

Are KIBS more than intermediate inputs? An Examination into the Role of Knowledge-Intensive High-Tech Services

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Motivations

- **Many studies point out the key role of KIBS in innovation systems:** by transmitting knowledge, helping to implementing new technologies or even creating innovations.
- **In recent years we have witnessed a great increase in the internationalisation of services:** many services are now “tradable”.
- **In consequence: why not to evaluate the contribution of KIBS to innovation from a “global” viewpoint?**
That is, compare the “domestic” and the “international” role of KIBS



Objective of the paper

- To calculate the product-embodied R&D diffused by the intermediate consumptions of a group of KIBS (the knowledge-intensive high-tech services) in 11 European countries in 2000.
- How? By applying an input-output model that allows to differentiate between:
 - The domestic product-embodied R&D diffused
 - The product-embodied R&D diffused via imports



Structure of the paper

- 1) Review of theories about the role of services in innovation and in international trade
- 2) Importance of high-tech services within production systems and evolution of their R&D efforts
- 3) Estimation of the product-embodied R&D diffused by domestic and imported intermediate consumptions of high-tech services
- 4) Conclusions



1) Review of theories about the role of services in innovation and in international trade



Innovation in services

- **Scarce interest in service innovation until the 80s:** when the pioneer works of Gershuny, Miles and Barras appeared
- **Nevertheless, the recognition of the knowledge diffuser role of services was earlier:** the studies of Machlup and Greenfield in the 60s call the attention to the role of business services as creators and diffusers of knowledge
- **Currently KIBS are considered to develop 3 major functions in innovation:** they are facilitators, carriers and sources of innovation




Internationalisation of services

- During the last decade international trade in services grew as never seen before: thanks to development of information technologies that have modified 2 aspects:
 - Non-storability
 - Intangibility
- In the case of business services, the following of clients abroad is the main motive for going international: the links established with clients is a key variable for business services to internationalise



Innovation and internationalisation services

- KIBS actively collaborate to innovation in other firms: acting as facilitators, carriers and sources of innovation
- Moreover, thanks to ICT, they can be provided at long distances
- Therefore: does the international provision of KIBS contribute to knowledge diffusion and innovation?




2) Importance of high-tech services
within production systems and
evolution of their R&D efforts

Evolution of the participation of high-tech services in intermediate consumptions, 1995-2000

	Share in total intermediate consumptions		Annual average growth rate	Percentage of intermediate consumptions imported	
	1995	2000		1995	2000
Belgium	2.53	4.23	18.34	21.07	21.62
Denmark	4.16	7.02	16.68	9.11	12.26
Finland	3.19	4.61	16.94	9.12	6.66
France	6.44	7.43	8.93	2.05	2.49
Germany	3.54	4.83	10.90	11.31	15.37
Ireland	n.a.	3.04	n.a.	n.a.	7.38
Italy	3.04	3.79	10.16	4.43	9.60
Netherlands	4.13	5.61	13.11	16.61	18.87
Spain	2.33	3.32	15.45	5.29	6.54
Sweden	5.40	7.18	11.98	7.78	14.39
United Kingdom	5.56	8.04	14.00	8.60	5.10
US	6.00	7.12	9.77	0.16	0.16
Canada	n.a.	4.09	n.a.	n.a.	7.10
Japan	6.43	7.49	4.33	1.10	1.50

Evolution of R&D expenditures in high-tech services, 1995-2000

	R&D intensity			Annual average growth rate		
	Post	Computer	Research	Post	Computer	Research
Belgium	0.81	2.20	0.55	32.97	14.10	-1.55
Denmark	n.a	6.39	3.60	n.a	20.53	40.46
Finland	3.33	3.79	n.a.	33.15	17.17	n.a
France	n.a.	1.04	n.a.	n.a	4.17	n.a
Germany	n.a.	1.99	5.74	n.a	46.37	38.15
Ireland	2.25	4.45	34.17	16.04	46.60	55.06
Italy	0.01	0.65	12.94	-41.62	18.41	18.88
Netherlands	0.47	2.10	3.45	-1.12	52.12	32.34
Spain	0.98	3.07	7.75	31.91	33.34	44.67
Sweden	1.83	2.97	9.82	10.64	36.51	4.86
United Kingdom	1.37	1.55	6.99	9.91	-2.26	11.29
US	0.43	4.18	16.53	-12.11	13.60	25.05
Canada	0.17	4.02	n.a.	-21.66	12.34	5.90
Japan	n.a.	1.37	n.a.	n.a	n.a	n.a



3) Estimation of the product-embodied
R&D diffused by domestic and
imported intermediate consumptions
of high-tech services

Product-embodied R&D per unit of value added diffused through domestic and imported intermediate consumptions of high-tech services, 2000

	Domestic			Imported	
	Post	Computer	Research	Computer	Research
Belgium	0.034	0.113	0.015	0.053	0.380
Denmark	n.a.	0.280	0.096	0.059	0.209
Finland	0.116	0.129	n.a.	0.059	n.a.
France	n.a.	0.047	n.a.	0.045	n.a.
Germany	n.a.	0.052	0.167	0.053	0.274
Ireland	0.065	0.091	1.788	0.051	0.174
Italy	0.0004	0.026	0.331	0.042	0.187
Netherlands	0.017	0.070	0.117	0.047	0.326
Spain	0.037	0.061	0.277	0.040	0.374
Sweden	0.077	0.127	0.317	0.062	0.268
United Kingdom	0.060	0.073	0.255	0.053	0.217

Total product-embodied R&D diffused through domestic and imported intermediate consumptions of high-tech services (percentage of total BERD), 2000

	Domestic			Imported	
	Post	Computer	Research	Computer	Research
Belgium	5.29	7.86	0.17	3.69	4.38
Denmark	n.a.	20.64	1.64	4.35	3.57
Finland	13.36	7.27	n.a.	3.31	n.a.
France	n.a.	6.11	n.a.	5.87	n.a.
Germany	n.a.	4.64	3.45	4.78	5.69
Ireland	19.48	9.79	4.95	5.45	0.48
Italy	0.17	6.18	20.01	9.75	11.32
Netherlands	3.54	10.71	3.97	7.20	11.04
Spain	16.82	10.19	1.78	6.63	2.41
Sweden	5.72	8.52	6.81	4.17	5.77
United Kingdom	13.58	13.06	7.93	9.51	6.73

Imported intermediate consumptions, R&D intensities and product-embodied R&D diffused through imports, 2000

	Computer services			Research and development		
	Share	Intensity	Diffusion	Share	Intensity	Diffusion
Belgium	28.47	5.69	0.053	81.87	1.20	0.380
Denmark	15.34	15.03	0.059	28.98	6.31	0.209
Finland	4.50	6.75	0.059	n.a.	n.a.	n.a.
France	1.54	1.97	0.045	n.a.	n.a.	n.a.
Germany	13.90	2.67	0.053	49.17	11.92	0.274
Italy	5.16	1.05	0.042	15.93	20.92	0.187
Netherlands	10.66	3.53	0.047	57.99	7.27	0.326
Spain	7.91	4.51	0.040	51.19	11.60	0.374
Sweden	8.36	6.92	0.062	49.65	19.89	0.268
United Kingdom	4.70	2.96	0.053	14.52	11.98	0.217



4) Conclusions



Conclusions

- During the period 1995-2000 the role of high-tech services in production systems has considerably increased:
 - Intermediate consumptions of high-tech services grew at an annual average growth rate higher than 10 percent in all European countries except France
 - Moreover, the percentage of imported intermediate consumptions greatly grown: for example, more than 50 percent of intermediate consumptions of research and development services were imported in 2000 in Belgium, Spain, Sweden and Germany



Conclusions

- The R&D efforts carried out by high-tech services has also increased, being the growth in R&D specially noteworthy in computer services and research and development:
 - In computer services the annual average growth of R&D was higher than 46 percent in the Netherlands, Germany and Ireland
 - The annual average growth in research and development was above 40 percent in Ireland, Spain and Denmark



Conclusions

- By comparing imported and domestic product-embodied R&D diffusion carried out by high-tech services we have corroborated that imported intermediate consumptions are key diffusers:
 - The diffusion carried out by imported intermediate consumptions is higher than those carried out by domestic intermediate consumptions in some cases.
 - Two countries stand out:
 - **Germany** in computer services
 - **Belgium** in research and development



Conclusions

- In sum, some evidence about a potential compensation of low domestic R&D intensities in high-tech services via imports is found
- A next step to be taken would be to link international flows of knowledge and development
 - To take into account the specialisation pattern in each country
 - And use information for more years