Knetworks
Dissemination and Network of Knowledge in Atlantic Area

ATLANTIC AREA
Transnational Programme

Project Part-Financed by the European Union

European Regional Development Fund

Knetworks project

Conceptual Foundations of the University-Industry Relations for the Innovation

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1. Conceptual frameworks applied to the role of academic research in industrial societies

Conceptual frameworks

1. “Linear model” of innovation (1945).
2. “Chain-linked” model (1986).
3. “Innovation systems” (1987).
4. “Cultural differences” (1994).
5. “Mode 2” concept of research (1994).
6. “Triple Helix ” (1997).
7. “Open Innovation” (2003).

1. Linear model

- One influential conceptualization of the role of academic research within national innovation systems and economies is the so-called "linear model" of innovation.
  - This model asserted that funding of basic research was both necessary and sufficient to promote innovation.
    - Vannevar Bush (1945), *Science: The Endless Frontier*.

2. Chain-linked model

- This point of view has been widely criticized:
  - Empirical evidence, as it was exemplified with Japan during the 1970 and 1980, showed that basic research may not be such necessary and sufficient condition to promote innovation.
  - It underestimates the many reverse processes and feedback loops inherent in technological change.
- The chain-linked model emphasizes that, although the process of innovation can be sequential, there are numerous feedback loops.
  - Kline, S., Rosenberg, N. (1986).

3. Innovation systems

- Universities are widely cited as critical institutional actors in national innovation systems, because affect the creation, development and diffusion if innovations.
  - The literature on national innovation systems emphasized the importance of strong linkages among institutions and this emphasis applies in particular to universities.
    - Freeman, C. (1987); Nelson, R. R. (1993); Edquist, Ch. (2005) .

4. Cultural differences

- The role of the university focuses on the contrasting "norms" of academic and industrial research.
  - For academic researchers, professional recognition depends crucially on been first to publish their result. Industrial innovation relies more heavily on secrecy and limitations to the disclosure of research results.
  - These "cultural differences" may assume greater significance in the face of closer links between university and industrial researches.
    - Dasgupta, P., David, P. (1994); David, P., Foray, D., Steinmueller, W.E. (1999).

5. Mode 2

- Another conceptual framework applied to the role of academic research in post-modern industrial societies is the "Mode 2" concept of research.
  - "Mode 2" research is associated with a more interdisciplinary, pluralistic, networked innovation system, in contrast to the previous system in which academic institutions were less closely linked with other institutions.
  - The growth of "Mode 2" research reflects the increased scale and diversity of knowledge inputs required for scientific research.
    - Gibbons, M. et al. (1994).

6. Triple Helix

- The Triple Helix emphasizes the increased interaction among institutional actors in industrial economies' innovation systems.
- In addition to linkages among institutional spheres, each sphere takes the role of the other.
  - Universities assume entrepreneurial tasks, such as marketing knowledge and creating companies.
    - Etzkovitz, H, Leytesdorff, L. (1997).

7. Open Innovation

- The firms can and should use external ideas as well as internal ideas, and internal and external paths to market, as the firms look to advance their technology.
  - Companies can not afford to rely entirely on their own research and universities must be more involved in the commercial application of science.
    - Chesbrough, H.W., 2003.

Conceptual Frameworks on University-Industry Relations	
	Type of Relation
“Linear model” of innovation (1945).	Spontaneous
“Chain-linked” model (1986).	Complex
“Innovation systems” (1987).	Receptive
“Cultural differences” (1994).	Complicated
“Mode 2” concept of research (1994).	Active
“Triple Helix ” (1997).	Intrusive
“Open Innovation” (2003).	Permeable

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2. Weaknesses in theoretical approaches conceptualizing the role of the university within the innovation processes

Agreement in theoretical approaches

- Practically, all the frameworks for conceptualizing the role of the research university within the innovation processes of knowledge-based economies emphasize the importance of strong links between universities and other institutional actors.

Weaknesses in theoretical approaches

- What is lacking in all of these frameworks is:
  - A clear set of criteria by which to asses the strength of such linkages.
  - A set of indicators to guide the collection of data.
- There are still strong debates about the missions of universities.

Next two points

- The next two points refer to:
  - Empirical data about universities and innovation in Atlantic Area.
  - Debates about the University-Industry relations in Atlantic Area.

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3. Comparative indicators on the training, research and relation roles of higher education systems in Atlantic Area (France, Ireland, Portugal, Spain and United Kingdom)

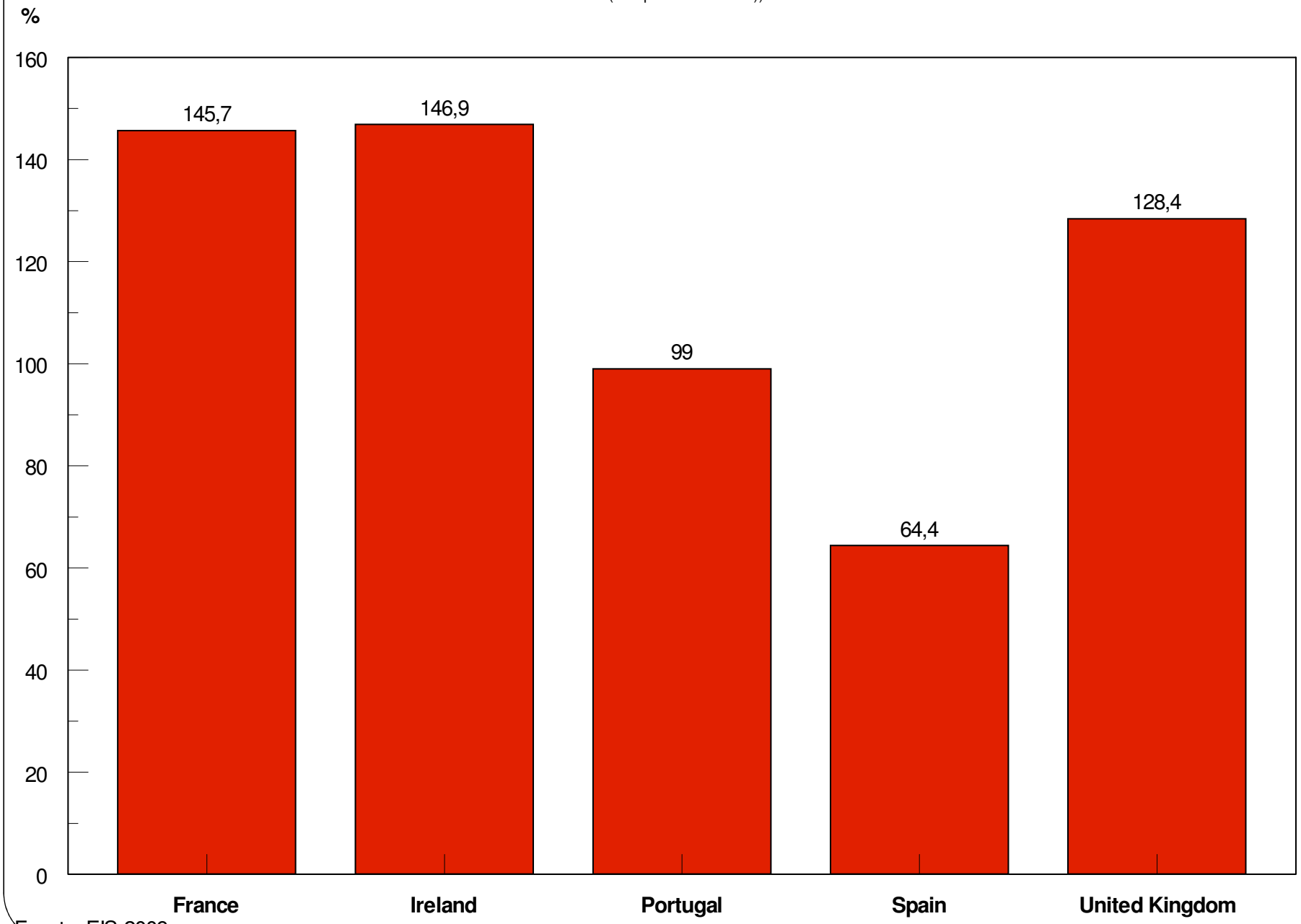
Comparative data

- European Innovation Scoreboard contains 30 indicators on innovation in European countries:
  - ENABLERS:
    - Human resources (5)
    - Finance and support (4)
  - FIRM ACTIVITIES:
    - Firm investments (3)
    - Linkages & entrepreneurship (4)
    - Throughputs (4)
  - OUTPUTS:
    - Innovators (4)
    - Economic effects (6)

Selection of EIS Indicators on University and its Relationships	
1.1.1 S&E and SSH graduates per 1000 population aged 20-29 (GRADUATES)	TRAINING
1.1.3 Population with tertiary education per 100 population aged 25-64 (TERTIARY)	TRAINING
1.1.2 S&E and SSH doctorate graduates per 1000 population aged 25-34 (DOCTORATE)	RESEARCH
1.2.1 Public R&D expenditures (% of GDP) (PUBLIC R&D)	RESEARCH
2.2.2 Innovative SMEs collaborating with others (% of SMEs) (COLABORATION)	RELATION
2.2.4 Public-private co-publications per million population (COPUBLICATION)	RELATION

1.1.1 S&E and SSH graduates per 1000 population aged 20-29, 2007

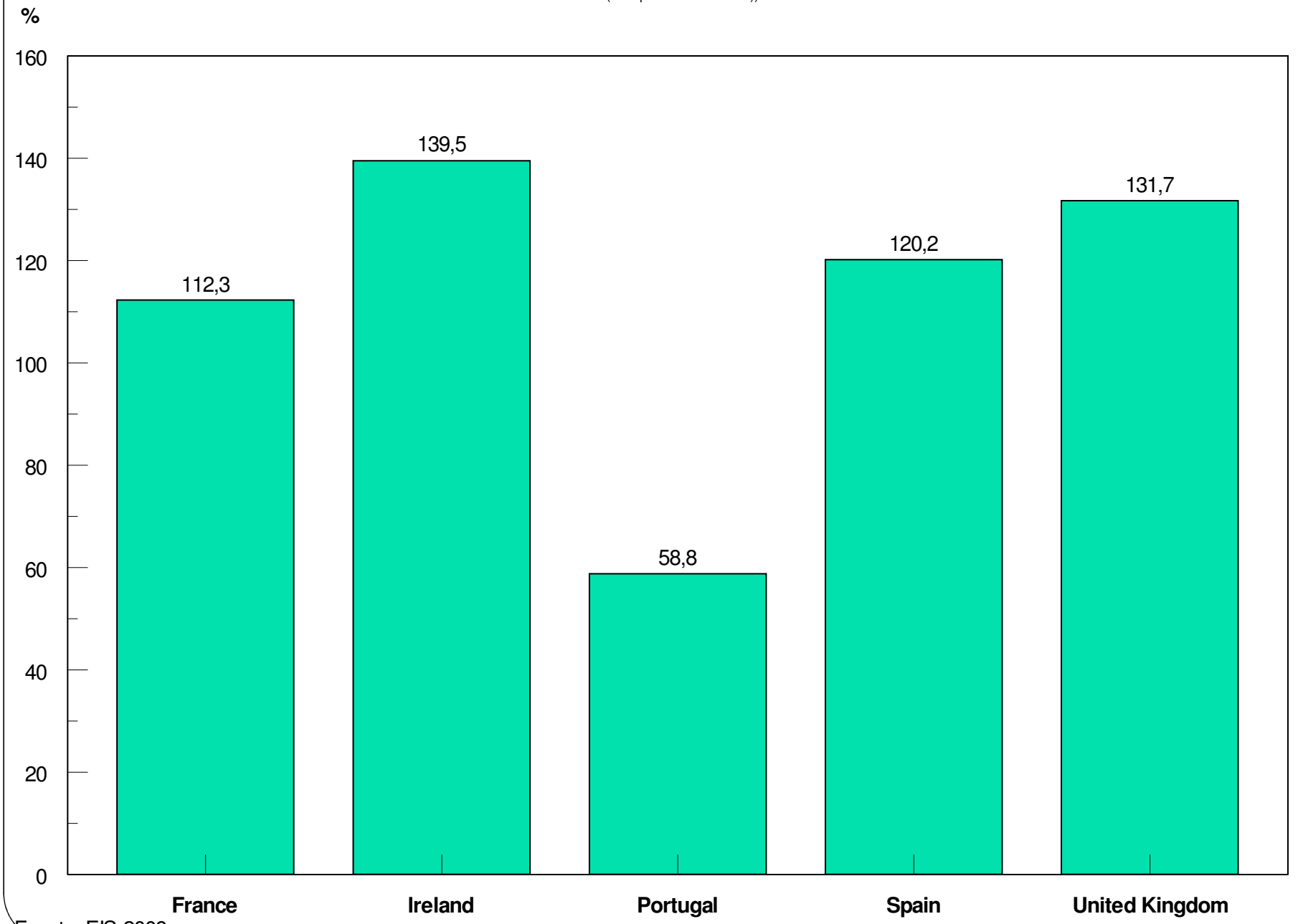
(European Union= 100))



Fuente: EIS-2009.

1.1.3 Population with tertiary education per 100 population aged 25-64, 2008

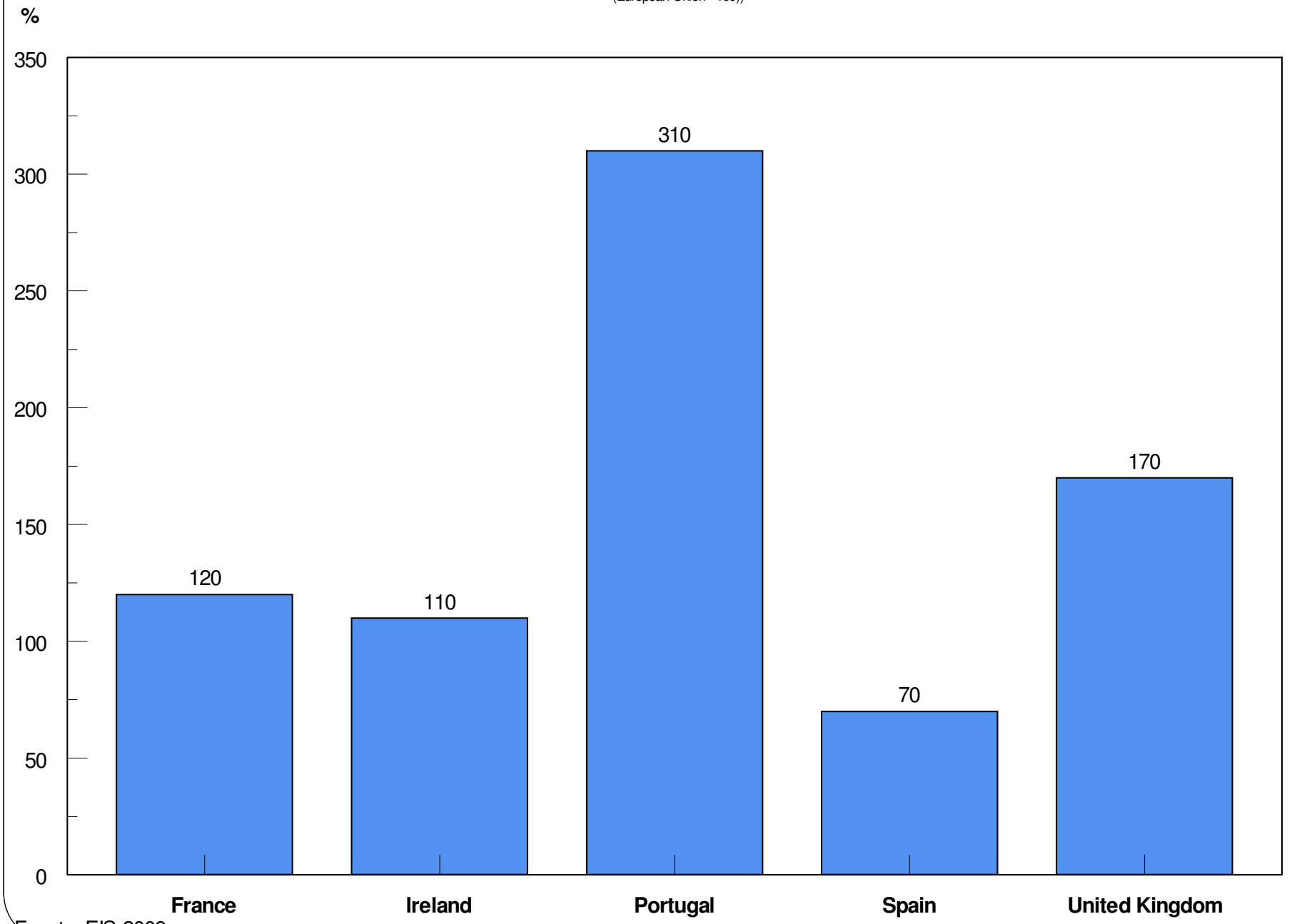
(European Union= 100))



Fuente: EIS-2009.

1.2.2 S&E and SSH doctorate graduates per 1000 population aged 25-34, 2007

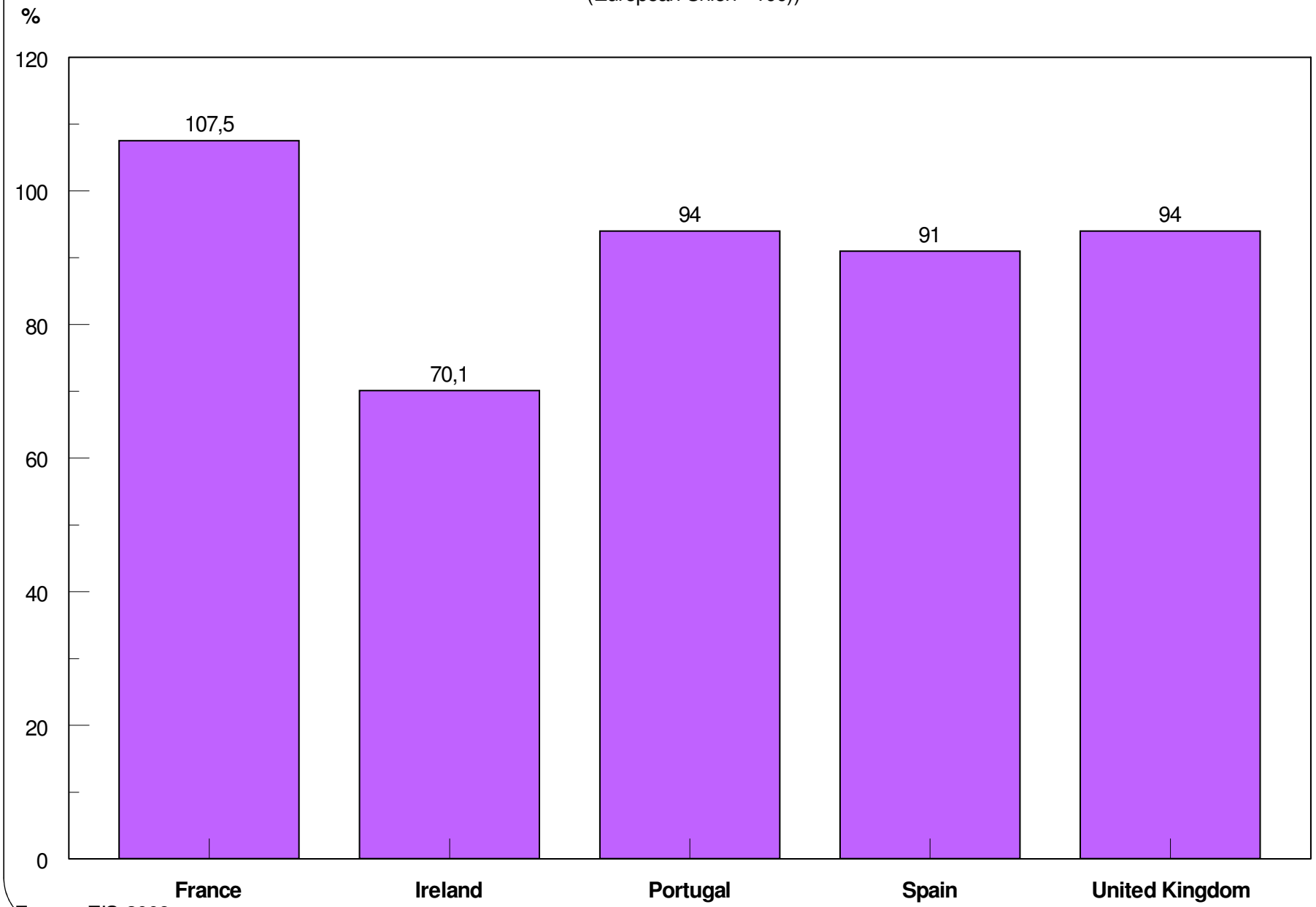
(European Union= 100))



Fuente: EIS-2009.

1.2.1 Public R&D expenditures (% of GDP), 2008

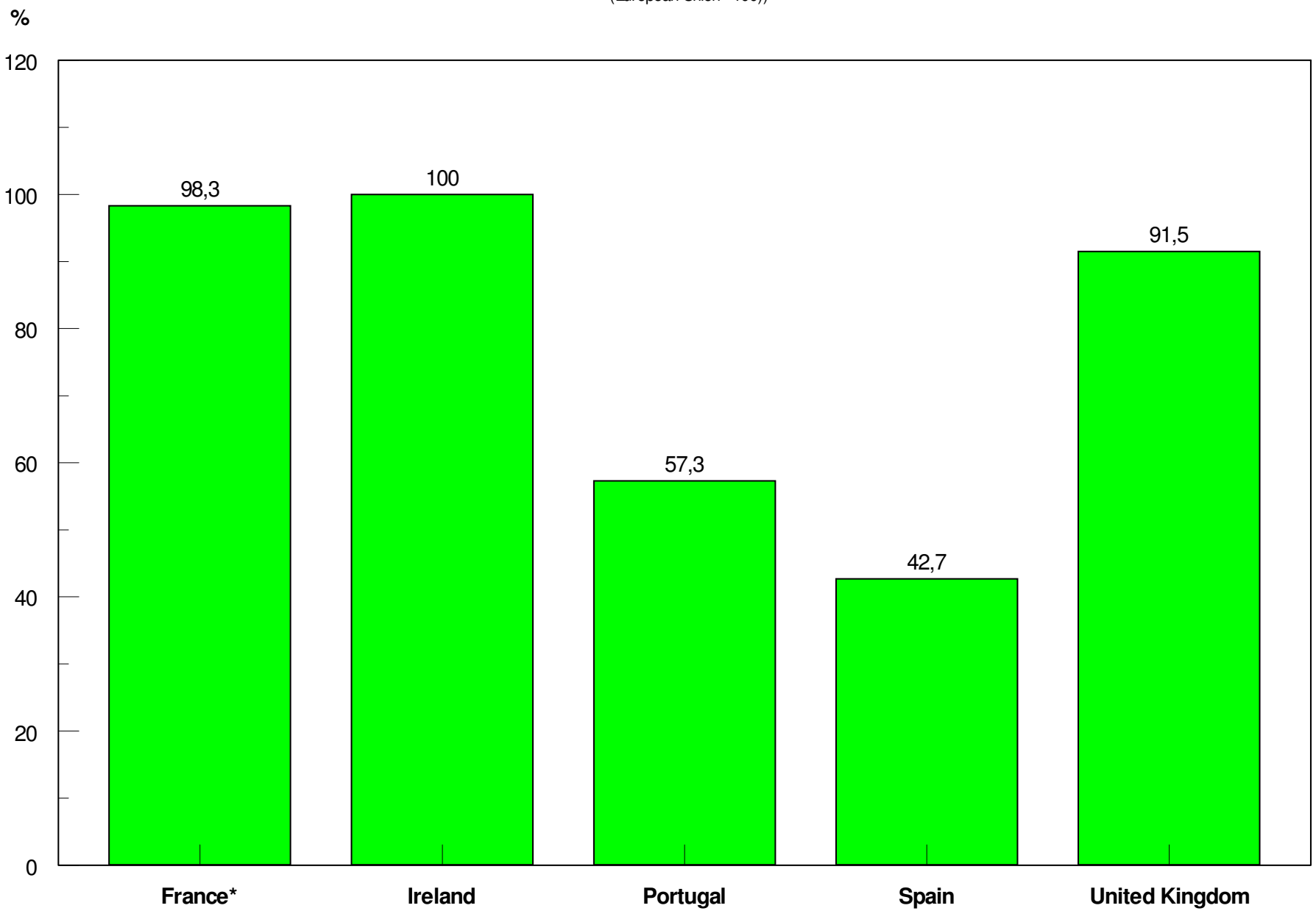
(European Union= 100))



Fuente: EIS-2009.

2.2.2 Innovative SMEs collaborating with others (% of SMEs), 2006

(European Union= 100))

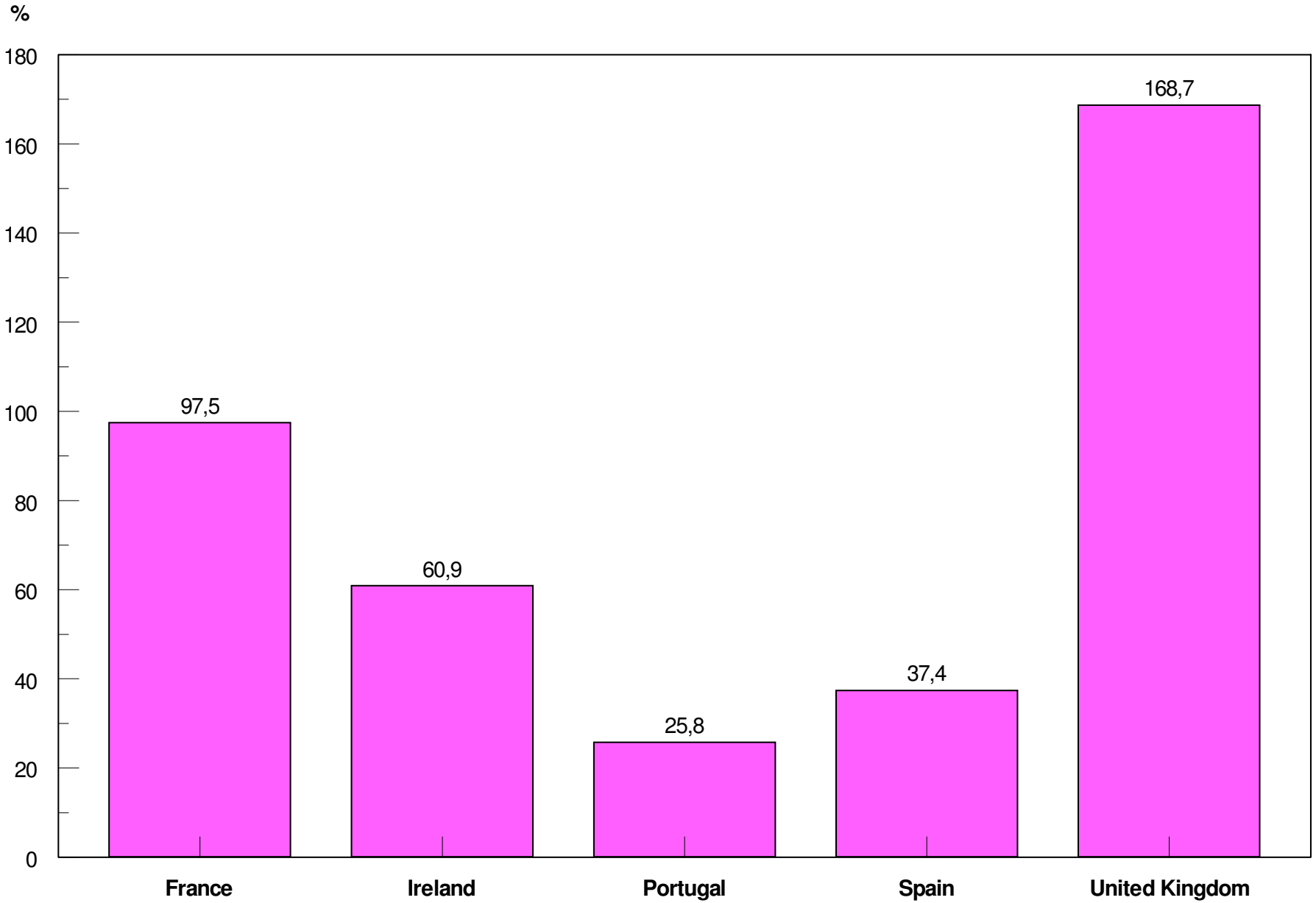


Fuente: EIS-2009.

* France, 2004.

2.2.4 Public-private co-publications per million population, 2007

(European Union= 100))



Fuente: EIS-2009.

* France, 2004.

Atlantic Area University Diagnosis			
		Strength	**Weakness**
Training	**GRADUATES**	France, Ireland, Portugal, United Kingdom	Spain
	TERCIARY	France, Ireland, Spain, United Kingdom	Portugal
Research	**DOCTORATE**	France, Ireland, United Kingdom, Portugal	Spain
	PUBLIC R&D	France, Portugal, Spain, United Kingdom	Ireland
Relation	**COLABORATION**	France, Ireland, United Kingdom	Portugal, Spain
	COPUBLICATION	France, United Kingdom	Ireland, Portugal, Spain

Spain' University Diagnosis		
Training	**Present strength**	TERCIARY
	Future weakness	GRADUATES
Research	**Present strength**	PUBLIC R&D
	Future weakness	DOCTORATE
Relation	**Present weakness**	COLABORATION
	Present weakness	COPUBLICATION

Portugal' University Diagnosis		
Training	**Present weakness**	TERCIARY
	Future strength	GRADUATES
Research	**Present strength**	PUBLIC R&D
	Future strength	DOCTORATE
Relations	**Present weakness**	COLABORATION
	Present weakness	COPUBLICATION

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4. Debates on University-Industry relations in Atlantic Area

Two questions

1. Is the Atlantic Area a favourable environment for a transregional and transnational University-Industry relationship?.
2. Is it necessary for Spain the encouragement of the relationship between University and Industry?.

1. Is the Atlantic Area a favourable environment for a transregional and transnational University-Industry relationship?.

Experience of FUAC

- REDOMIC project has shown the possibility and successfulness of a transregional and transnational University-Industry relationship in SUDOE Area (France, Portugal and Spain).
- **Why not in Atlantic Area?.**

2. Is it necessary for Spain the encouragement of the relationship between University and Industry?.

Texto para el debate

- "Las clasificaciones (o rankings) de las universidades están lastradas por un prejuicio favorable al modelo de las universidades elitistas norteamericanas, carísimas, altamente selectivas y volcadas en la investigación".
  - "Las universidades europeas y latinoamericanas no pueden competir con las de Estados Unidos en este último aspecto. Los contratos multimillonarios de las grandes universidades estadounidenses con las empresas y los organismos estatales les permiten hacer lo que las nuestras nunca lograrán, por mucho que se lo propongan, en el campo de la investigación y de la innovación".
- "Los conservadores británicos están definiendo un modelo posible para las universidades públicas del Reino Unido que podría aplicarse también en España, y que se basa en la prioridad de la instrucción respecto a la investigación, lo que podrá parecer una opción resignada, pero que es indudablemente realista".
  - J. Juaristi (2010).

Por qué no

- Porque renunciar de antemano a hacer algo es el camino más seguro de no conseguirlo.
- Porque utilizar los recursos disponibles y procurar mejorarlos es el camino más prometedor para alcanzarlo.
- Llegar a dónde:
  - **A una economía en España basada en el conocimiento,**
  - **Más próspera, competitiva, dinámica y resistente que la que tenemos actualmente.**

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ANEXO

European Innovation Scoreboard 2009 Database		
ENABLERS	**Human resources**	
	1.1.1 S&E and SSH graduates per 1000 population aged 20-29	Graduados
	1.1.2 S&E and SSH doctorate graduates per 1000 population aged 25-34	Doctorados
	1.1.3 Population with tertiary education per 100 population aged 25-64	Edu. Terciaria
	1.1.4 Participation in life-long learning per 100 population aged 25-64	Aprendizaje
	1.1.5 Youth education attainment level	Educación Juventud
	Finance and support	
	1.2.1 Public R&D expenditures (% of GDP)	I+D Público
	1.2.2 Venture capital (% of GDP)	Capital Riesgo
	1.2.3 Private credit (relative to GDP)	Crédito Privado
	1.2.4 Broadband access by firms (% of firms)	Banda Ancha

FIRM ACTIVITIES	**Firm investments**	
	2.1.1 Business R&D expenditures (% of GDP)	I+D Empresa
	2.1.2 IT expenditures (% of GDP)	Gasto Tec. Inf.
	2.1.3 Non-R&D innovation expenditures (% of turnover)	Gasto IT
	Linkages & entrepreneurship	
	2.2.1 SMEs innovating in-house (% of SMEs)	Innovación interna
	2.2.2 Innovative SMEs collaborating with others (% of SMEs)	Colaboración
	2.2.3 Firm renewal (SMEs entries + exits) (% of SMEs)	Renovación
	2.2.4 Public-private co-publications per million population	Copublicaciones
	Throughputs	
	2.3.1 EPO patents per million population	Patentes EPO
	2.3.2 Community trademarks per million population	Marcas
	2.3.3 Community designs per million population	Diseños
	2.3.4 Technology Balance of Payments flows (% of GDP)	Balanza Pagos

OUTPUTS	**Innovators**	
	3.1.1 SMEs introducing product or process innovations (% of SMEs)	Innovación P-P
	3.1.2 SMEs introducing marketing or organisanational innovations (% of SMEs)	Innovación C-O
	3.1.3 Resource efficiency innovators	
	3.1.3a Reduced labour costs (% of firms)	Reducc. Trabajo
	3.1.3b Reduced use of materials and energy (% of firms)	Reducc. Energía
	Economic effects	
	3.2.1 Employment in medium-high & high-tech manufacturing (% of workforce)	Empleo MAT
	3.2.2 Employment in knowledge-intensive services (% of workforce)	Empleo Servicios
	3.2.3 Medium-tech and high-tech exports (% of total exports)	Export MAT
	3.2.4 Knowledge-intensive services exports (% of total services exports)	Export SERV
	3.2.5 New-to-market sales (% of turnover)	Nuevo Mercado
	3.2.6 New-to-firm sales (% of turnover)	Nuevo Empresa