

Creating Advantage in Peripheral Regions: The Role of Publicly Funded R&D Centres

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Presentation for the Compera Workshop February 2009

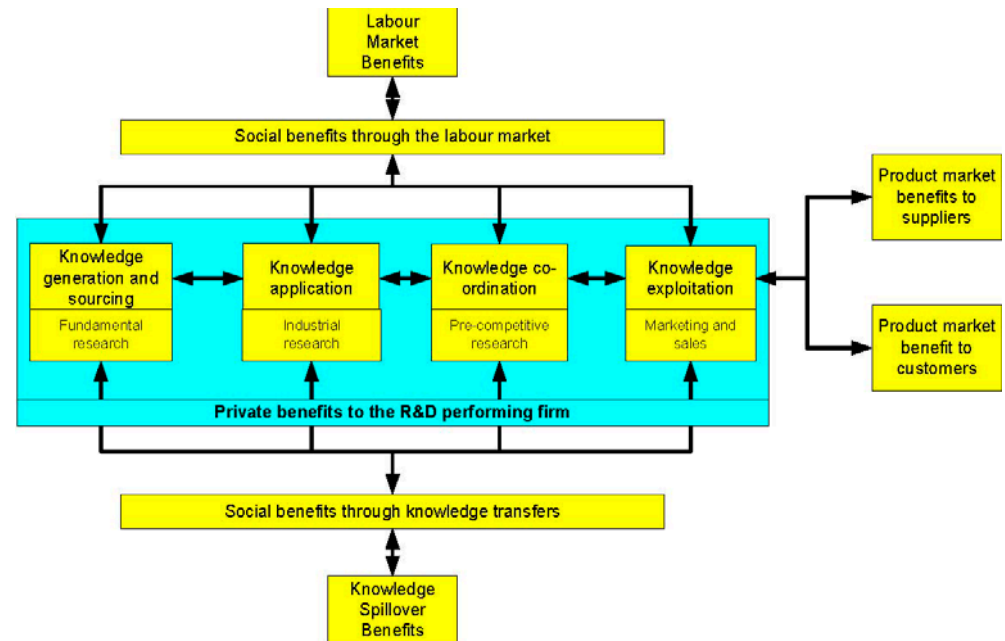


Starting points

- ▣ R&D and technological development widely recognised to play crucial role in shaping regional development trajectories
- ▣ Recent papers by the OECD and EU have emphasised the role of public policy in ‘creating advantage’ in regions
- ▣ One approach has been to introduce public funded research centres (CRCs) in the US (Feller, 2004) and EU (e.g. Graversen, 2005)
- ▣ Aim here to examine value of investment in PRCs to regional economic development in less developed region – Northern Ireland
- ▣ Study is based on longitudinal, real-time monitoring of development of group of 18 CRCs established in 2002 – the micro mechanisms for spillovers

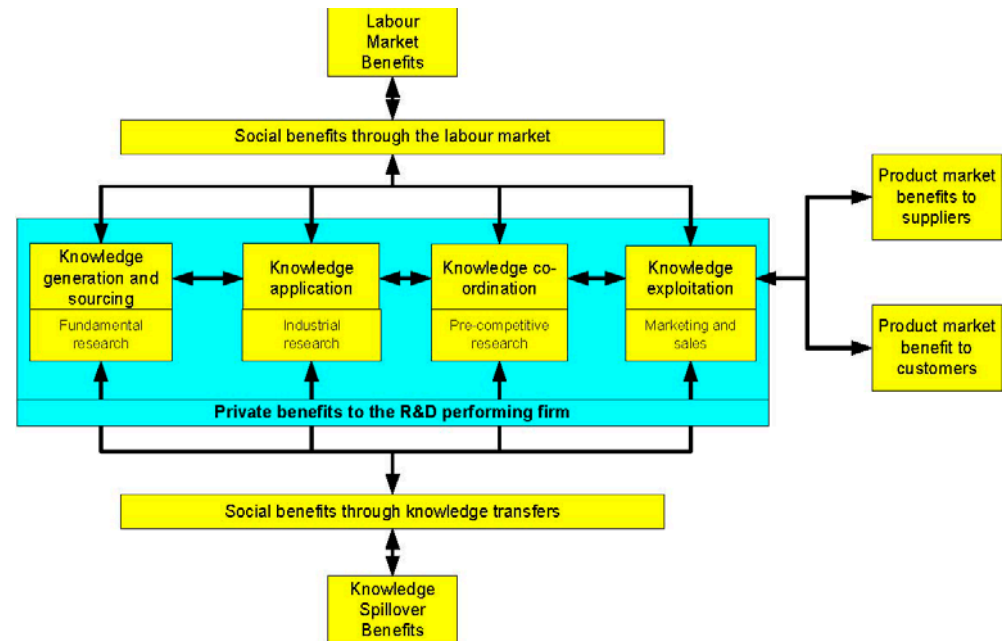
Conceptual approach

- ❑ Aim to identify the main channels through which CRCs can benefit local economy
- ❑ Envisage four main channels:
 - ❑ Private gains
 - ❑ Rent spillovers
 - ❑ Labour spillovers
 - ❑ Pure knowledge spillovers



Appropriating gains from CRCs

- Key point is that each type of gain will depend on different aspects of the regional economy
- Private gains – depend on learning and firms' appropriation ability
- Rent spillovers – will depend on the strength of local supply chains
- Labour spillovers – will depend on mobility and regional retention
- Pure knowledge spillovers – depend on networks and appropriateness



Regional context

- ⌘ Northern Ireland is the smallest UK region with a population of around 1.7m
- ⌘ The economy has performed relatively well over recent years – playing catch-up – although manufacturing and declined and private services grown.
- ⌘ Productivity remains around 80 per cent of the UK average or around the average for the EU25.
- ⌘ The political and economic story of Northern Ireland has led to a strongly interventionist industrial policy regime spearheaded by regional development agency – Invest NI.

Policy Context

- CRCs considered here were established in 2002 to ‘support the establishment of R&D centres to stimulate exploitable and commercially focussed research which will demonstrably improve the competitiveness of NI industry’
- 18 CRCs established with public support, 10 in companies and 8 in the two universities in the region
- The scale of the investment such that increased HERD by around 20 per cent and BERD by around 10 per cent.
- Programme expenditure was more capital intensive than R&D spending in the region in general – perhaps not surprising given infrastructural nature of the programme

The CRC/PRCs in outline

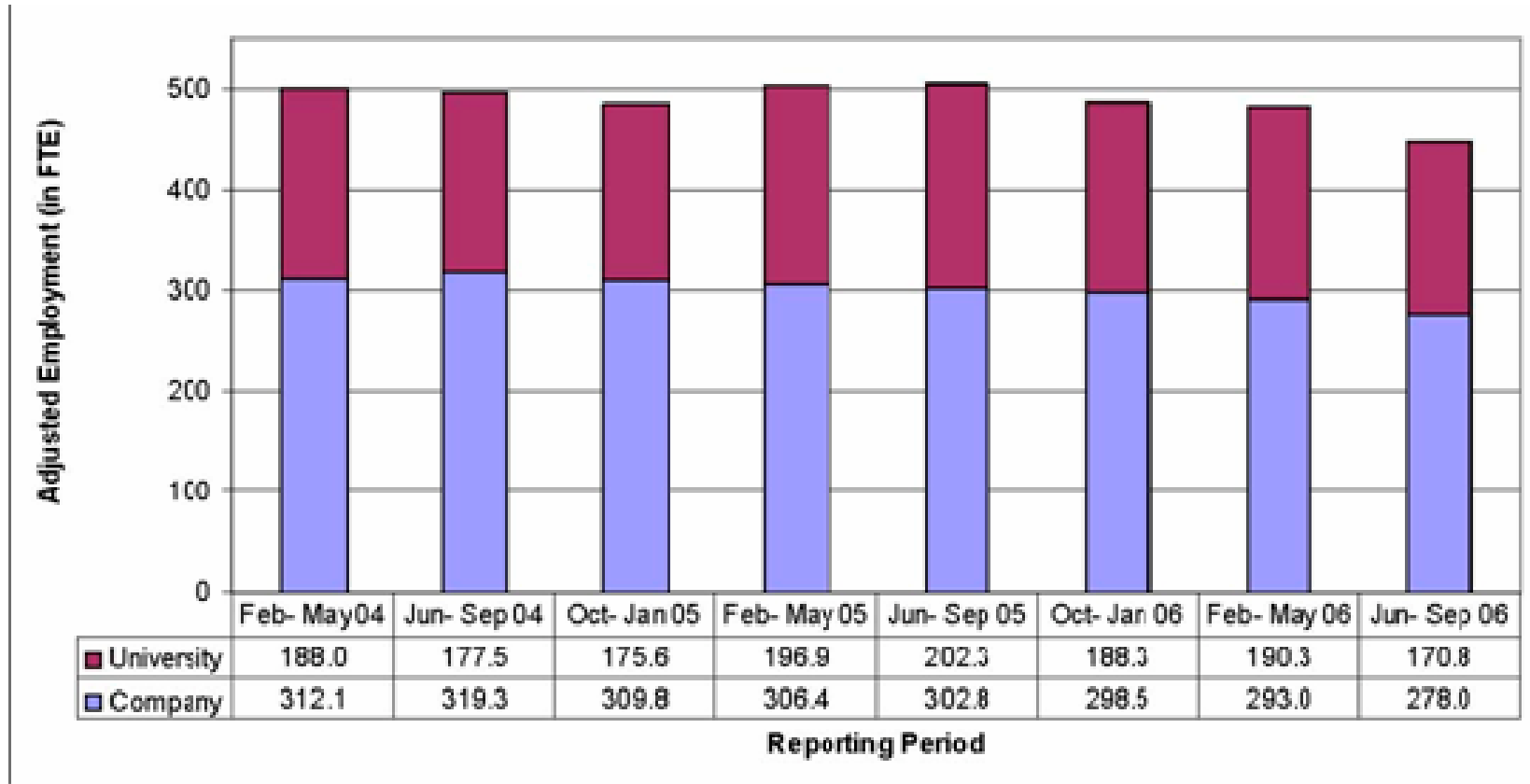
PRC	Budget £m	Employ. in 2005	Subject Focus	Host Organisation	Types of R&D Undertaken		
					? Major Focus	? Minor Element	
					Basic R&D	Applied R&D	Experimental Development
University-Based PRCs							
PRC-1	37.76	110	Electronic Communication Technologies	University	?	?	?
PRC-2	4.20	4	Medical Polymers	University	?	?	?
PRC-3	3.65	10	Aeronautical Technologies	University	?	?	?
PRC-4	11.65	17	Nanotechnology	University	?	?	?
PRC-5	1.51	2	Software Process Improvement	University		?	?
PRC-6	4.00	7	Functional Genomics	University		?	
PRC-7	0.95	6	Technology Start-up & Incubation	University		?	?
PRC-8	3.95	22	Environmental Monitoring Technologies	University		?	?
Company-Based PRCs							
PRC-9	6.52	23	Electric Power Engineering	multinational operation		?	?
PRC-10	7.97	28	Recording Media Substrate	multinational operation		?	
PRC-11	4.99	41	Mobile Software Systems	multinational operation			?
PRC-12	4.50	3	Electrical Engineering Test Centre	multinational operation		?	?
PRC-13	7.03	23	Controlled Drug Delivery	multinational operation		?	?
PRC-14	2.71	30	Automotive Engineering	Locally-owned SME			?
PRC-15	4.71	23	Food Research and Development	Locally-owned firm			?
PRC-16	3.14	15	Scientific Cameras	Locally-owned SME		?	?
PRC-17	4.15	20	Speciality Pharmaceuticals	Locally-owned SME			?
PRC-18	2.89	35	Proteomics	Locally-owned firm		?	?

CRCs and PRCs ...

- ⌘ All our PRCs are included in the set of Compera CRCs on www.competence-research-centres.eu

- ⌘ They are:
 - ⌘ Stand-alone units albeit within very different organisational settings – one exception
 - ⌘ Collaborative governance groups with industry-university members
 - ⌘ Widely varying R&D agendas, IP management approaches and organisational objectives
 - ⌘ Common funding source/scheme

Employment in the CRCs



Evaluation Data and Methods

- ❑ Data used comes from four main sources:
 - ❑ Application and official reporting documents
 - ❑ Quarterly questionnaire (78 per cent response)
 - ❑ Irregular interviews
 - ❑ Focussed set of interviews on impacts (Summer '06)
- ❑ Enabled us to identify partners and connectivity of PRCs and then categorize
- ❑ Key distinction we make between
 - ❑ Knowledge partnerships – two way
 - ❑ Knowledge suppliers – one way
 - ❑ Network partners
 - ❑ Supply chain partners

Empirical Results: Private Benefits

- Public sector support was enabling firms and universities to formally organise and enlarge their R&D activities – additionality strong
- Pushed companies towards more applied research and university centres towards more commercialisable R&D – convergence?
- Recruitment patterns very different – university centres attracted more staff from outside the region
- Significant technological gains – 38 patent applications, 7 spin-outs and 5 licensing deals. Patent application costs £3.05m average – similar in both types of PRC
- Significant new commercial contracts emerged too – concentration in company based PRCs but NI contracts small – company based centres have faster ‘hit’

Empirical results – public benefits

- ▣ Based largely on patterns of connectivity of the PRCs as well as discussions with contacts
- ▣ Remember four different types of connection...

PRC's pattern of connectivity (Table 4)

		Pure Knowledge Spillovers		Network	Supply-chain spillovers
		Technology Partner	Knowledge Transfer		Customer/Supplier
	n	n	n	n	n
A. Overall profile					
University-based centres	277	134	51	43	49
Northern Ireland	79	35	12	8	24
Outside Region	198	99	39	35	25
Company-based centres	107	33	11	13	50
Northern Ireland	46	14	5	9	18
Outside Region	61	19	6	4	32
B. Profile per PRC					
University-based centres	34.6	16.8	6.4	5.4	6.1
Northern Ireland	9.9	4.4	1.5	1.0	3.0
Outside Region	24.8	12.4	4.9	4.4	3.1
Company-based centres	10.7	3.3	1.1	1.3	5.0
Northern Ireland	4.6	1.4	0.5	0.9	1.8
Outside Region	6.1	1.9	0.6	0.4	3.2

Empirical results – pure knowledge spillovers

- ▣ Reflecting technology partnerships, knowledge transfers and network relationships (Table 4)
- ▣ Significant differences between the patterns of engagement of university and company based PRCs – but higher numbers of external contacts from universities per PRC
- ▣ Network linkages - Company-based PRCs tended to be more closely allied with intra-regional partners; universities with extra-regional partners
- ▣ Technology partnerships and knowledge transfer partnerships largely follow same pattern with university-based PRCs tending to have few local technology partnerships – reflecting absorptive capacity?

Empirical results – supply chain spillovers

- ❖ Related to supply chain linkages (Table 4)
- ❖ More similarity here between university and company based PRCs but proportionately stronger local links by firms
- ❖ Both types of PRC had stronger external links than local however and local contract sizes small by comparison
- ❖ Potentially small size of local market and supply base may be limited potential for supply spillovers

Empirical results: labour market spillovers

- ⌘ Through mobility and retention
- ⌘ 320 staff recruited but universities recruited larger percentage outside region (22 per cent) compared to firms (5 per cent) Table 3
- ⌘ In addition 77 per cent of staff which left the centres (120 in total) were retained in the region
- ⌘ Labour turnover was higher in the university based PRCs.
- ⌘ Implication that potential for labour market spillovers stronger from the university based PRCs.

Conclusions

- Strong additionality and impact on the nature, organisation and scale of research being undertaken. Tendency to convergence
- Profile of regional spillovers different – rent-based spillovers from company centres and stronger knowledge and labour market spillovers from university based centres
- In short term key benefits from supply chain linkages in firms and labour market spillovers in universities.
- So PRCs do have potential to be positive investment in less developed regions. Type of investment however should depend on the type of spillovers desired.

Want to read more?

⌘ Paper detailing results is available for download as:

⌘ **Centre for Small and Medium-Sized Enterprises, Warwick Business School, Working Paper 102, Creating Advantage in Peripheral Regions: The Role of Publicly Funded R&D Centres** by Nola Hewitt-Dundas and Stephen Roper

⌘ URL:http://www2.warwick.ac.uk/fac/soc/wbs/research/csme/research/working_papers/