

Some Figures about Nanotechnology R&D in Europe and Beyond



Compiled by Unit G4 *Nanosciences and Nanotechnologies*
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The present publication is based on the information that was available at the time and cannot be guaranteed to be complete or accurate.

The views expressed in this document are entirely those of the Authors and do not engage or commit the European Commission in any way.

Introduction

With its two Communications on nanotechnology, a *Strategy* and an *Action Plan*, the European Commission has presented the vision and a set of actions for the useful, safe, responsible and profitable development and application of nanosciences and nanotechnologies in Europe. The Council of the European Union has endorsed the *integrated and responsible* strategy proposed by the Commission.

In our day-to-day work, we have collected and we are steadily continuing to collect data on the many indicators associated with nanotechnology research, technological development and their applications. Many stakeholders have repeatedly asked us to share some of these data; hence the publication of these pages, as a service to all those interested.

Europe is one of the leading actors in nanosciences and nanotechnologies both in research as well as in technological development, thanks to the creativity of European researchers, the initiatives of industry, academia and research organisations, to the quality of the infrastructures and the commitment of public authorities.

Nevertheless, some worrying signals emerge, which call for appropriate initiatives, as the European Commission pointed out in its *Action Plan*. For instance, Figure 10 documents the apparently low level of private funding for research on nanotechnology, which is more broadly addressed by the European Commission with its 3% initiative.

Moreover, Figures 22 and 23 present some possible scenarios for funding under the EU 7th framework programme for research and technological development. These simulated scenarios suggest concentrating future available resources to maximise efficiency and effectiveness.

The present *figures* are based on the information to which we had access; they should not be deemed to be complete and in no way do they engage the European Commission. I thank my colleague Dr. Raymond Monk for the energy and attention that he put in this compilation.

We hope that you find this to be a useful initiative and would welcome all comments and suggestions on the *figures* presented, so to be able to realise a more comprehensive documents in the future.

More information is available -amongst others- on:

<http://cordis.europa.eu.int/nanotechnology>, <http://cordis.europa.eu.int/en/home.html>
and www.nanoforum.org.

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A) Funding for nanotechnology R&D in Europe and worldwide

Table 1: Estimated worldwide public funding for nanotechnology R&D in 2004

Country	Funding (€)	Country	Funding (€)
European Union		Third Countries	
Austria	13,1 ⁱ	Argentina	0.4 ⁱⁱ
Belgium	60,0 ^{*iii}	Australia	62 ^{iv}
Czech Republic	0,4 ^v	Brazil	5.8 ^{vi}
Denmark	8,6 ^{vii}	Canada	37.9 ^{viii}
Finland	14,5 ^{ix}	China	83.3 ^x
France	223,9 ^{xi}	India	3.8 ^{xii}
Germany	293,1 ^{xiii}	Indonesia	16.7 ^{xiv}
Greece	1,2 ^{*xv}	Japan	750 ^{xvi}
Ireland	33,0 ^{xvii}	Malaysia	3.8 ^{xviii}
Italy	60,0 ^{*xix}	Mexico	10 ^{xx}
Latvia	0,2 ^{*xxi}	New Zealand	9.2 ^{xxii}
Lithuania	1,0 ^{xxiii}	Singapore	8.4 ^{xxiv}
Luxembourg	0,8 ^{xxv}	South Africa	1.9 ^{xxvi}
Netherlands	42,3 ^{xxvii}	South Korea	173.3 ^{xxviii}
Poland	1,0 ^{*xxix}	Taiwan	75.9 ^{xxx}
Portugal	0,5 ^{*xxxi}	Thailand	4.2 ^{xxxii}
Slovenia	0,5 ^{*xxxiii}	USA (Federal)	910 ^{xxxiv}
Spain	12,5 ^{xxxv}	USA (States)	333.3 ^{xxxvi}
Sweden	15,0 ^{xxxvii}	Third Countries Total	2,490
United Kingdom	133,0 ^{xxxviii}		
EU-25 Total	915		
EC	370		
Candidate Countries and Associated States			
Israel	46 ^{xxxix}		
Norway	7 ^{xl}	Total EU	1,285
Romania	3.1 ^{xli}	Total EU + CC + AS	1,360
Switzerland	18.5 ^{xlii}	World Total	3,850
CC & AS Total	75		

Source: European Commission, 2005 and various sources indicated by superscripted references. Data are unavailable for Cyprus, Estonia, Hungary, Iceland, Liechtenstein, Malta, Slovakia and Turkey. Data indicated with * are taken from 2003.

Figure 1: Absolute worldwide public expenditure in 2004
(Purchasing Power Parity (PPP) corrected)

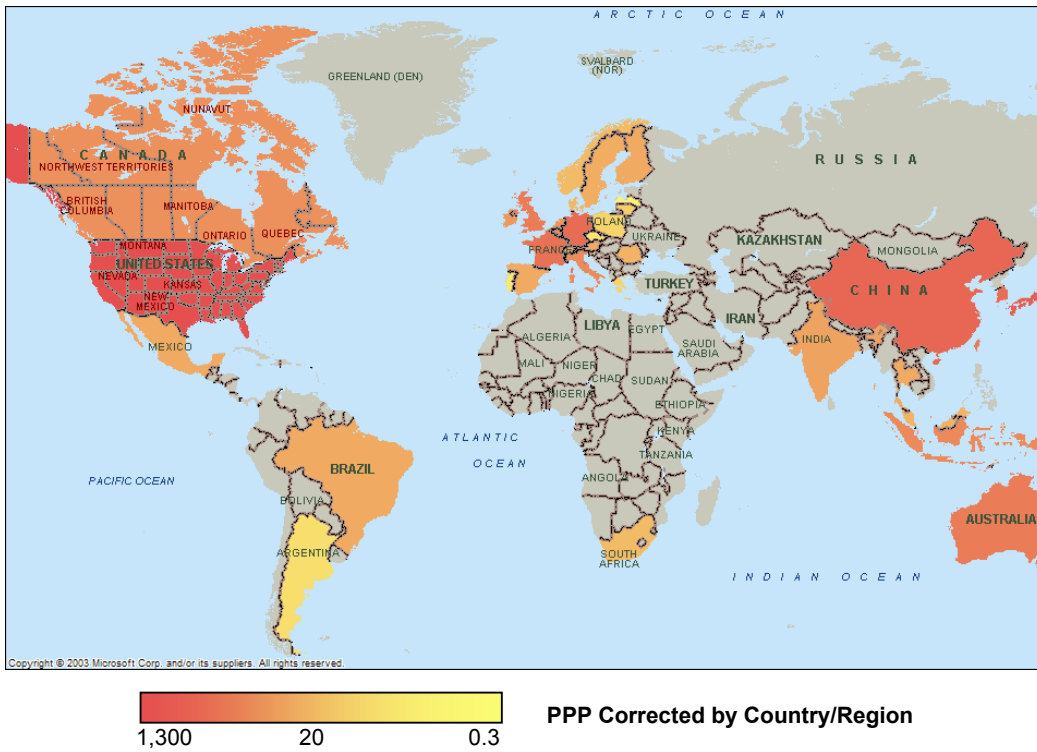


Figure 2: Worldwide per capita public expenditure in 2004 (PPP corrected)

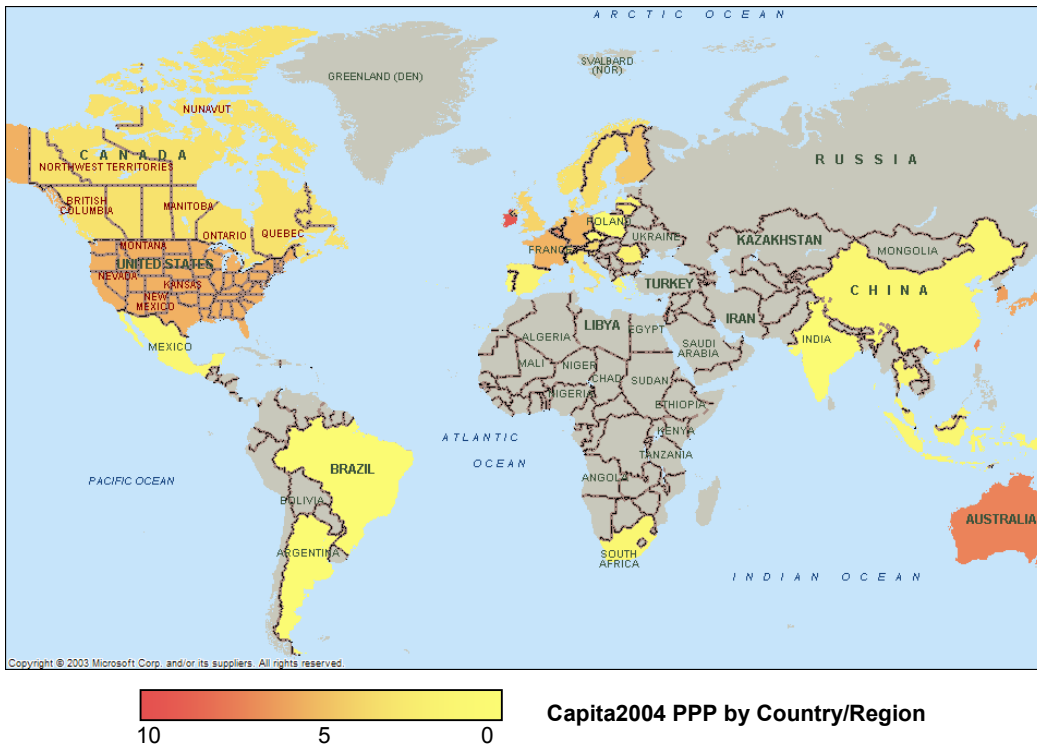


Figure 3: Absolute European public expenditure in 2004 (PPP corrected)

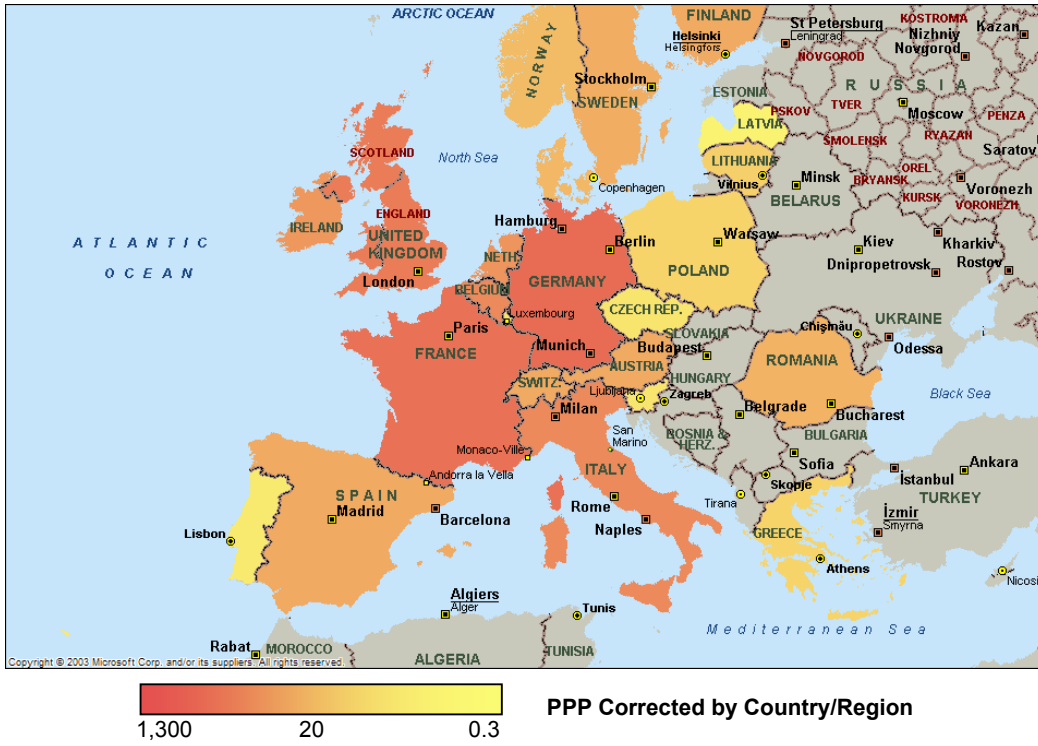


Figure 4: European per capita public expenditure in 2004 (PPP corrected)

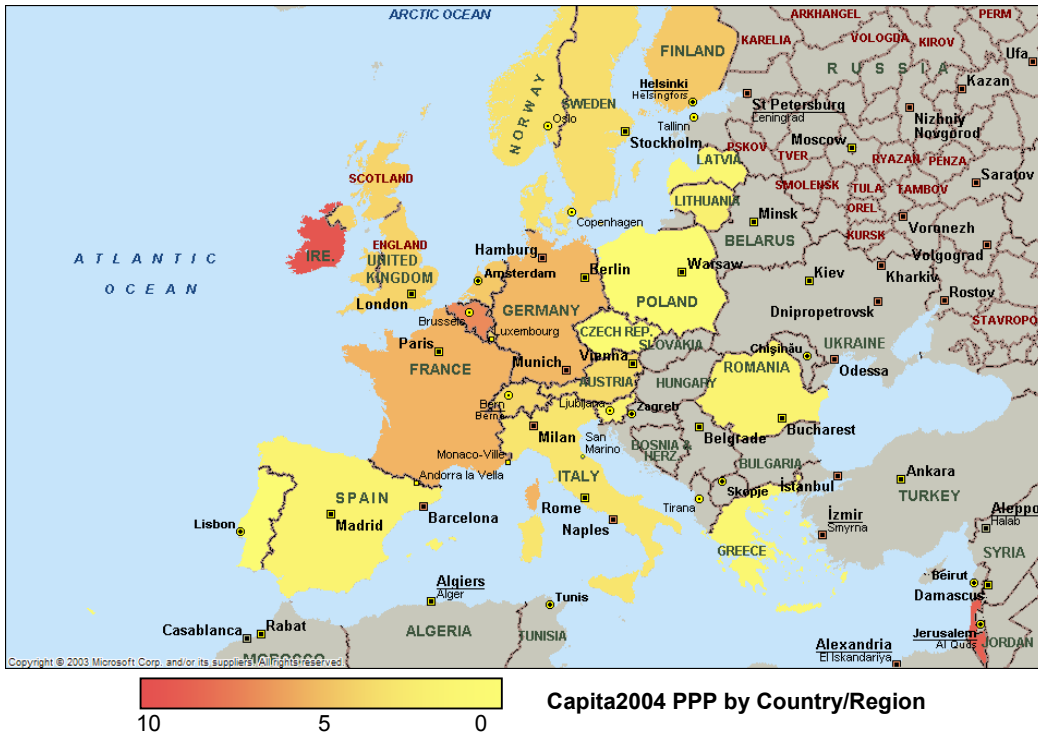


Figure 5: Absolute world public expenditure in 2004 (PPP corrected)

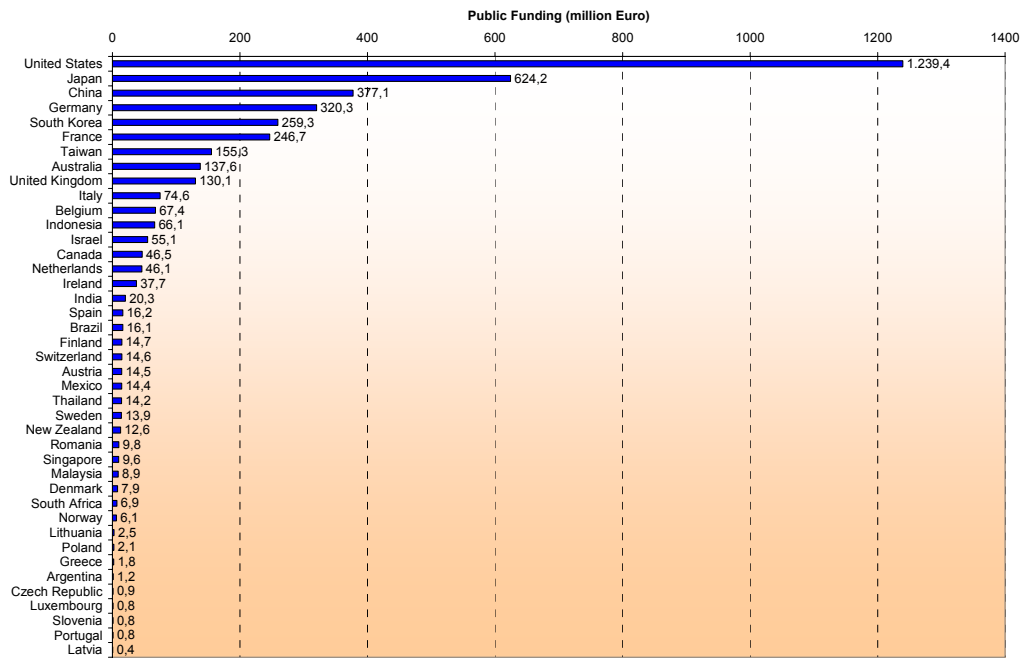


Figure 6: World per capita public expenditure in 2004 (PPP corrected)

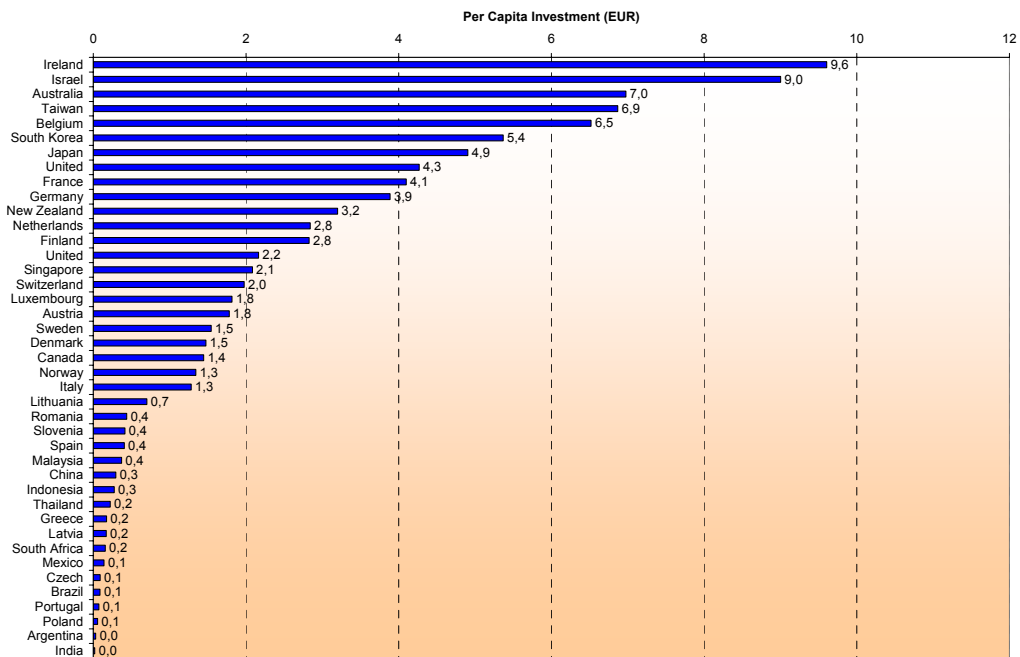


Figure 7: EU absolute public expenditure in 2004
(PPP corrected and including Countries associated to the EU Framework Programme)

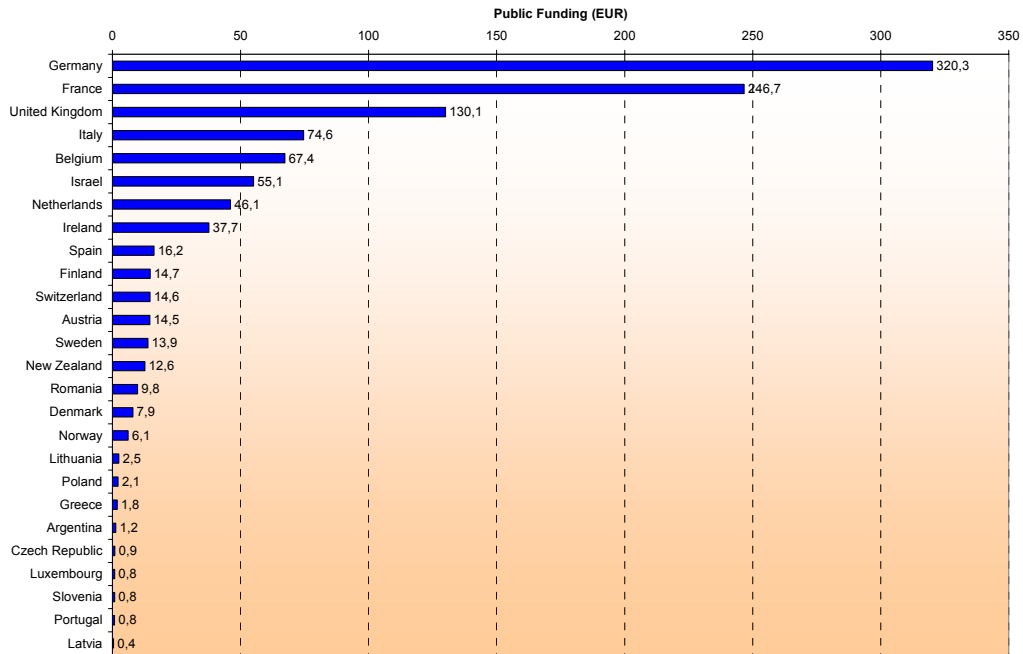


Figure 8: EU per capita public expenditure in 2004
(PPP corrected and including Countries associated to the EU Framework Programme)

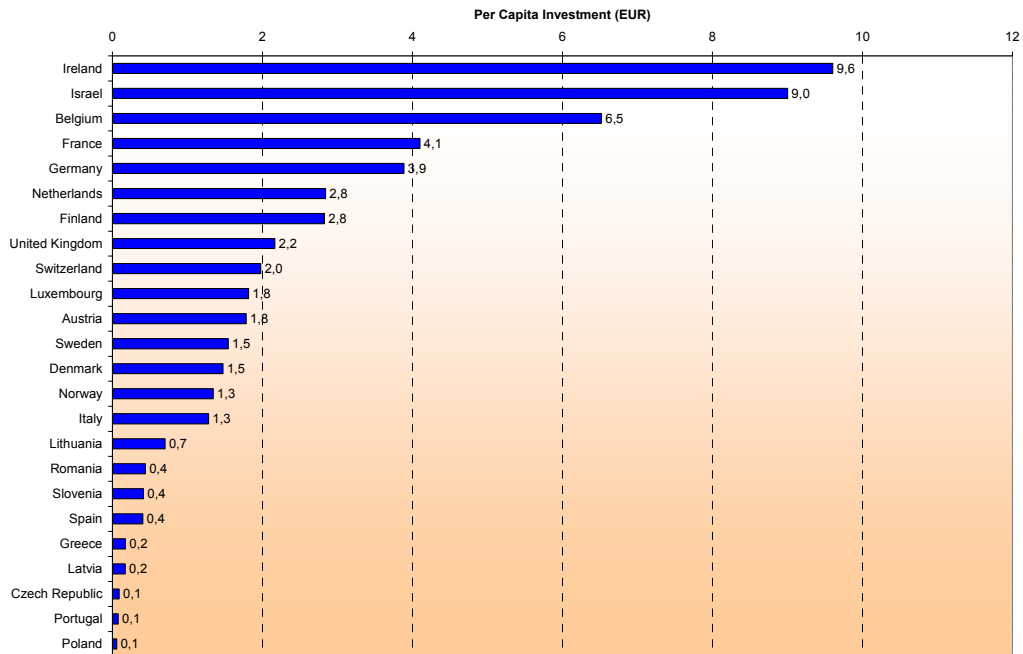


Figure 9: Evolution of worldwide public expenditure
(1€=1\$ to avoid distortions due to exchange rate variations)

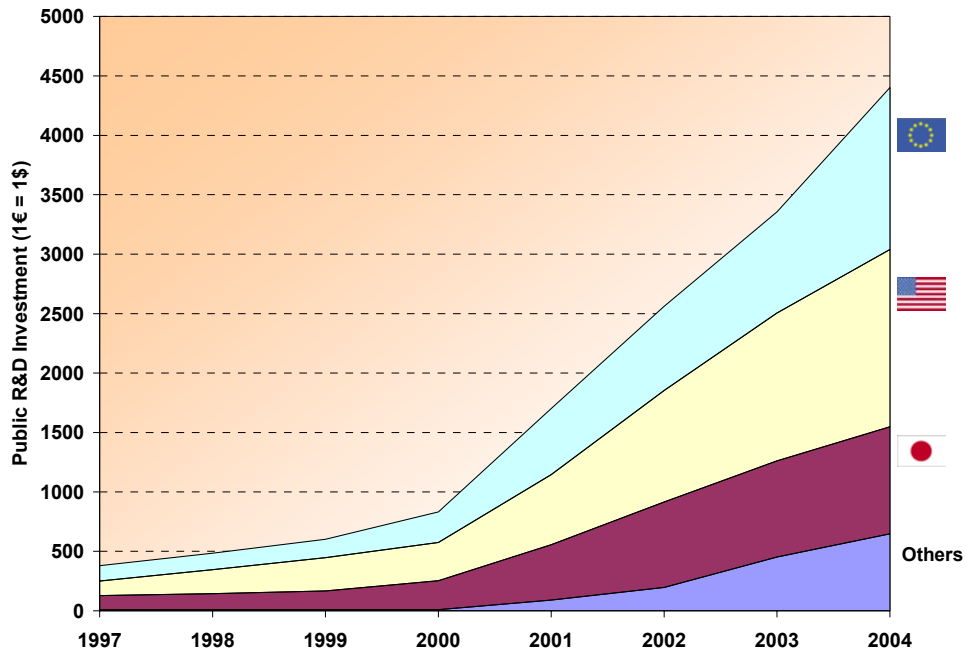


Figure 10: Worldwide public and private expenditure in 2004 (private figures taken from average of Lux Research^{xliii} and Technology Review^{xliv}, US States figures taken from Lux Research^{xlv})

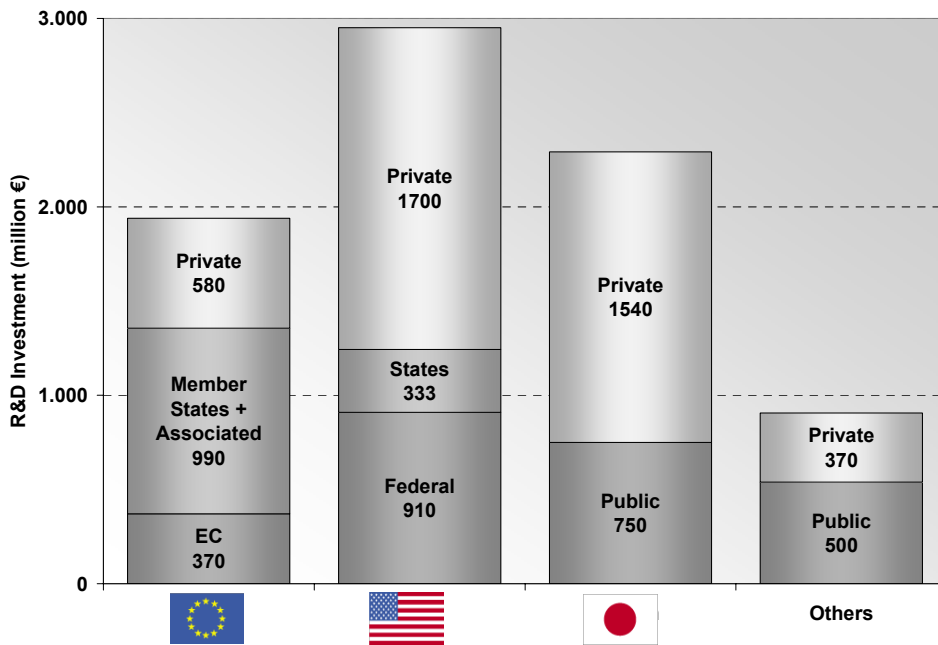


Figure 11: Division of worldwide public expenditure in 2004

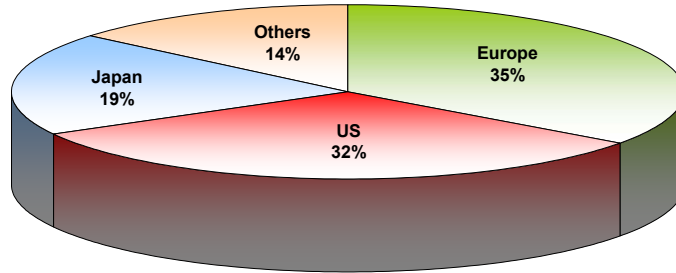


Figure 12: Division of worldwide private expenditure in 2004

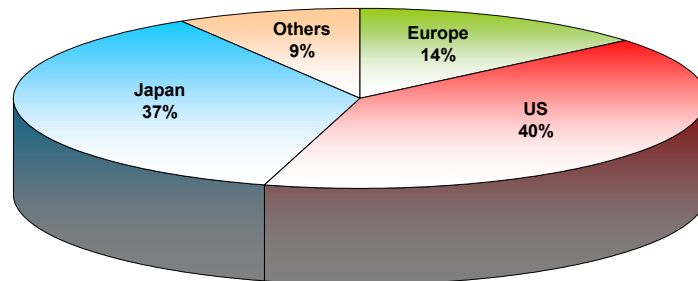
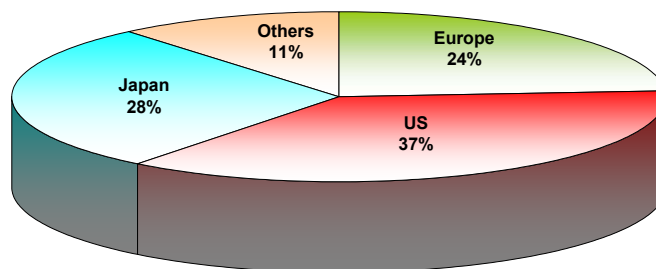


Figure 13: Division of overall (public + private) expenditure in 2004



B) Evolution of funding for nanotechnology in the EU Framework Programmes

Figure 14: Evolution of EU Framework Programmes (FP) funding devoted to nanotechnology R&D (2005 data are a to-date estimate and subject to change)

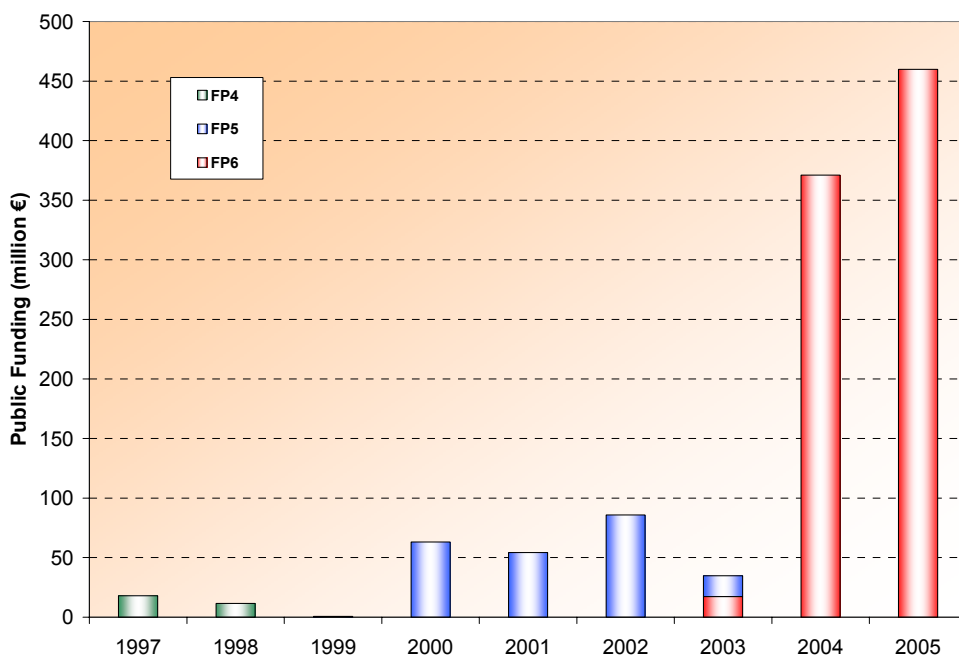


Figure 15: Evolution of FP funding devoted to nanotechnology R&D including known funding leveraged by full-cost participants (2005 data are a to-date estimate and subject to change)

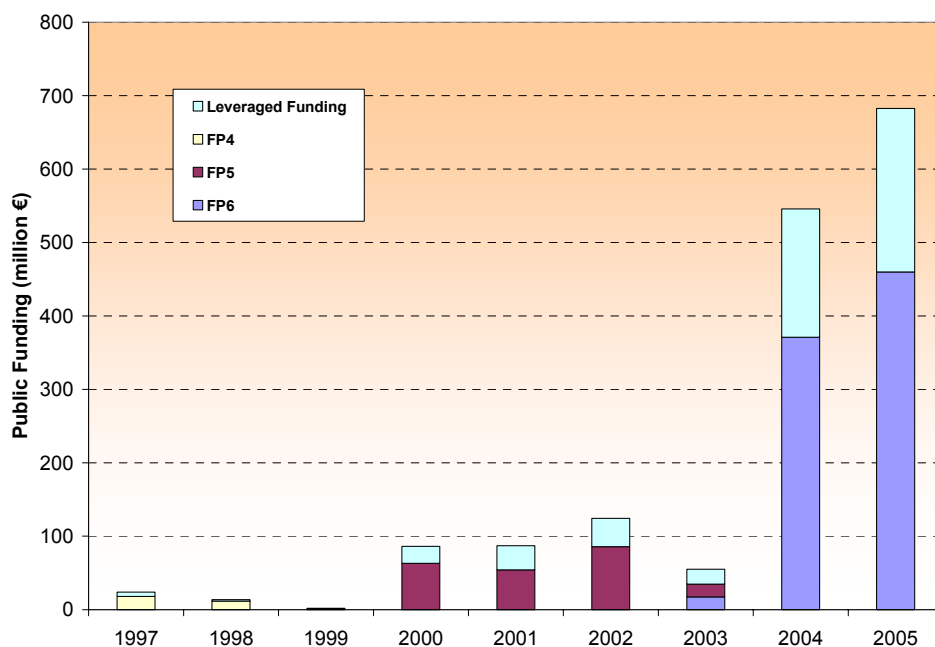


Figure 16: Integrated FP funding devoted to nanotechnology R&D (2005 data are a to-date estimate and subject to change)

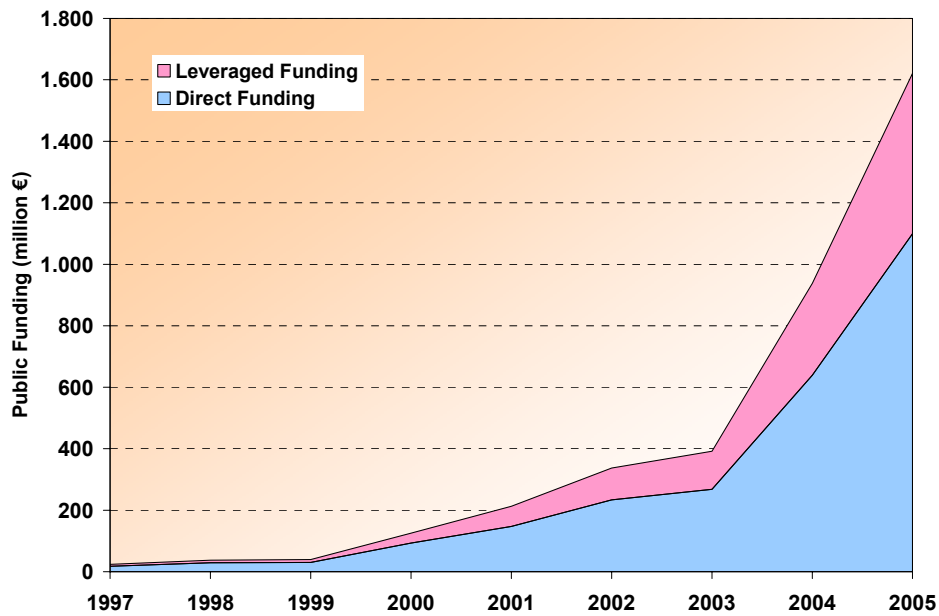


Figure 17: Nanotechnology R&D areas supported by successive FPs

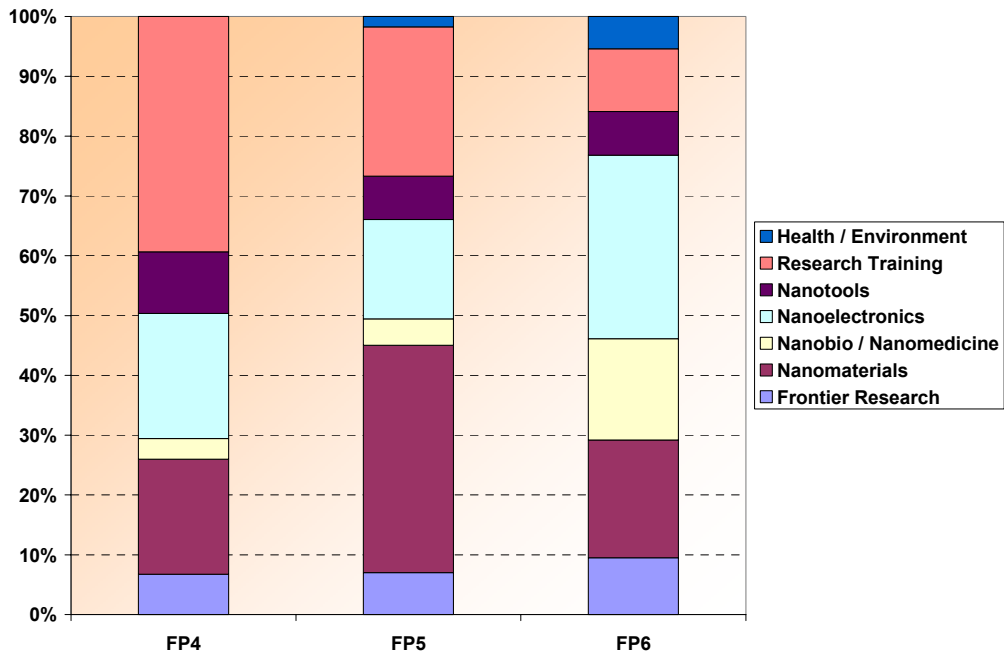


Figure 18: The FP6 support to nanotechnology R&D in 2004 (in millions of Euro)

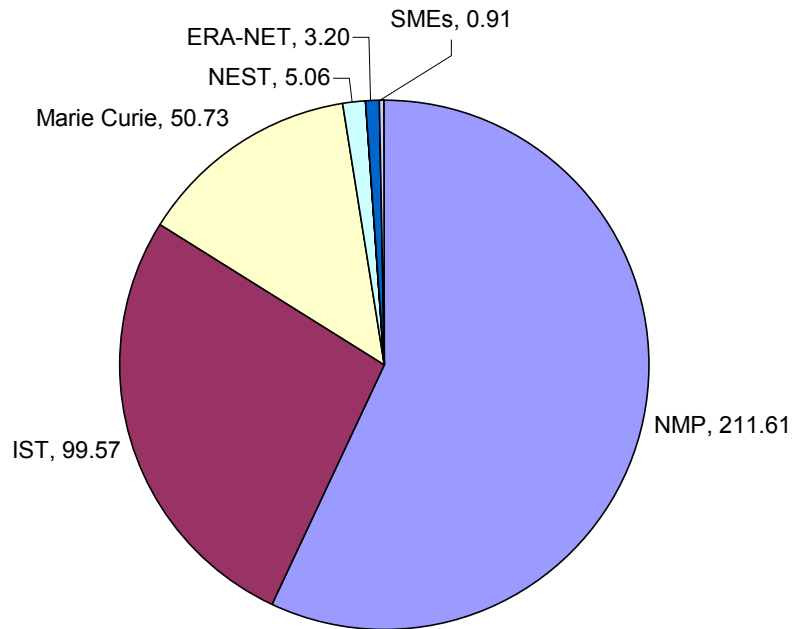


Figure 19: To-date FP6 support to nanotechnology R&D in 2005 (in millions of Euro)

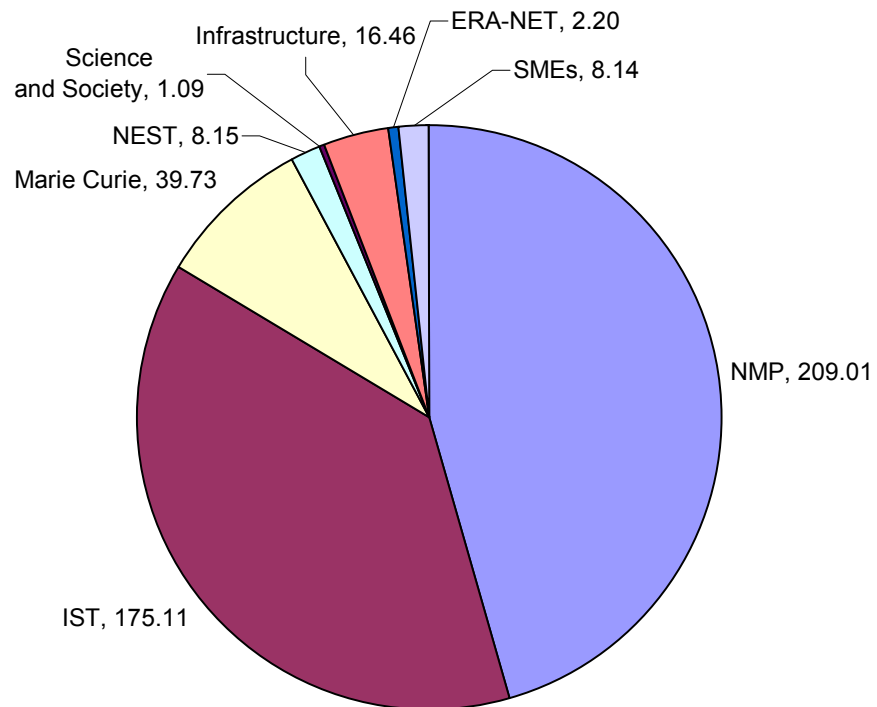





Figure 20: Some examples of projects funded via the FP6

- CANAPE: Carbon **Nanotubes** for Applications in Electronics, Catalysis, Composites and Nano-Biology – University of Cambridge (UK)
- NAIMO: Nanoscale Integrated processing of **self-organizing** Multifunctional Organic Materials - Université Libre de Bruxelles (BE)
- NANOFUN-POLY: Nanostructured and functional **polymer-based** materials and nanocomposites - Consorzio Interuniversitario Scienza e Tecnologia dei Materiali (IT)
- RADSAS: Rational Design and Characterisation of **Supramolecular** Architectures on Surfaces - Eidgenössische Materialprüfungs- und Forschungsanstalt (CH)
- BIOMACH: **Molecular Machines** - Design and Nano-Scale Handling of Biological Antetypes and Artificial Mimics - Forschungszentrum Karlsruhe GmbH (DE)
- Cornea engineering: Three-dimensional reconstruction of human **corneas** by tissue engineering” - Centre National de la Recherche Scientifique / Rhône Alpes (FR)
- Ambio: Advanced nanostructured surfaces for the control of **biofouling** - University of Birmingham (UK)
- ANVOC: Application of nanotechnologies for **separation and recovery** of volatile organic compounds from waste air streams – S&T Research Council of Turkey (TU)
- NANOSAFE2: **Safe production and use** of nanomaterials - Commissariat à l’Energie Atomique (FR)
- Nanologue: Facilitating the **dialogue** between research, business and the civil society to improve the quality of life, create wealth and reduce impacts to society - Wuppertal Institute for Climate, Energy and the Environment GmbH (DE)


Figure 21: Some projects addressing nano(eco)toxicology



Projects in EU Framework Programmes for RTD

<ul style="list-style-type: none"> • NANOSAFE • NANODERM • NANOPATHOLOGY • MAAPHRI • NANOFORUM 	}	 ~2.5M€
<ul style="list-style-type: none"> • NANOTOX • IMPART • NANOSAFE2 • 6 new projects to be negotiated 	}	 >8M€ + 12 M€?

+ NANOCARE funded by the F.R.Germany



C) Examples of funding projections

Figure 22: Projection of absolute EU public expenditure compared to the USA and Japan under different possible FP7 scenarios of funding

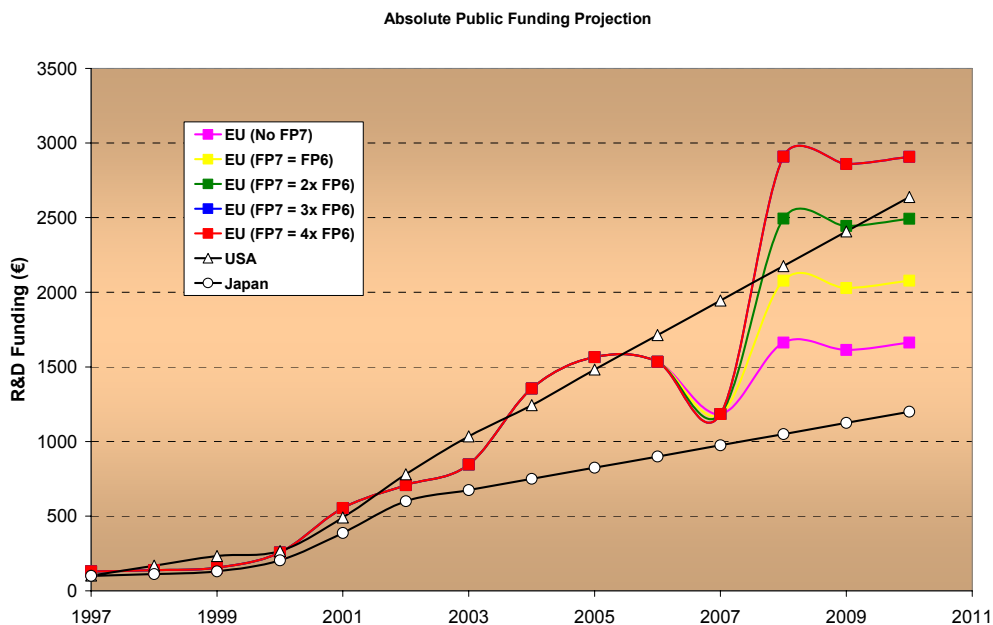
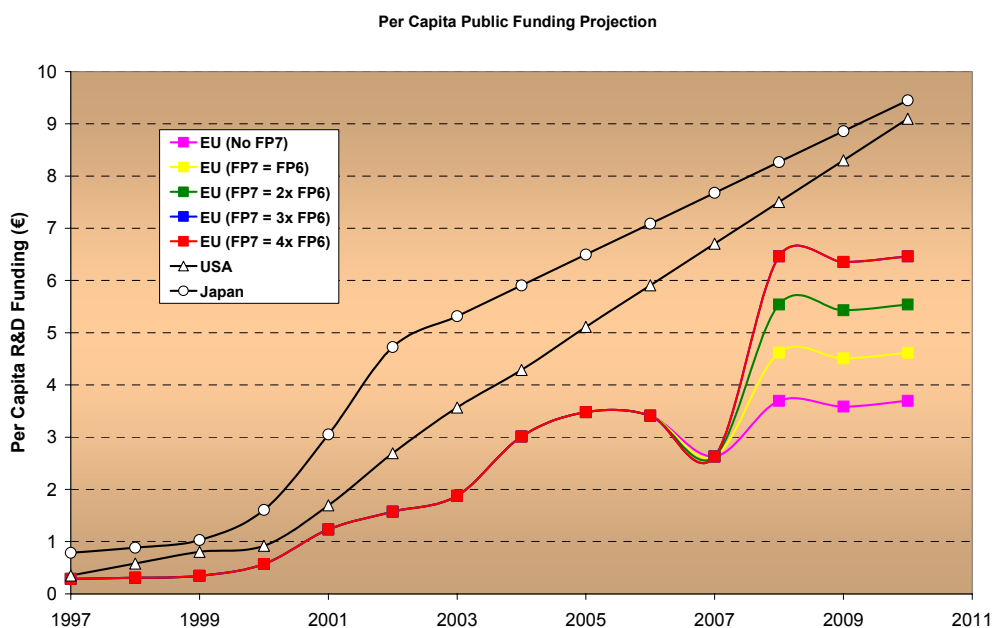


Figure 23: Projection of per capita EU public expenditure compared to the USA and Japan under different possible FP7 scenarios of funding



APPENDIX: Data reported in absolute figures not considering the Purchasing Power Parity (PPP)

Figure A1: Absolute worldwide public expenditure in 2004

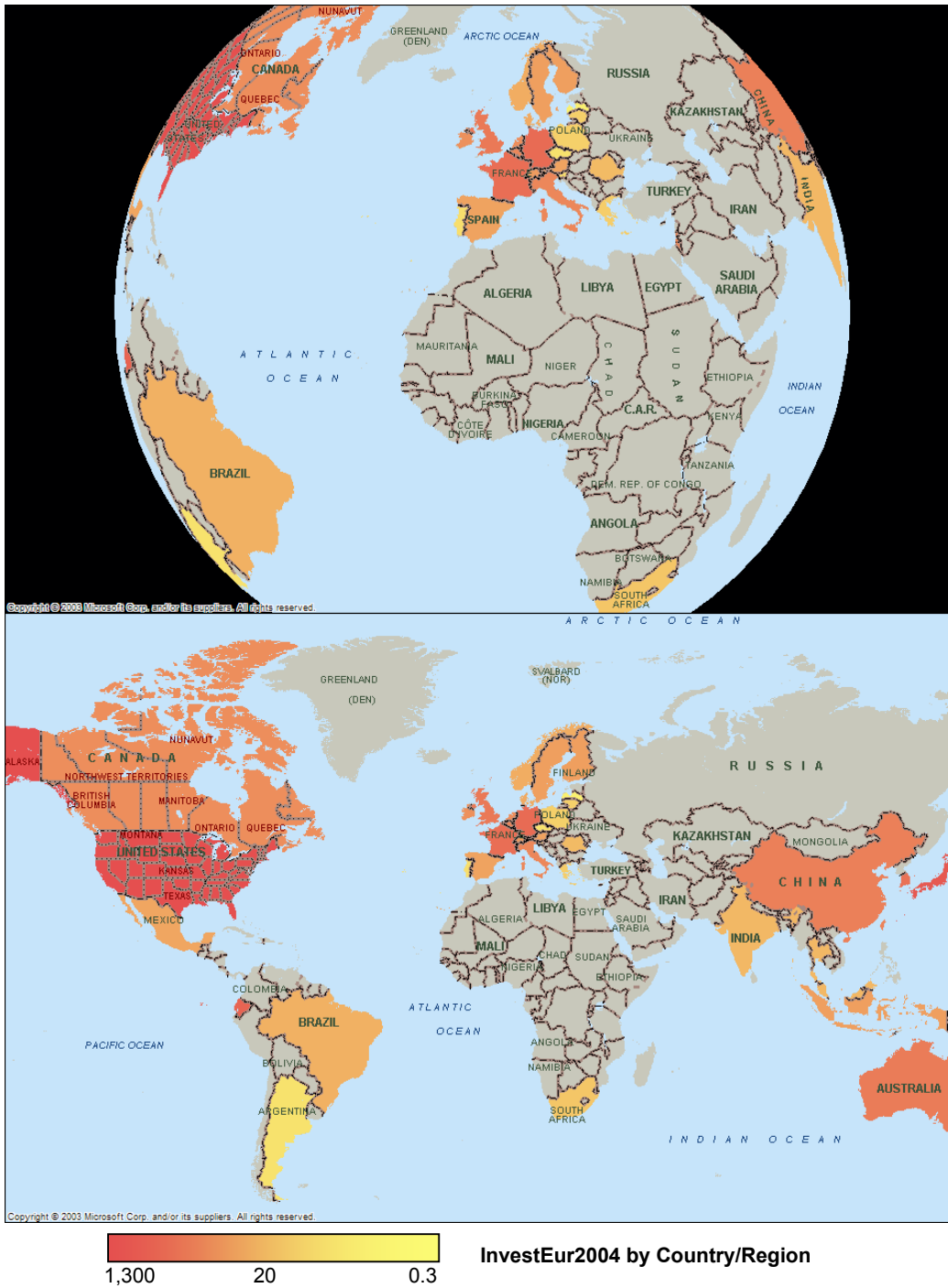


Figure A2: Absolute European public expenditure in 2004

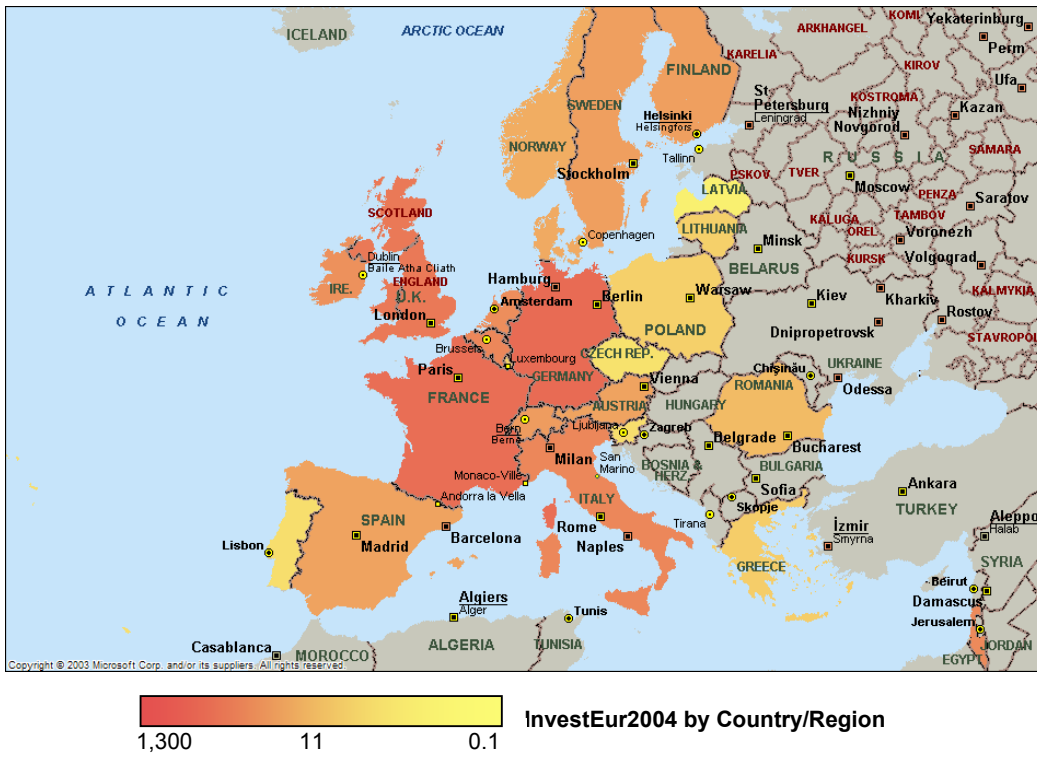


Figure A3: European per capita public expenditure in 2004

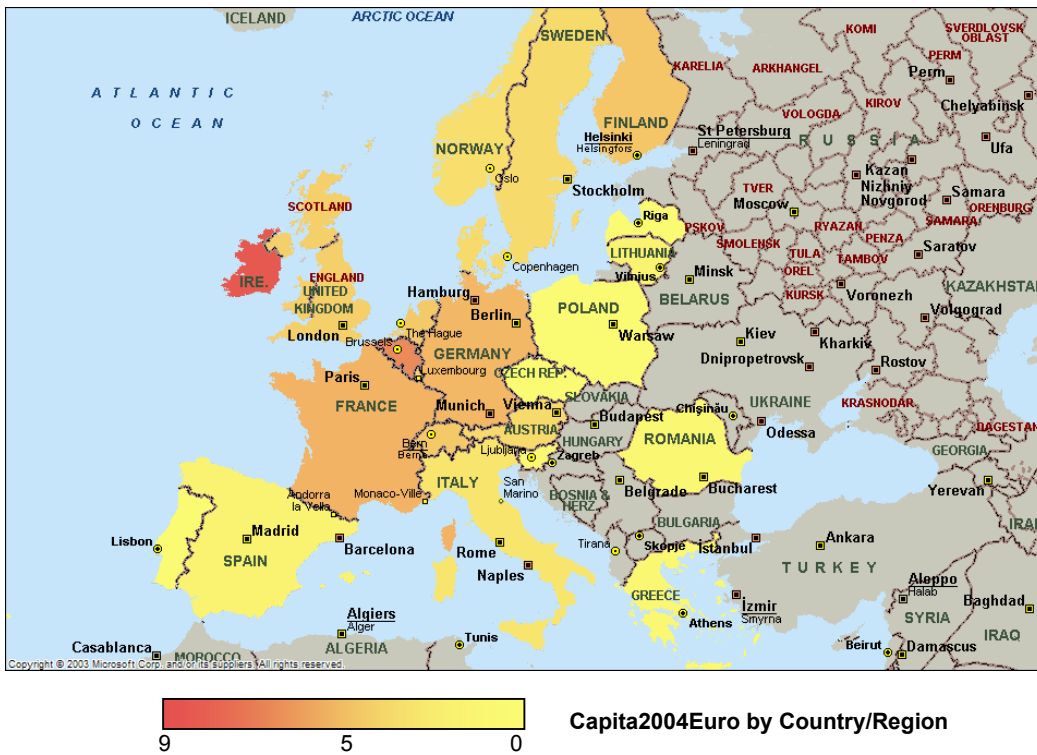


Figure A4: Absolute world public expenditure in 2004

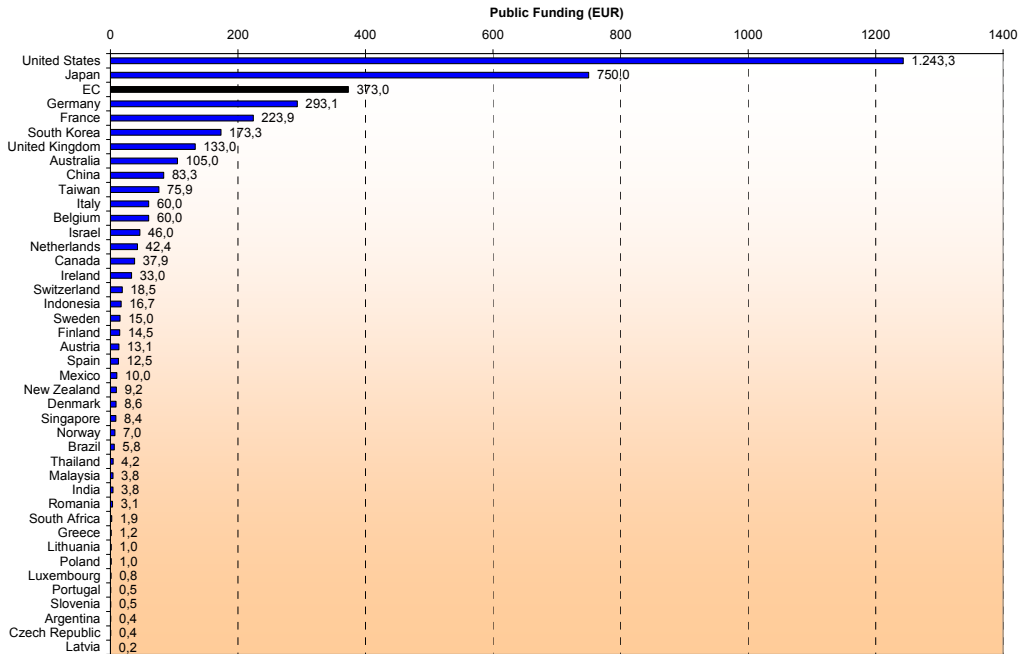


Figure A5: World per capita public expenditure in 2004

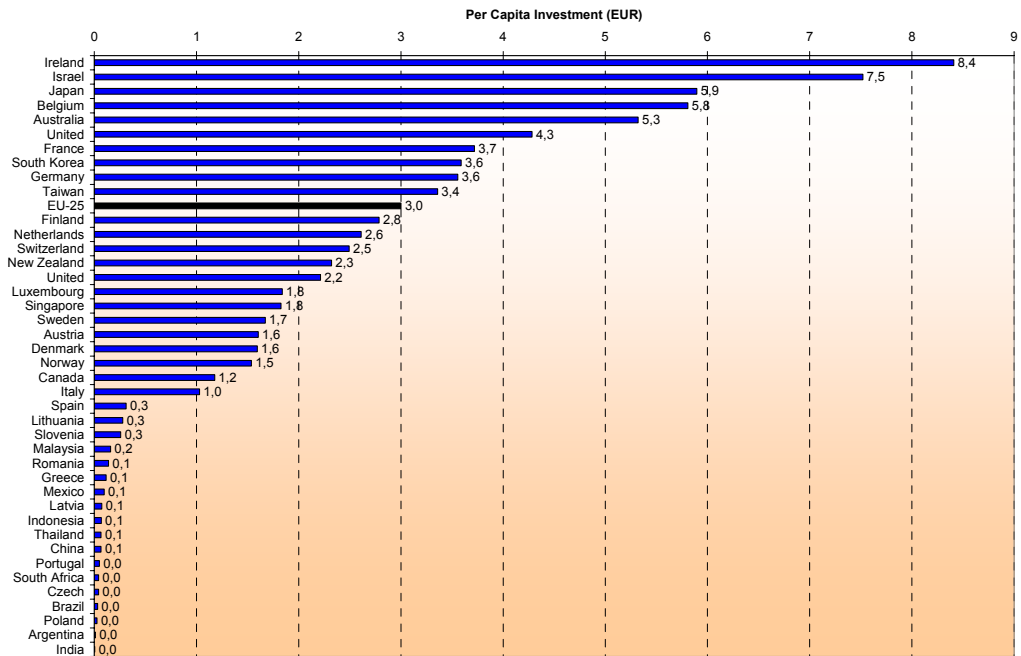


Figure A6: EU absolute public expenditure in 2004

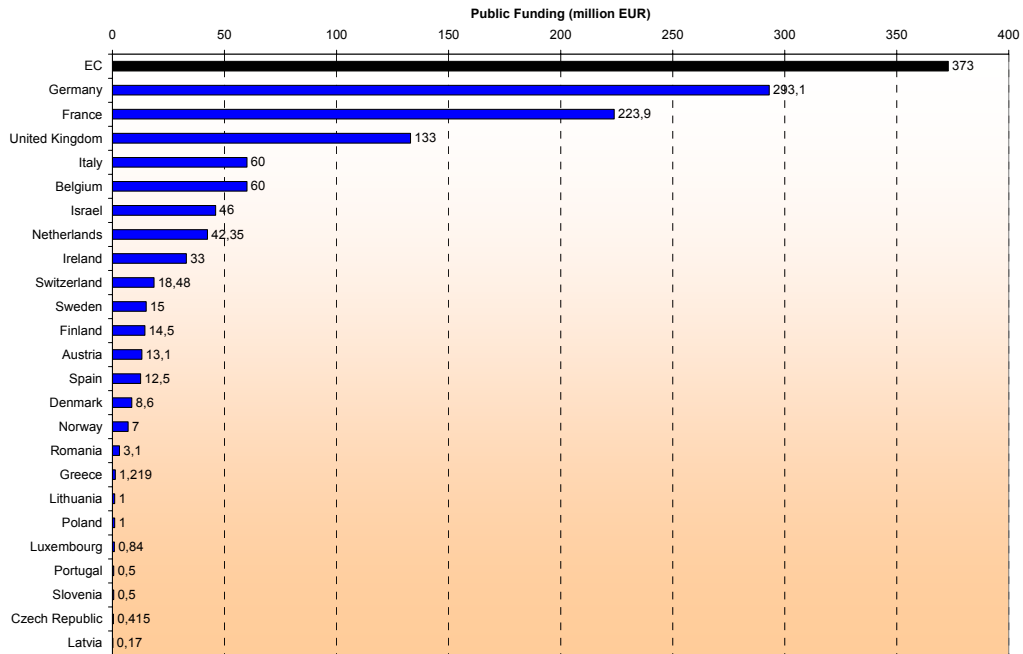
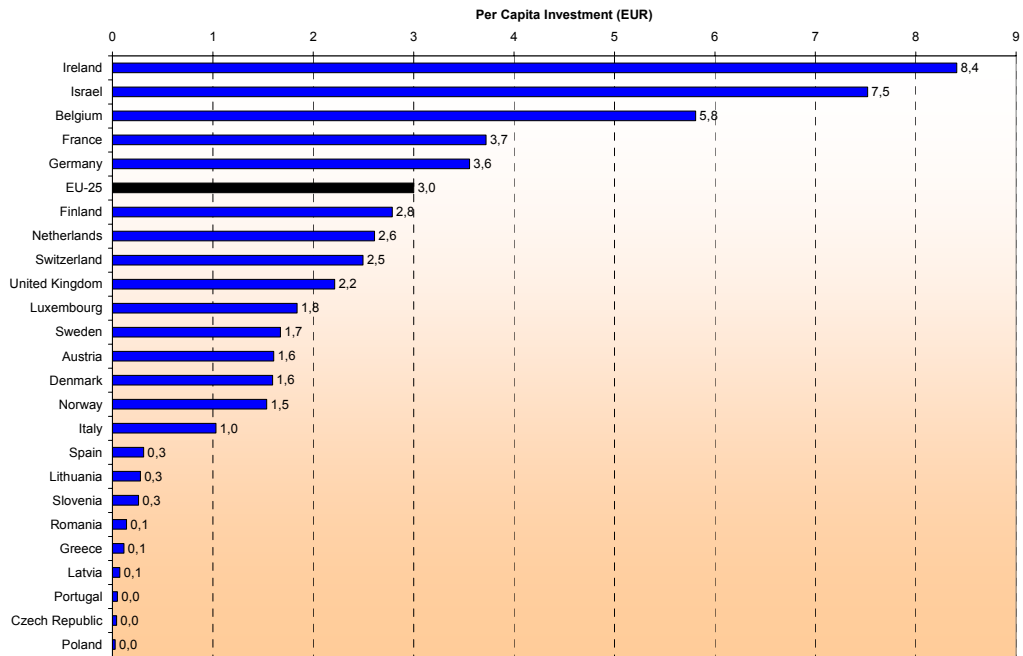


Figure A7: EU per capita public expenditure in 2004



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