

Does learning from prior collaboration help firms to overcome the ‘two-worlds’ paradox in university-business collaboration?

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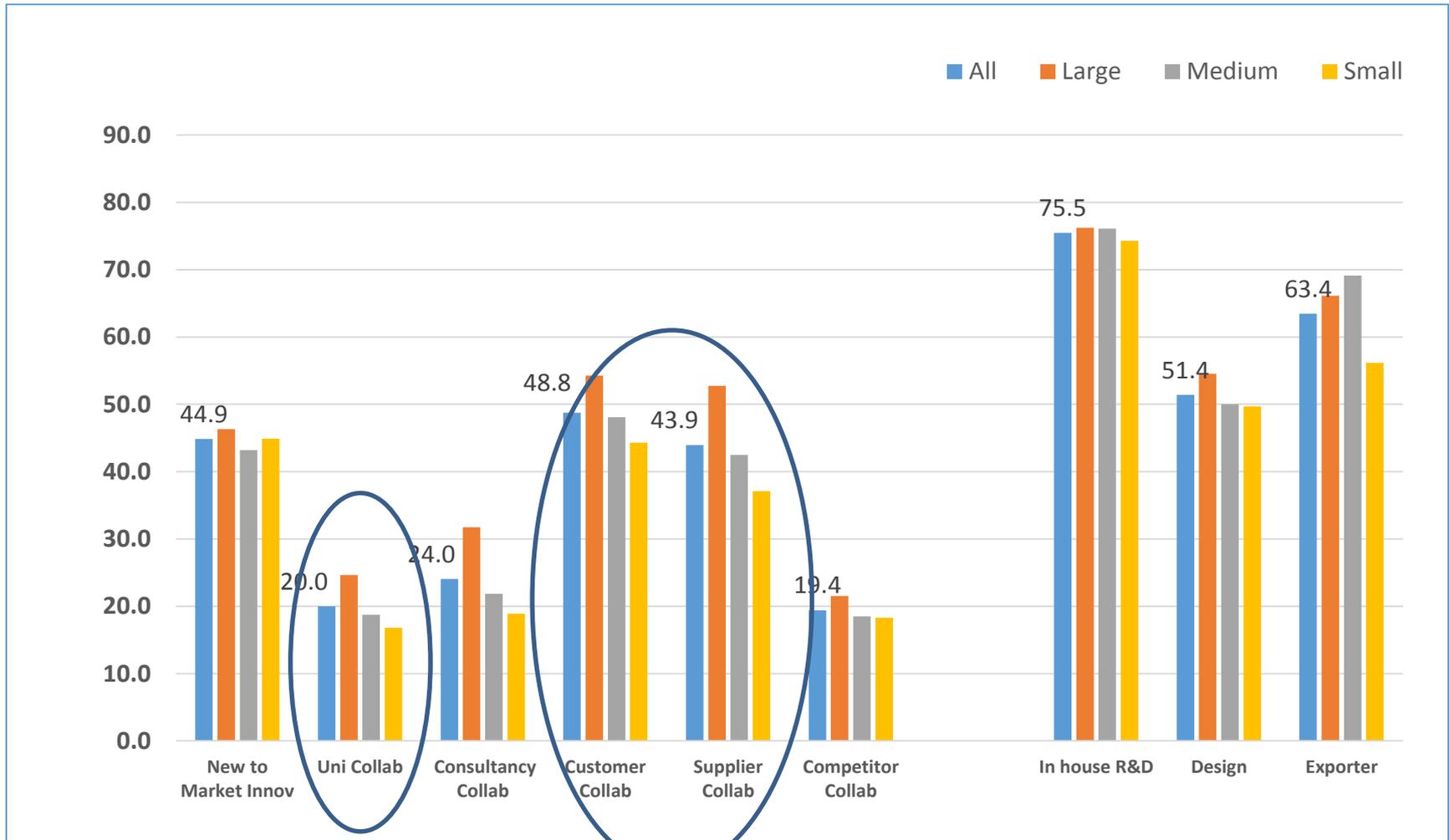
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Policy Context

Protection of science and research funding: £1.5bn Global Challenges Research Fund (2016-2021); £6.9bn capital investment in new equipment, labs and research institutes (2015-2021)
Autumn Statement (2016) announcement of £2bn new R&D spend by 2020

- **Purpose:** ‘to integrate research and Innovate UK functions, which offers an opportunity to strengthen the **strategic approach** to future challenges and **maximise value** from Government’s investment of over £6 billion per annum in research and innovation’.
- Improved collaboration between the research base and the commercialisation of discoveries in the business community, ensuring that research outcomes can be fully exploited for the benefit of the UK

Profiling UK Innovators



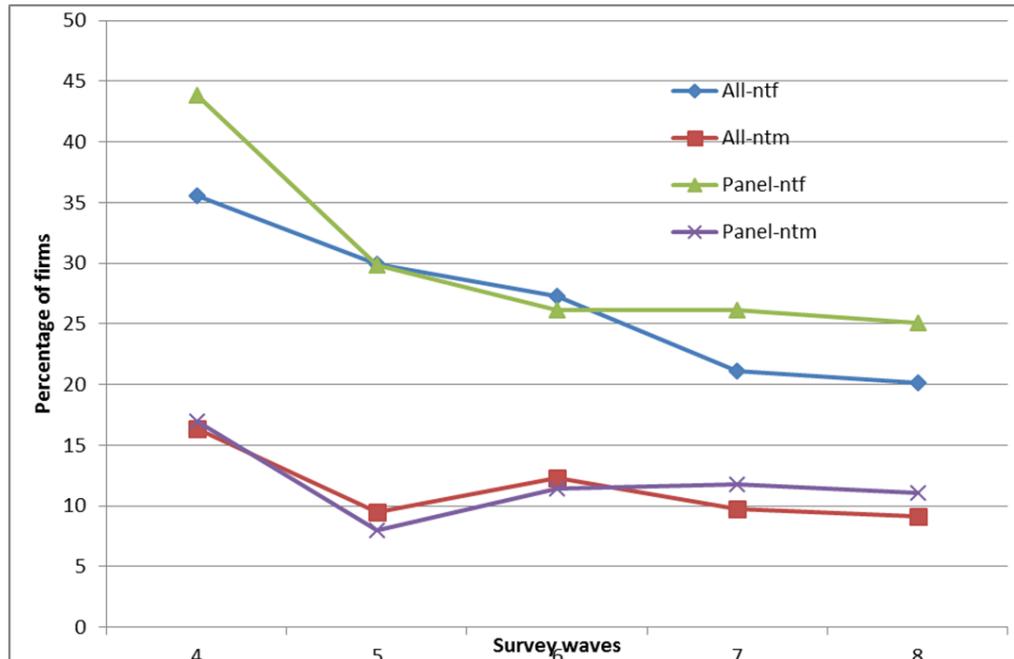
Radical vs Incremental innovation

New to the market innovation

‘This business introduced a new product or service to the market before competitors’

New to the firm innovation

‘This business introduced a new product or service that was essentially the same as a good or service already available from competitors’



The proportion of UK firms undertaking NTM and NTF innovation has fallen with a greater fall in NTF innovation.

New-to-the-market Innovation

- NTM innovation life cycles are longer, more unpredictable, have more stops and starts, and are more context-dependent (Keizer and Holman, 2007).
- Innovation strategy will be shaped by internal resources, organisational structures and market environment
- Dependence on internal R&D and organisational routes is unlikely to result in new-to-the-market innovation (Stringer, 2000)
- External knowledge sourcing: reduce costs and risk, access new ideas, knowledge and complementary skills (Un et al. 2010; Hotternott and Lopes-Bento 2016)



Universities as partners

- Collaborating with universities will reflect the type of knowledge the firm is seeking as well as their own internal knowledge profile (Miotti and Sachwald, 2003)
- Provide frontier-edge knowledge for NTMI (Amara et al. 2008; Belderbos et al. 2015)
- Reduced risk of moral hazard

- Offset by two-worlds paradox (Hall, 2003; Bruneel et al. 2010) differences in institutional logics and priorities may lead to tensions around project timelines, rewards, commercialisation and administrative procedures

How to overcome the 'two worlds' paradox?

Learning mechanisms:

- Experience through managing and structuring external collaborations...
 - Experience and knowledge from past innovation activities...
- ➔ ...enhancement of firms' cognitive and absorptive capacity

Hypotheses

H₁ Prior experience from collaboration for innovation with *non-university partners*... *cognitively closer, interactional* → *general and specific capabilities*

H₂ Prior experience from collaboration with *universities* for innovation... *Relationship specific memory (Fang et al 2011)*

H₃ Prior experience from previously undertaken NTM innovation... *Path dependent, persistence difficult, strategic partner choice (Kohler et al 2012)*

...will increase the probability of subsequent collaboration with university partners for innovation

H₄ : Collaboration with universities will increase the probability of introducing new to the market innovation.



Data & Method

- UK Innovation Surveys (UKIS) 2004-2012 (5 waves)
- Stratified sample, postal, non-compulsory, bi-annual, response rate 51% (2008-10) - 58% (2002-04): unbalanced panel. Focus on responses for 2 consecutive waves; c.1000 obs per double-wave; N=3,581

Dependent variable 1: New to the market innovation (0/1)

Dependent variable 2: New to the market innovation Sales ratio (%)

Dependent variable 3: University Collaboration (0/1)

Bivariate dynamic and recursive model allowing the simultaneous estimation of the probability of introducing NTM innovation, conditional on the likelihood of collaborating with a University

$$NTMI_{it}^* = \alpha_0 + \alpha_1 UNI_COOP_t + \alpha_2 OTH_COOP_t + \alpha_3 FLC_t + \varepsilon_{1t} \quad (1)$$

$$UNI_COOP_t = \beta_0 + \beta_1 NTMI_{t-1} + \beta_2 UNI_COOP_{t-1} + \beta_3 OTH_COOP_{t-1} + \beta_4 FLC_t + \varepsilon_{2t} \quad (2)$$

$$\varepsilon_1, \varepsilon_{21} \sim N_2[(0,0), (1,1,\rho)]$$

Findings

Hypothesis	Expected Sign	All firms	Small	Medium	Large
1. Learning from other partners $_{(t-1)}$	+	+	+/-	+	+
2. Learning from prior university collaboration $_{(t-1)}$	+	+	+	+	+
3. Learning prior new to the market innovation activities $_{(t-1)}$	+	+	+	+	+
4. University effects on new to the market innovation $_{(t)}$	+	+	+	+	+
Rho ($\rho_{ntmi, unicollab}$)		SS	nss	SS	SS

... so how important is University collaboration to NTM innovation?

		dy/dx	Std. Err.	z	P>[z]
All Firms	University collaboration (0/1)	.2466	.0331	7.46	0.000
Small Firms (<50)	University collaboration (0/1)	.2214	0.046	4.80	0.000
Medium Firms (50-250)	University collaboration (0/1)	.2134	0.0322	6.62	0.000
Large Firms (250+)	University collaboration (0/1)	.2119	.0830	2.55	0.011

... so how important is University collaboration to NTM innovation success ?

		Coeff.	Std. Err.	P>[z]
All Firms	University collaboration (0/1)	4.085	1.788	*
Small Firms (<50)	University collaboration (0/1)	1.378	3.013	
Medium Firms (50-250)	University collaboration (0/1)	15.860	1.960	***
Large Firms (250+)	University collaboration (0/1)	12.392	2.009	***

Discussion

- University collaboration increases the probability of NTM innovation as compared to NTF by c.25%
- This university effect is equivalent to the *combined effect* of in-house R&D, design investment and exporting
- University collaboration increases sales from NTM innovation. More substantial sales effect at 12.3-15.9% for medium and larger firms
- Significant learning effects from other collaborations, yet small: increasing the percentage of firms collaborating by no more than c. 5%

Implications

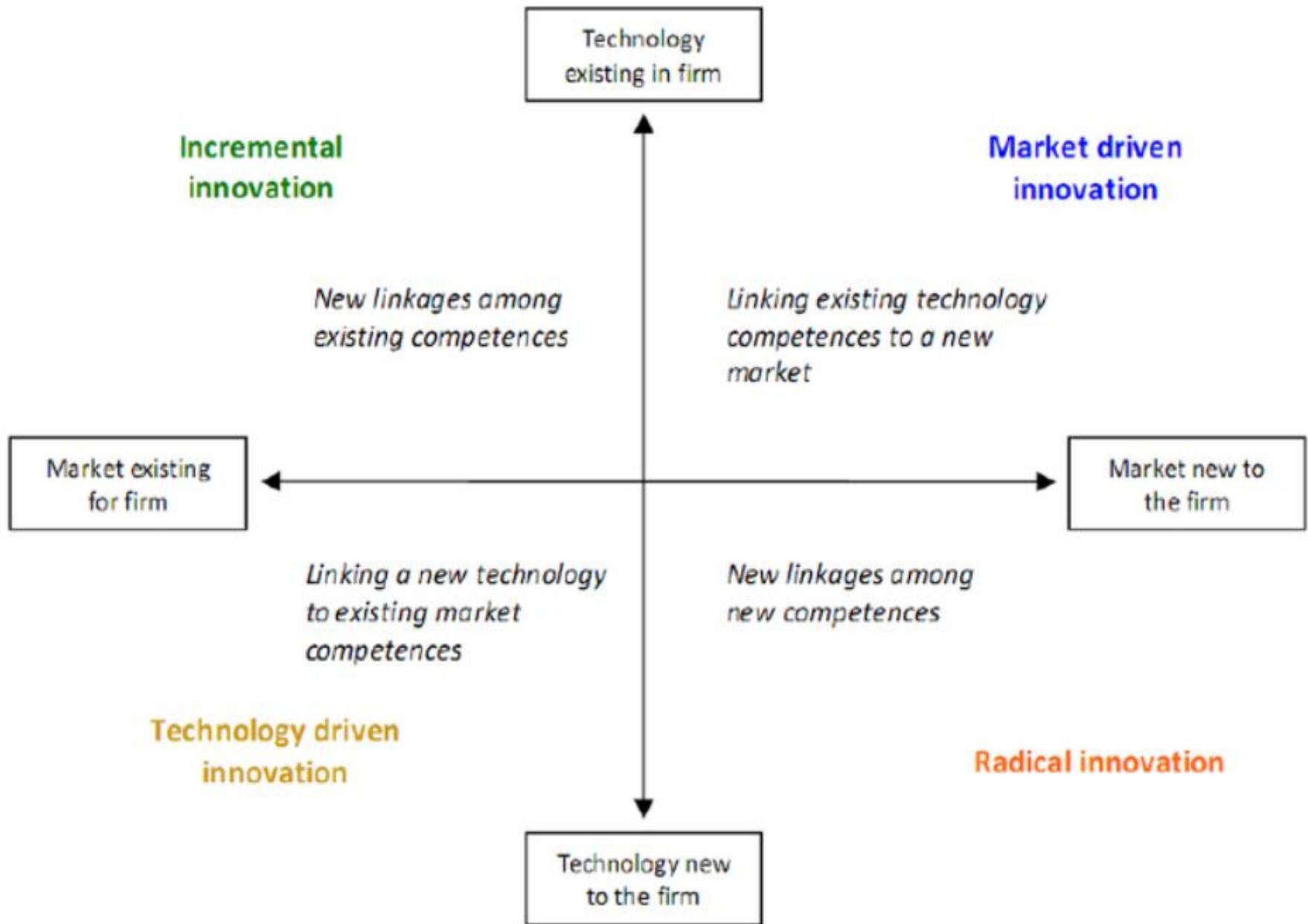
- Universities are impacting on NTM innovation – a disruptive influence?
- Predominantly larger firms collaborating but no evidence of monopolising these relationships and largely reflects relative collaboration levels with other knowledge partners
- Small firms also benefit from university collaboration (introduction of NTM innovation), but appear less able to capitalise on this through sales
- Learning effects are observed but are weak so policy efforts to encourage collaboration remain important (and once established collaboration persists)

Read the full paper at:

www.enterpriseresearch.ac.uk

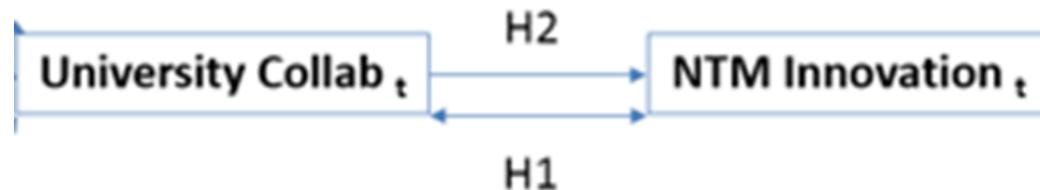
And, thank you for your attention!

Additional back-up slides



University Collaboration & NTM Innovation

- There is prior evidence of positive relationship between university partnering and (NTM) innovation ... but temporal precedence of this relationship is unclear (Todtling et al. 2009):
 - **H1 Decision to undertake NTM innovation and university collaboration are inter-related**
 - **H2 University collaboration will increase the probability of NTM innovation**



Overcoming the two-worlds paradox

- Universities represent 'distant' partners but with greater potential to lead to breakthrough innovation outcomes (Bingham and Spradlin 2011; Lopez-Vega et al. 2016).
- Learning through 'local' knowledge partnering
 - (a) Capability to collaborate with more 'distant' partners
 - (b) Firm's functional (innovation) knowledge store is enhanced (Fang et al. 2016)

H3 Prior innovation collaboration with 'local' knowledge partners will increase the probability of subsequent university collaboration



University collaborations: 'relationship-specific memory'
(Fang et al. 2011)

H4 Prior collaboration with universities for innovation will increase the probability of subsequent collaboration

- Similarly, through NTM innovation, resources and capabilities formed to enable subsequent NTM innovation
- Persistence of NTM is very difficult (Roper and Hewitt-Dundas 2008)
- Strategic partner choice critically important – in particular university partners
- Alternatively NTM innovation may act as a signal to university partners of capability to collaborate

H5 Firms having previously undertaken NTM innovation will form innovation collaborations with universities

