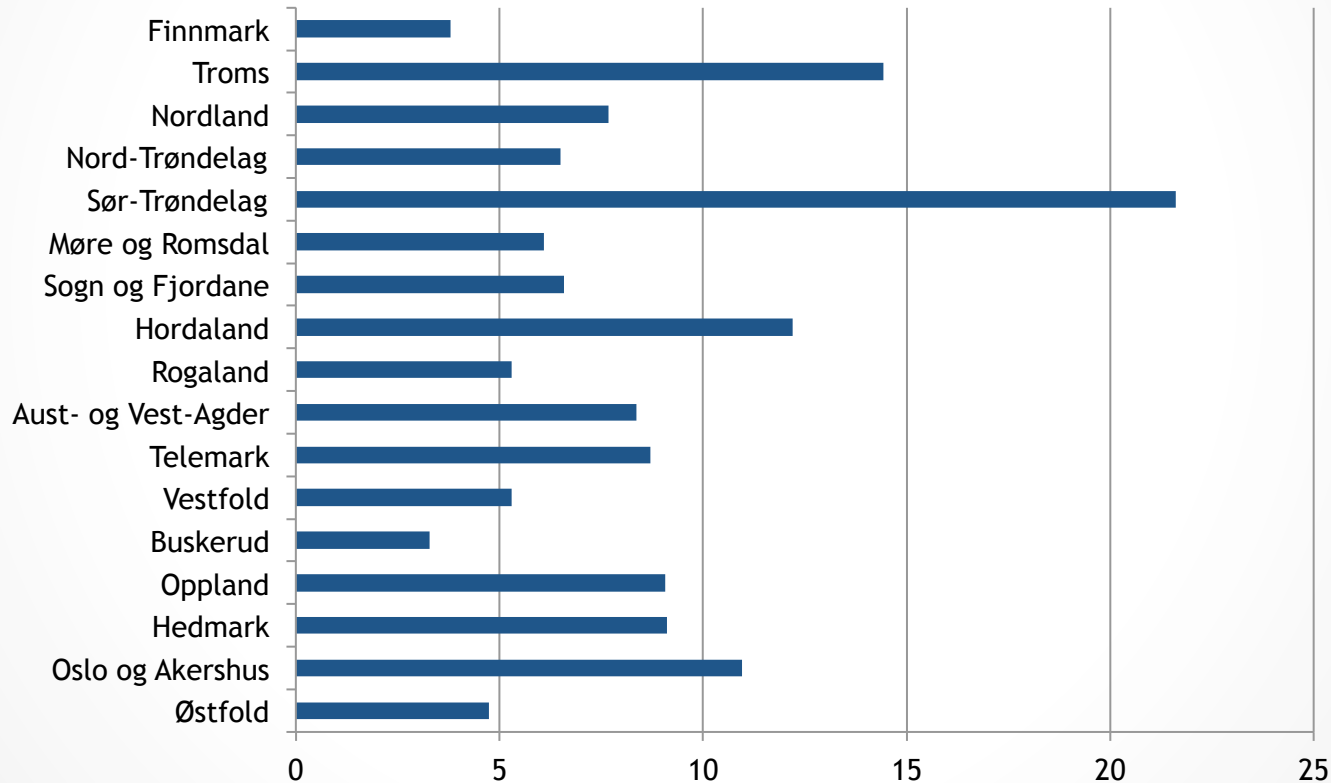
Bodø 
53.000

Lillehammer 
39.000

PhD graduates in Norwegian regions



Students as a share of employed population



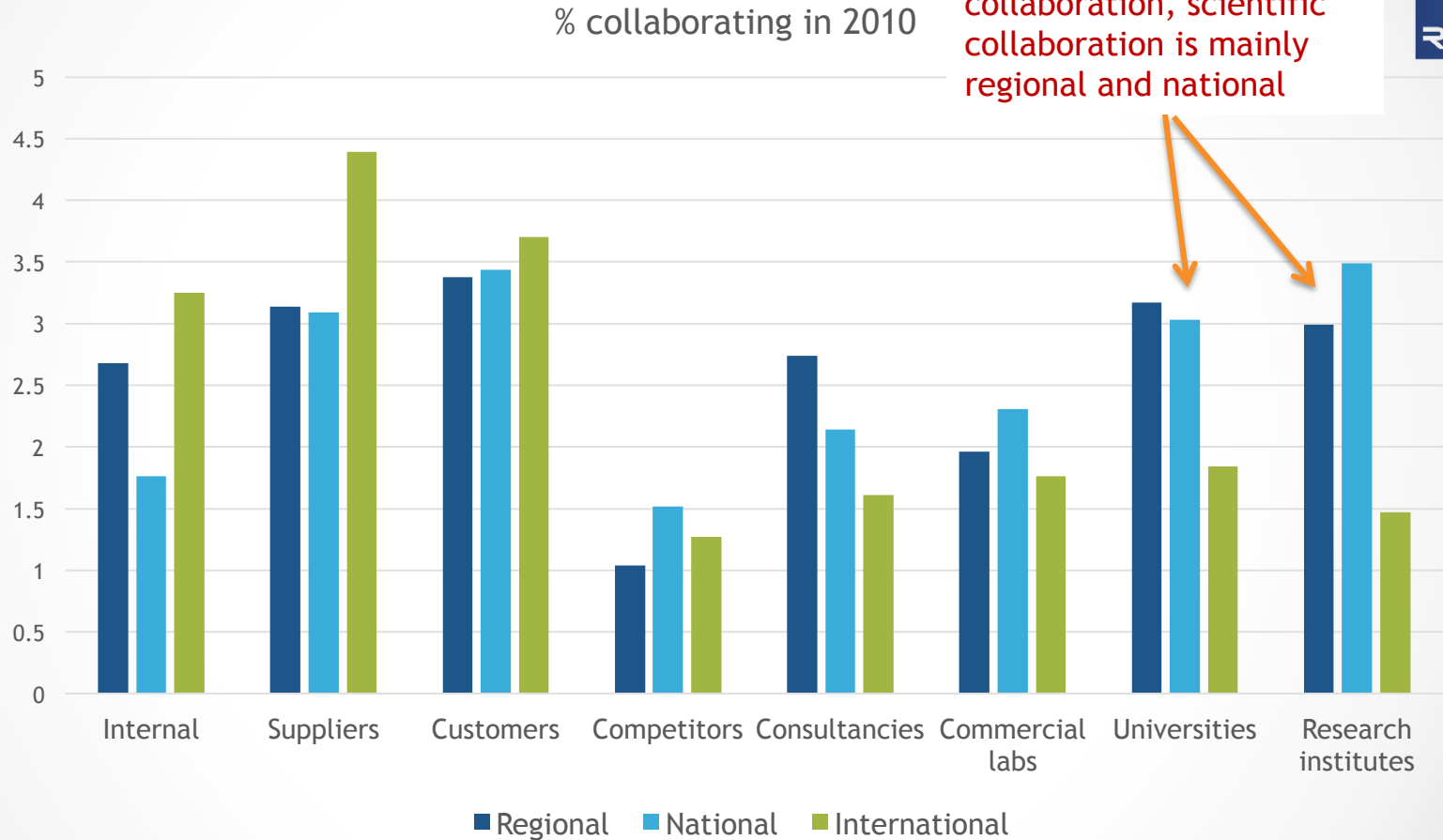
Data

- **Community Innovation Survey - Norwegian data**
 - Based on Oslo Manual, 2005 revision
 - 3 waves: 2004-06, 2006-08 and 2008-10
- **Coverage:**
 - Full population of firms above 50 employees
 - All firms with 10-49 employees reporting significant R&D activities
 - Sample of firms with 5-49 employees, stratified by industry and size group
- **Participation is mandatory with fines for non-participants**
 - Response rate 97 percent
 - Sample of 6000-6500 firms in each wave, total 18897 firms
 - This represents 1/3 of firms and 2/3 of employees in the sampling population (firms with more than 5 employees)
- **Analyses cover firms that are present in two concurrent waves**
 - Total sample 6353 firms
- **Supplemented with linked employer-employee data**
 - Location of firm (based on employee workplace data rather than official corporate address)
 - Employee educational background

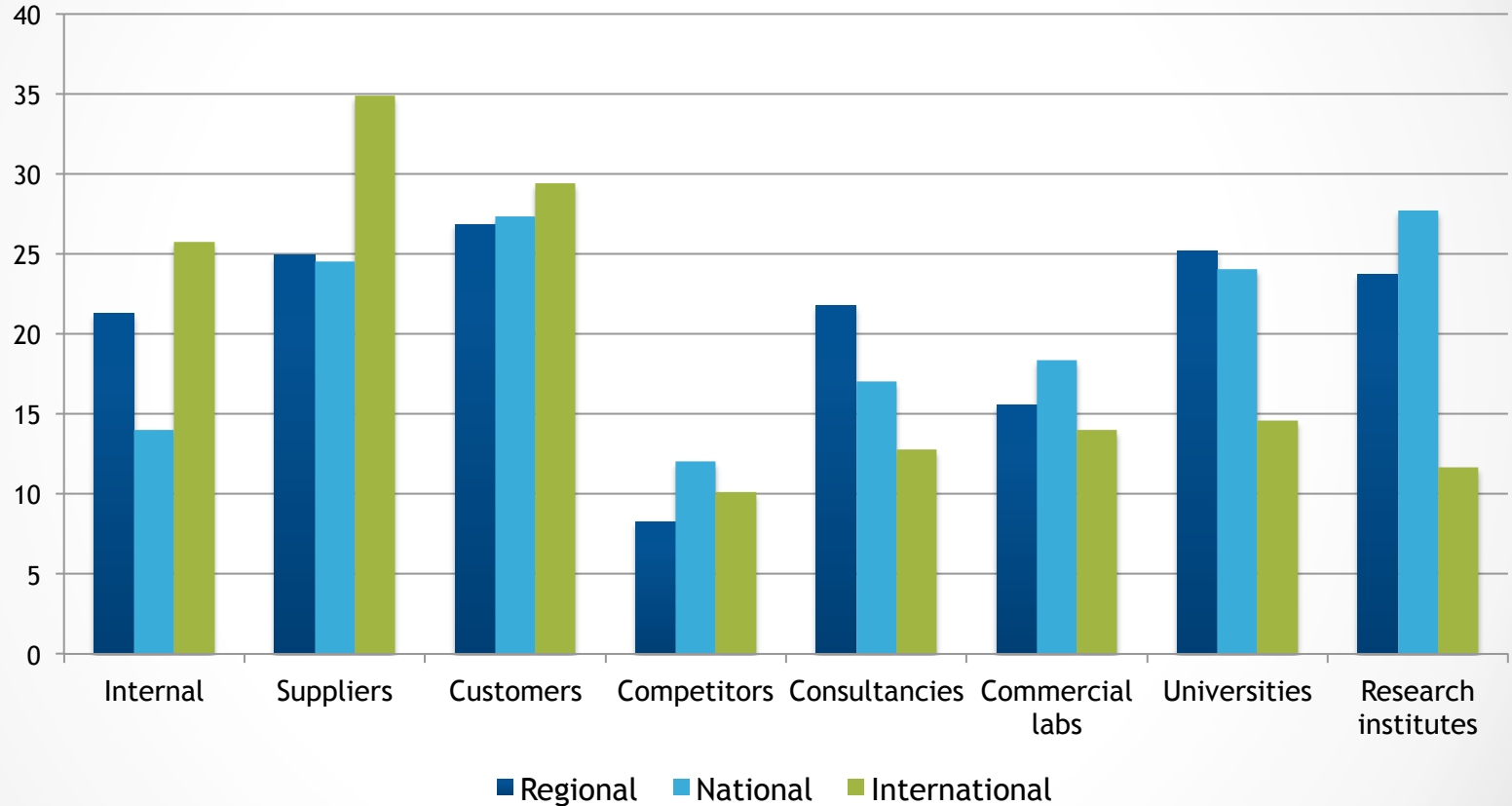
Collaboration with universities, own survey

	All firms, share	Leading university regions, share	Other regions, share
None	78.3	76.8	80.0
Local only	11.9	12.8	11.0
Non-local only	5.6	5.6	5.6
Local and non-local	4.2	4.8	3.6
Total	100.0	100.0	100.0
N	1994	1040	954

Unlike industrial collaboration, scientific collaboration is mainly regional and national



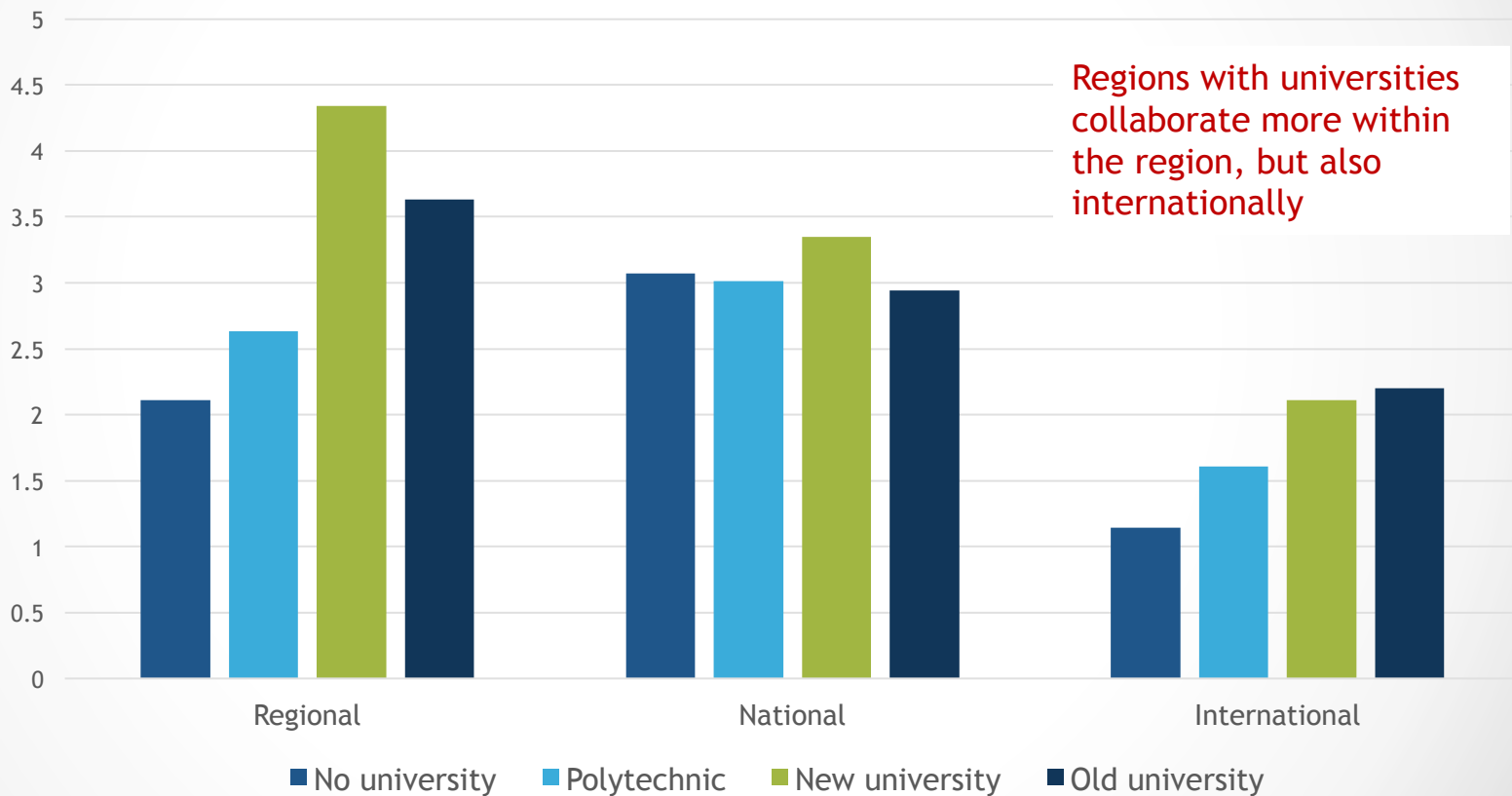
Collaborating in 2010, % of collaborating firms only



Collaboration with universities, CIS 2010

Share of firms	All firms	Old university regions	New university regions	Polytechnic regions	Non-university regions
None	94.0	93.5	93.6	94.2	95.2
Local only	2.0	2.2	2.0	2.1	1.2
Non-local only	2.8	2.8	2.1	3.2	2.7
Local and non-local	1.2	1.4	2.4	0.5	0.9
Total	100.0	100.0	100.0	100.0	100.0
N	6532	2725	806	1862	1139

University collaboration by presence of regional university, 2010



Which firms collaborate with universities?

Model 1: $\text{logit}(\text{Collaboration}_{i,t}) = \alpha + \beta_1 \text{University quality}_{i,t} + \beta_2 \text{Other collaboration}_{i,t} + \beta_3 \text{R\&D intensity}_{i,t} + \beta_4 \text{Firm size}_{i,t} + \beta_5 \text{Human capital}_{i,t} + \beta_6 \text{Controls}_{i,t} + \varepsilon_i$

- *Collaboration:* Collaboration with universities, Collaboration with universities within the region, Collaboration with other national universities, Collaboration with foreign universities
- *Other collaboration:* No. of types of other partners at three scales: Within the region, elsewhere in the country, abroad
- *University quality:* Location within the region of: No university (baseline), a polytechnic, a new university, or an old university. Firm location is based on site of largest employment.
- *R&D intensity:* R&D expenditure (log)
- *Firm size:* Number of employees (log)
- *Human capital:* Share of employees with tertiary education (log)
- *Controls:* two-digit NACE (62 dummies), year. Standard errors clustered over i .

	University collaboration		With regional university		With other national univ.		With foreign university	
No university	Baseline		Baseline		Baseline		Baseline	
Polytechnic	-0.03	(0.15)	-0.06	(0.20)	0.08	(0.19)	0.13	(0.25)
New university	0.01	(0.19)	0.44†	(0.24)	-0.05	(0.23)	0.08	(0.33)
Old university	-0.22	(0.15)	-0.17	(0.19)	-0.32	(0.20)	0.15	(0.25)
Other regional partn.	0.77***	(0.03)	1.11***	(0.04)	-0.02	(0.05)	0.07	(0.06)
Other national partn.	0.75***	(0.04)	0.04	(0.04)	1.09***	(0.04)	0.21***	(0.05)
Other foreign partn.	0.59***	(0.04)	0.10*	(0.04)	0.16***	(0.04)	1.03***	(0.05)
Log R&D exp	0.19***	(0.01)	0.18***	(0.02)	0.22***	(0.02)	0.15***	(0.03)
Log employees	0.17***	(0.04)	0.09†	(0.05)	0.19***	(0.05)	-0.09	(0.07)
Log % univ educ	2.73***	(0.39)	3.16***	(0.48)	2.51***	(0.49)	2.51***	(0.66)
Year	Controlled		Controlled		Controlled		Controlled	
Industry	Controlled		Controlled		Controlled		Controlled	
N	18514		18198		17963		16278	
Pseudo R ²	0.58		0.51		0.56		0.55	

	University collaboration		With regional university		With other national univ.		With foreign university	
No university	Baseline		Baseline		Baseline		Baseline	
Polytechnic	-0.02	(0.15)	-0.09	(0.19)	0.12	(0.18)	0.31	(0.25)
New university	0.12	(0.19)	0.56*	(0.23)	0.00	(0.23)	0.35	(0.33)
Old university	-0.18	(0.15)	-0.17	(0.18)	-0.19	(0.19)	0.27	(0.26)
Other regional partn.	0.35***	(0.03)	0.74***	(0.04)	-0.17***	(0.04)	-0.04	(0.05)
Other national partn.	0.42***	(0.03)	-0.07†	(0.04)	0.78***	(0.04)	0.13**	(0.04)
Other foreign partn.	0.36***	(0.03)	0.04	(0.04)	0.08*	(0.04)	0.86***	(0.05)
Log R&D exp	0.08***	(0.02)	0.06***	(0.02)	0.10***	(0.02)	0.09**	(0.03)
Log employees	0.18***	(0.04)	0.13**	(0.05)	0.22***	(0.05)	-0.09	(0.07)
Log % univ educ	2.45***	(0.40)	3.06***	(0.48)	2.24***	(0.49)	2.21***	(0.66)
Year	Controlled		Controlled		Controlled		Controlled	
Industry	Controlled		Controlled		Controlled		Controlled	
N	3053		3023		3016		2915	
Pseudo R ²	0.26		0.26		0.33		0.38	

How does university collaboration affect innovation?



Model 2: $\text{logit}(\text{Innovation}_{i,t}) = \alpha + \beta_1 \text{Innovation}_{i,t-1} + \beta_2 \text{University collaboration}_{i,t-1} + \beta_3 \text{Other collaboration}_{i,t-1} + \beta_4 \text{Controls}_{i,t-1} + \varepsilon_i$

- *Innovation:* Product innovation, New-to-market product innovation, Process innovation, Organisational innovation, Marketing innovation
- *University collaboration:* Collaboration with universities within the region, Collaboration with other national universities, Collaboration with foreign universities
- *Other collaboration:* No. of types of other partners at three scales: Within the region, elsewhere in the country, abroad
- *R&D intensity:* R&D expenditure (log)
- *Firm size:* Number of employees (log)
- *Human capital:* Share of employees with tertiary education (log)
- *Controls:* two-digit NACE (62 dummies), year, region (78 dummies). Standard errors clustered over i .
- Analysis includes innovation-active firms only



	Product innovation		New-to-market product innovation		Process innovation		Organisational innovation		Marketing innovation	
Innovation t-1	1.34***	(0.08)	1.12	(0.09)	0.94***	(0.08)	0.66***	(0.08)	1.14***	(0.08)
Regional university	-0.36*	(0.17)	-0.44*	(0.18)	0.01	(0.16)	-0.23	(0.17)	-0.22	(0.16)
Other national univ	-0.09	(0.18)	0.14	(0.18)	-0.02	(0.17)	0.12	(0.17)	-0.09	(0.17)
Foreign university	-0.08	(0.21)	0.02	(0.20)	0.03	(0.20)	0.10	(0.22)	-0.05	(0.21)
Other regional partn.	-0.01	(0.04)	0.02	(0.05)	0.05	(0.04)	0.21***	(0.04)	0.05	(0.04)
Other national partn.	-0.02	(0.04)	0.03	(0.04)	-0.04	(0.04)	0.07	(0.04)	-0.03	(0.04)
Other foreign partn.	0.15***	(0.04)	0.07†	(0.04)	0.04	(0.04)	-0.02	(0.04)	0.08†	(0.04)
Log R&D exp	0.19***	(0.01)	0.20***	(0.01)	0.15***	(0.01)	0.09***	(0.01)	0.10***	(0.01)
Log employees	-0.01	(0.03)	-0.04	(0.03)	0.05	(0.03)	0.20***	(0.03)	0.04	(0.03)
Log % univ educ	0.96***	(0.32)	0.98**	(0.33)	0.42	(0.31)	0.48	(0.33)	0.48	(0.32)
Year	Controlled		Controlled		Controlled		Controlled		Controlled	
Industry	Controlled		Controlled		Controlled		Controlled		Controlled	
Region	Controlled		Controlled		Controlled		Controlled		Controlled	
N	6313		6213		6273		4854		5624	
Pseudo R ²	0.31		0.28		0.16		0.11		0.16	

	Product innovation		New-to-market product innovation		Process innovation		Organisational innovation		Marketing innovation	
Innovation t-1	1.19***	(0.09)	1.01	(0.09)	0.81***	(0.08)	0.50***	(0.08)	1.02***	(0.09)
Regional university	-0.31†	(0.17)	-0.36*	(0.18)	0.06	(0.15)	-0.18	(0.17)	-0.21	(0.16)
Other national univ	0.02	(0.18)	-0.05	(0.18)	0.05	(0.17)	-0.05	(0.17)	-0.03	(0.17)
Foreign university	-0.09	(0.20)	0.00	(0.20)	0.03	(0.19)	0.08	(0.21)	-0.06	(0.21)
Other regional partn.	-0.02	(0.04)	0.02	(0.05)	0.04	(0.04)	0.20***	(0.04)	0.05	(0.04)
Other national partn.	-0.02	(0.04)	0.02	(0.04)	-0.04	(0.04)	0.06	(0.04)	-0.04	(0.04)
Other foreign partn.	0.17***	(0.04)	0.09*	(0.04)	0.06	(0.04)	0.01	(0.04)	0.09*	(0.04)
Log R&D exp	0.18***	(0.01)	0.18***	(0.01)	0.13***	(0.01)	0.07***	(0.01)	0.09***	(0.01)
Log employees	-0.10**	(0.04)	-0.11**	(0.04)	-0.02	(0.04)	0.15***	(0.04)	-0.01	(0.04)
Log % univ educ	0.12	(0.35)	0.44	(0.36)	-0.15	(0.35)	0.06	(0.38)	-0.02	(0.36)
Year	Controlled		Controlled		Controlled		Controlled		Controlled	
Industry	Controlled		Controlled		Controlled		Controlled		Controlled	
Region	Controlled		Controlled		Controlled		Controlled		Controlled	
N	3841		3795		3828		3089		3506	
Pseudo R ²	0.24		0.22		0.12		0.08		0.13	

Average marginal effects of collaborating with regional university in different regions

	Product innovation		New-to-market product innovation		Process innovation		Organisational innovation		Marketing innovation	
No university	-0.01	(0.06)	0.04	(0.06)	0.02	(0.06)	-0.05	(0.08)	0.02	(0.07)
Polytechnic	-0.09*	(0.05)	-0.06	(0.04)	-0.00	(0.05)	-0.06	(0.05)	-0.04	(0.05)
New university	-0.09†	(0.05)	-0.09†	(0.05)	0.00	(0.06)	0.07	(0.08)	-0.05	(0.05)
Old university	-0.01	(0.04)	-0.06	(0.04)	0.04	(0.04)	-0.02	(0.05)	-0.04	(0.04)

A short comparison with earlier results...



Research Policy

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Firm collaboration and modes of innovation in Norway

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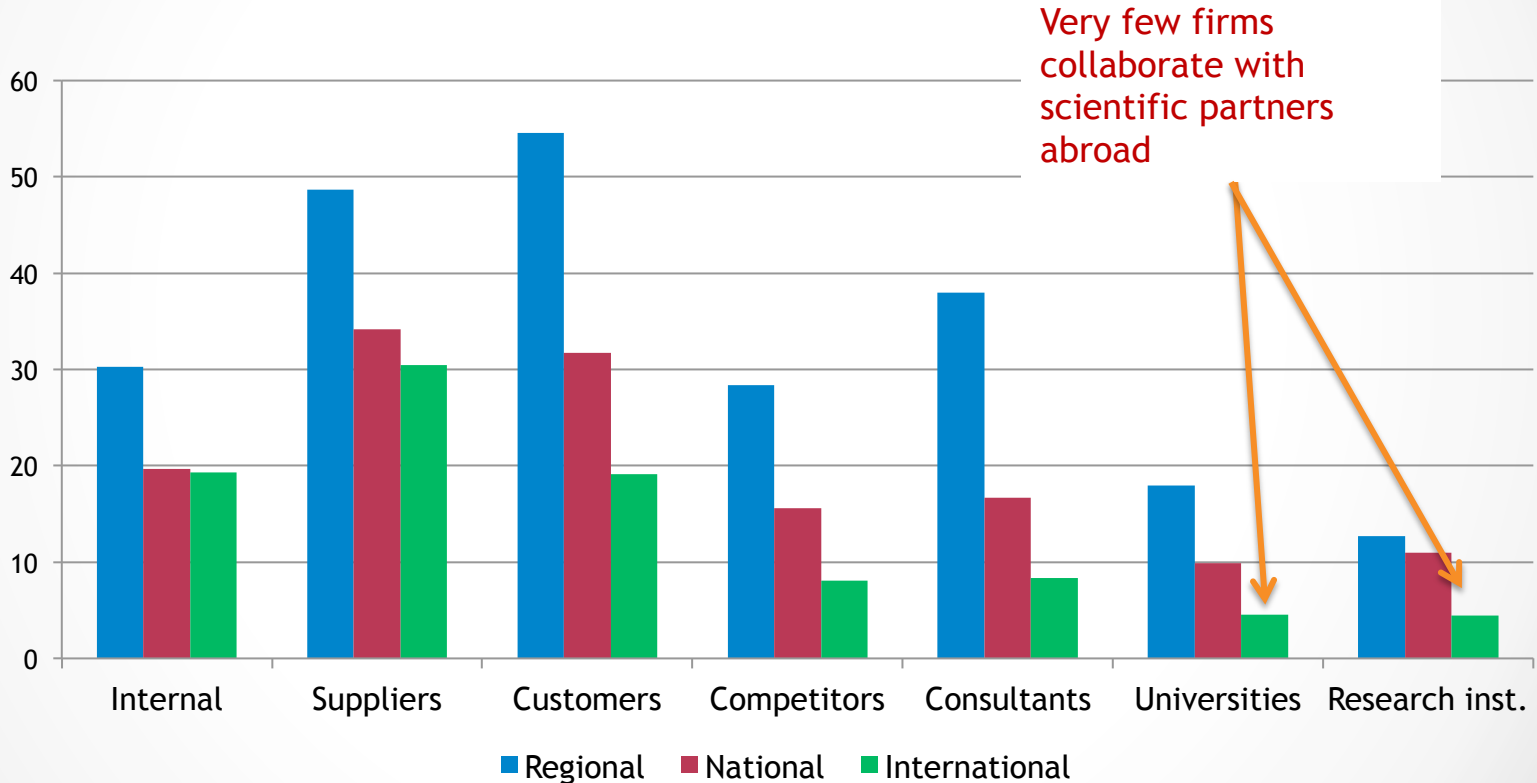
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Abstract

This paper examines the sources of firm product and process innovation in Norway. It uses a purpose-built survey of 1604 firms in the five largest Norwegian city-regions to test, by means of a logit regression analysis, Jensen et al.'s (2007) contention that firm innovation is both the result of 'Science, Technology and Innovation' (STI) and 'Doing, Using and Interacting' (DUI) modes of firm learning. The paper classifies different types of firm interaction into STI-mode interaction (with consultants, universities, and research centres) and DUI-mode interaction, distinguishing between DUI interaction within the supply-chain (i.e. with suppliers and customers) or not (with competitors). It further controls for the geographical locations of partners. The analysis demonstrates that engagement with external agents is closely related to firm

- Tailor-made survey of firms with more than 10 employees in Norway
- Targeting the managers of those firms
- Conducted by telephone
- In the five largest urban agglomerations in Norway
- In the spring of 2010
- Examining
 - Collaboration with external partners
 - The location of external partners used

Collaboration for innovation by Norwegian firms



Innovation and collaboration with partner types

	Product	New to market	Process	New to industry
<i>Within congl</i>	0.39** (0.12)	0.20 (0.13)	-0.02 (0.12)	0.10 (0.15)
<i>Suppliers</i>	0.39** (0.14)	0.33* (0.16)	0.76*** (0.14)	0.38* (0.19)
<i>Customers</i>	0.36** (0.13)	0.54*** (0.15)	0.03 (0.13)	-0.03 (0.17)
<i>Competitors</i>	-0.39*** (0.12)	-0.55*** (0.13)	-0.14 (0.12)	-0.09 (0.15)
<i>Consultancies</i>	0.15 (0.12)	0.18 (0.13)	0.16 (0.12)	0.03 (0.15)
<i>Universities</i>	0.30* (0.16)	0.53*** (0.15)	0.21 (0.15)	0.13 (0.18)
<i>Research inst</i>	0.26 (0.16)	0.20 (0.16)	0.26 (0.16)	0.79*** (0.18)

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

What type of knowledge travels better?

	Product	New to market	Process	New to industry
<i>DUI non-supp regional</i>	-0.20 (0.13)	-0.51*** (0.15)	-0.13 (0.13)	-0.08 (0.17)
<i>DUI non-supp non-regional</i>	-0.30* (0.15)	-0.13 (0.16)	-0.07 (0.15)	-0.01 (0.18)
<i>DUI supply-ch regional</i>	0.12 (0.12)	0.17 (0.13)	0.13 (0.12)	-0.03 (0.15)
<i>DUI supply-ch non-regional</i>	0.73*** (0.12)	0.72*** (0.14)	0.50*** (0.12)	0.42** (0.16)
<i>Scientific regional</i>	0.23* (0.12)	0.40** (0.13)	0.20 (0.12)	0.14 (0.15)
<i>Scientific non-regional</i>	0.37** (0.14)	0.33* (0.14)	0.33* (0.13)	0.35* (0.16)

* p < 0.05, ** p < 0.01, *** p < 0.001

Why do firms prefer to collaborate with local universities?

- Tendency to collaborate locally usually explained in terms of benefits of geographical proximity for knowledge transfer
- However, other reasons can potentially also account for this:
- The search for partners may be limited to well-known and trusted ones
- Firms may seek to invest in university's development for potential future gain
- University collaboration may be part of broader local social responsibility

(Based on: Fitjar, R.D. and Gjelsvik, M. (2017): Why do firms collaborate with local universities? *Regional Studies*, forthcoming)



Localised knowledge spillover model

- The utility of interacting with universities is a function of the quality of knowledge transmitted by the university and the loss of knowledge during transmission
- Loss of knowledge is a function of geographical distance - as distance increases, more knowledge is lost
- This is mainly true for tacit knowledge - but arguably it is precisely tacit knowledge which can boost firm competitiveness, given that codified knowledge produced at universities is available to all
- Asheim et al. (2007): Even firms with analytical knowledge bases tend to cluster around major universities to get access to leading researchers
- Laursen et al. (2011): Trade-offs between geographical proximity and university quality. Same pattern found in D'Este and Iammarino (2010), D'Este et al. (2013), Muscio (2013), Garcia et al. (2015), Johnston and Huggins (2017)
- Mansfield and Lee (1996): Stronger distance effect for research funding at lower-quality universities

Localised partner search model

- Firms have limited search scope
 - Search is costly
 - Firms may be satisficing rather than maximising utility: Scan possible partners until they find an acceptable one
- This also applies to interaction with universities
 - Considering potential utility of all possible universities requires information
 - Firms often search for individual researchers more than universities (D'Este and Patel 2007)
 - This will increase the search costs further
 - Search scope might further be restricted to partners considered trustworthy
- Scans will often start locally or at one's *alma mater* (Thune 2007, Johnston and Huggins 2016)
- Firms will maximize utility over the set of universities that they are well familiar with and already trust

Dynamic knowledge spillover model

- Firm does not necessarily have a short-term perspective, could be maximizing expected future utility
- Long-term investment - help university to develop for possible future benefit
- The firm contributes to building research capacity at the university, e.g. through project funding
- This contribution is directed to areas that benefit firm the most - and to some extent firm-specific
- Firm is well-positioned in geographical and relational space to benefit

The local communitarian model

- Interaction with universities - even in R&D projects - not always solely to access new knowledge
- Corporate social responsibility increasingly popular - and often embedded in local communities (Marquis et al. 2007; Lähdesmäki and Suutari 2012)
- Academia is one of the main beneficiaries of place-based philanthropy (Glückler and Ries 2012), based on regional affection and commitment

Formal expression of the models

- These models can be formally expressed to highlight the differences between them
 - Firm n wants to collaborate with a university to gain access to new knowledge
 - Choice of J universities as partner
 - Expected utility of collaborating with i is $E(U_{ni})$, $i = 1, \dots, J$
 - Partner possesses relevant knowledge K_i , is located at distance D_i and has other characteristics X_i
- Local knowledge spillover model
 - Firm will choose i iff $E(U_{ni}) > E(U_{nj}) \quad \forall j \neq i$
 - Expected utility of collaboration: $E(U_{ni}) = f_n(K_i, D_i, X_i)$
- Localised partner search model
 - Firm chooses among subset $J^* \subseteq J$ of known and trusted universities
 - Probability of belonging to subset: $\pi(i \in J^*) = f_n(K_i, D_i, X_i) \quad \forall J^* \subseteq J$
 - Firm will choose i iff $E(U_{ni}) > 0$
 - If if $E(U_{ni}) \leq 0$, another $j \in J$ is examined
- Long-term model
 - Expected utility of collaboration: $E(U_{ni}) = f_{nt}(K_{it}, D_i, X_{it}) + f_{n(t+1)}(K_{i(t+1)}, D_i, X_{i(t+1)})$
 - If firm collaborates with i at t , $K_{i(t+1)} > K_{it}$
- Local communitarian model
 - Expected utility of collaboration $E(U_{ni}) = f_n(K_i, D_i, R_i(D_i), X_i)$

Interview data

- Based on firms interacting with regional universities in four Norwegian regions:
 - Stavanger (University of Stavanger)
 - Tromsø (University of Tromsø - the Arctic University)
 - Bodø (University of Nordland)
 - Haugesund (Stord Haugesund University College)
- 5-7 firms interviewed in each region - identified by university as important partners
- Each region has one regional university located in the central city
- None of the universities are world-leading - only Tromsø is ranked in the THER list, in the 351-400 band
- Most are fairly small, from 2800 (Stord Haugesund) to 10000 (Stavanger) students, and from 273 (Stord Haugesund) to 2500 (Tromsø) employees

Interviewed firms

#	Region	Empl.	Ownership	Industry	Respondent	Collaboration type	University department	Quality (RCN, 1-5 scale)	Other university collaboration
1	Stavanger	> 500	MNE	Oil & gas	Res. Dir.	Joint industry proj., res. centres	Engineering	2 (2015)	Several, nat+int
2	Stavanger	50 - 500	Local MNE	Manuf.	IP Dir.	Joint res. centre, ind. PhD, prod. dev.	Health	2-3 (2011)	2 nat + some int
3	Stavanger	> 500	MNE	Oil services	Res. Dir.	Res. projects, commercialisation	Engineering	2 (2015)	2 nat and 4 int
4	Stavanger	> 500	National MNE	Oil & gas	Prog. Dir.	Res. proj+centres, PhDs, educ. prog.	Engineering	2 (2015)	Several, nat+int
5	Stavanger	> 500	MNE	Oil & gas	Ext Aff Advisor	Research projects, PhD programme	Engineering	2 (2015)	Several, nat+int
6	Bodø	50 - 500	Local	IT	CEO	Dev. projects, guest lecturing	Engineering	2 (2015)	3 nat
7	Bodø	> 500	Local	Aquaculture	CEO	Res. projects, staff training, lab	Biology	4 (2011)	3 nat
8	Bodø	50 - 500	Local	Aquaculture	Proj. Dir.	Cluster proj., res. proj., guest lect.	Biology	4 (2011)	3 nat
9	Bodø	50 - 500	Local MNE	Maritime	CEO	Master theses, trainees, mentoring	Business	3 (2007)	1 nat
10	Bodø	50 - 500	Local MNE	Oil services	CEO	Res. proj., thesis superv., prod. dev.	Business	3 (2007)	1 nat
11	Tromsø	< 50	Local	IT	CEO	Commercialisation of research	ICT	3 (2011)	2 int
12	Tromsø	< 50	Local	Biotech	CEO	Commercialisation of research	Biology	3 (2011)	No
13	Tromsø	< 50	Local	IT	CEO	Commercialisation of research	ICT	3 (2011)	No
14	Tromsø	< 50	Local	Various	CEO + 2 Dir.	Lab, industry PhD	Biology	3-4 (2011)	2 nat
15	Tromsø	< 50	Local	Biotech	CEO	Commercialisation of research	Chemistry	3-4 (2011)	No
16	Tromsø	50 - 500	National MNE	IT	Sales Dir.	Res. proj., master theses, PhD proj.	Physics	3 (2010)	3 nat
17	Haugesund	> 500	National MNE	Oil services	Proj. Dir.	Staff training prog., thesis superv.	Business	-	3 nat
18	Haugesund	> 500	MNE	Oil services	Inn. Dir.	Thesis supervision, res. proposal	Engineering	-	Some nat
19	Haugesund	50 - 500	Local	Maritime	CEO	Research proj., development proj.	Engineering	-	No
20	Haugesund	50 - 500	Local	IT	Product manager	Thesis supervision	Engineering	-	One int
21	Haugesund	> 500	Local MNE	Maritime	Dep. CEO + Dir.	Research projects, lab, thesis superv.	Engineering	-	-
22	Haugesund	> 500	National MNE	Oil services	Dep. CEO + 2 Dir.	Collaboration forum, staff training	Engineering	-	3 national
23	Haugesund	< 50	Local	Finance	CEO	Guest lecturing, dev. projects	Engineering	-	No

Interviewed firms



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5	Stavanger	> 500	MNE	Oil & gas	Ext Aff Advisor	Research projects, PhD programme	Engineering	2 (2015)	Several, nat+int
6	Bodø	50 - 500	Local	IT	CEO	Dev. projects, guest lecturing	Engineering	2 (2015)	3 nat
7	Bodø	> 500	Local	Aquaculture	CEO	Res. projects, staff training, lab	Biology	4 (2011)	3 nat
8	Bodø	50 - 500	Local	Aquaculture	Proj. Dir.	Cluster proj., res. proj., guest lect.	Biology	4 (2011)	3 nat
9	Bodø	50 - 500	Local MNE	Maritime	CEO	Master theses, trainees, mentoring	Business	3 (2007)	1 nat
10	Bodø	50 - 500	Local MNE	Oil services	CEO	Res. proj., thesis superv., prod. dev.	Business	3 (2007)	1 nat
11	Tromsø	< 50	Local	IT	CEO	Commercialisation of research	ICT	3 (2011)	2 int
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16	Tromsø	50 - 500	National MNE	IT	Sales Dir.	Res. proj., master theses, PhD proj.	Physics	3 (2010)	3 nat
17	Haugesund	> 500	National MNE	Oil services	Proj. Dir.	Staff training prog., thesis superv.	Business	-	3 nat
18	Haugesund	> 500	MNE	Oil services	Inn. Dir.	Thesis supervision, res. proposal	Engineering	-	Some nat
19	Haugesund	50 - 500	Local	Maritime	CEO	Research proj., development proj.	Engineering	-	No
20	Haugesund	50 - 500	Local	IT	Product manager	Thesis supervision	Engineering	-	One int
21	Haugesund	> 500	Local MNE	Maritime	Dep. CEO + Dir.	Research projects, lab, thesis superv.	Engineering	-	
22	Haugesund	> 500	National MNE	Oil services	Dep. CEO + 2 Dir.	Collaboration forum, staff training	Engineering	-	3 national
23	Haugesund	< 50	Local	Finance	CEO	Guest lecturing, dev. projects	Engineering	-	No

Localised knowledge spillover

Firms emphasize quality as an important aspect:

- “We primarily go after the best expertise” (CEO, Nordland)
- “We are always chasing quality” (External affairs advisor, Stavanger)
- “We research where the competence is the best” [Programme director, Stavanger]

Proximity is important to some, but not to everybody:

- “It’s easiest for us to collaborate with communities in Bodø due to the proximity” (Project director, Nordland)
- “The world has become smaller and distance matters less” (IP manager, Stavanger)

Localised partner search

Firms were mostly satisfied if universities had sufficient quality

- “Competence” mentioned 170 times, “quality” 27 times
- “If the competence exists [at the University of Tromsø], we go there” (Sales director, Tromsø)
- “Today, the University of Tromsø has little competence associated with our activities [...] but we are collaborating with Bergen” (CEO, Tromsø)

Competence mostly considered at level of individual academics:

- “We had the researcher NN, it’s his scientific clout” (General manager, Tromsø)
- “... who’s Norway’s best entrepreneur in fisheries” (CEO, Tromsø)
- “NN is a leader in his area globally” (External affairs advisor, Stavanger)
- “We knew NN was still in Haugesund” (Project management director, Haugesund)

Localised partner search (cont.)

Consequently, knowledge of these individuals is important - and geographical proximity matters for that

- “Haugesund isn’t the world’s largest city, so there are quite a few arenas where people meet” (Business innovation director, Haugesund)
- “It’s reasonable to contact NN at UiN. We’ve worked with him before” (Project director, Nordland)

Often, firms don’t even seek out universities - they are sought out:

- “Often, the universities come to us” (Research director, Stavanger)
- - Who takes the initiative? “It’s the universities, every time” (CEO, Nordland)
- “NN is a very good ambassador to the [...] industry” (Business innovation director, Haugesund)

Firms sometimes evaluate utility in considering these proposals:

- “We have limited time and capacity, we prioritize what’s closest to our productivity” (CEO, Nordland)

Dynamic knowledge spillover

Others emphasize taking a long-term perspective:

- “We wanted to have a university with stronger quality and research” (External affairs advisor, Stavanger)
- “We want to build competence at the universities” and the programme is “a tool to nurse a long and good relationship to strategically important universities” (Programme director, Stavanger)
- “We wanted to build up a real-time lab in the local area” [CEO, Nordland]

Social responsibility

In other cases, instrumental considerations are absent

- “[The founder] had an idealistic perspective. He wanted this region to be the most innovative” (Research director, Stavanger)
- “[The founder] was very interested in getting a university to Tromsø and donated quite a bit of money” (CEO, Tromsø)
- “We want to have a role locally because we are a local firm, so when you participate in something like this, you don’t always do it to get something back, but to support [Stord Haugesund University College]” (Business innovation director, Haugesund)
- “Personally, I care about having a strong academic institution in the local community for the consciousness of being a city, but also for educating exciting people who will work and live in the city that we love” [CEO, Haugesund]

These motives are not necessarily expressed as philanthropy, but could also affect willingness to participate in projects

Summary - why do firms collaborate with local universities?



- Knowledge spillovers are often an important motivation for firms collaborating with universities
- However, firms rarely maximize knowledge spillovers, as in the rationalist model - once a satisfactory partner has been found, the search is often stopped
- Cooperation is the result of ongoing relations or past experiences of successful collaboration - often at individual level
- Geography matters because the search often starts locally - and ends locally if a suitable partner is found
- Social and community responsibility is also a consideration for many firms - collaboration with universities is not strictly instrumental, but may be a contribution to the development of the university - either for future gain or as part of a contribution to the region



Conclusions

- Collaboration with universities more local than other types of innovation collaboration
 - This is the case in all regions, not just those with top research universities
 - Local university collaboration driven by characteristics of the firm more than the research quality of the university
- Little evidence that local (or non-local) university collaboration positively affects innovation capacity of firm
 - This is the same regardless of the type of university
 - Negative relationship between local university collaboration and product innovation (in some regions)
 - Some more positive results in own survey, with broader definition of collaboration
- Localised knowledge spillover is not the only reason for collaboration with universities being mostly local
 - Firms have limited search scope and tend to satisfy rather than maximise partner quality
 - Firms may have a long-term perspective - knowledge spillover goes both ways
 - Firms may want to contribute to the community and thereby to the university