



CAREERS OF DOCTORATE HOLDERS: DEVELOPING THE STATISTICAL EVIDENCE

Laudeline Auriol (OECD)

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Doctoral Graduates**

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Outline of the presentation

- Why track careers of doctoral graduates?
- The Careers of Doctorate Holders Project (CDH) vs. other relevant surveys
- Results of the latest data collection
- Conclusions and prospects



Why track careers of doctoral graduates?

- Massive expansion of higher education (HE) leading to increased number of postgraduate students and doctorate awards
- Internationalisation of HE and research systems leading to competition for talents and recognition of doctorate as the reference degree for research careers
- Change in research system organisation with more limited number of tenured positions and less linear careers
- Bottlenecks at the early research career stage with increased number of postdoc and temporary contracts
- Diversification of doctoral graduate careers with increased numbers in business and non research jobs
- Aging of the HE and research labour force
- Increased number of women but not across all disciplines and positions
- Changes in the skill mix requested on the labour market
- ...

But limited statistical evidence...



Typology of international data sources

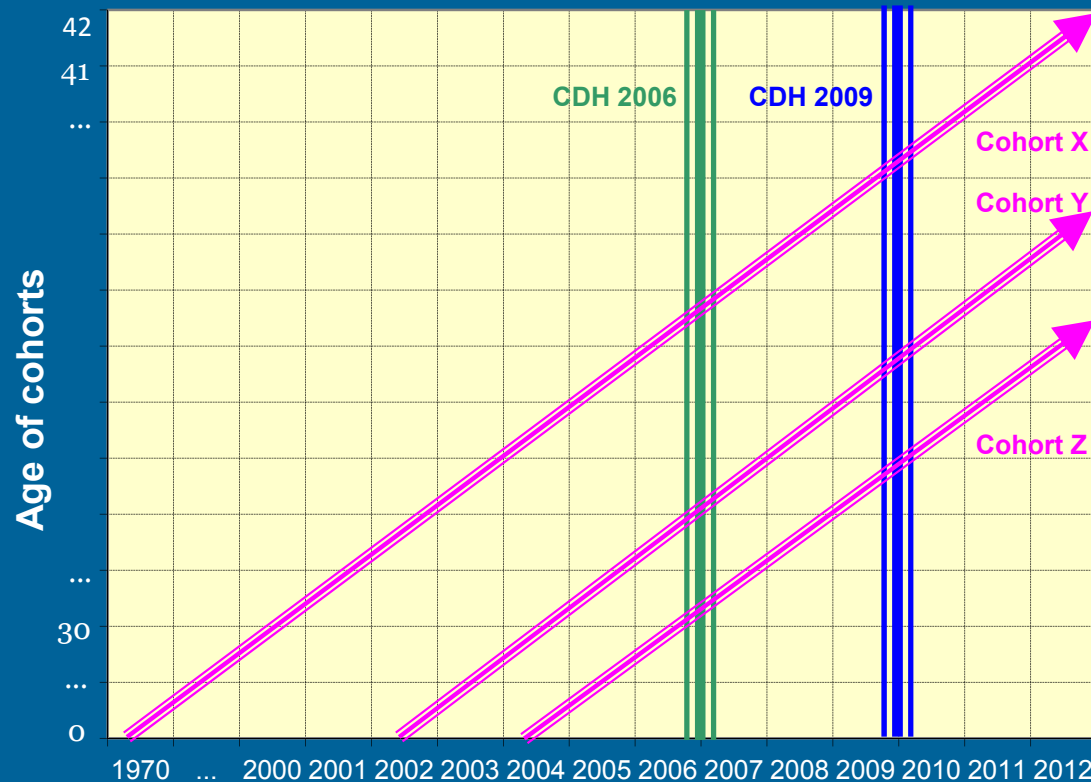
	Coverage of doctoral population	Size of doctoral population	Type of relevant information	Other remarks
Mainstream household and population surveys Censuses Labour force surveys ...	Full Full	Good Limited	Limited Limited	Unfrequent; doctorate not always identified Doctorate not always separately identified
Careers of Doctorate Holders surveys	Good	Good	Good	
Graduate surveys US National Science Foundation surveys <i>Survey of Doctorate Recipients</i> <i>Survey of Earned Doctorates</i> ... Japan <i>Survey of Recent Doctoral Graduates</i> United kingdom <i>Destinations of Leavers from Higher Education (DLHE)</i> <i>Longitudinal DLHE (L DLHE)</i> France <i>'Génération' surveys</i> ...	Good Early career Early career Early career Early career Early career	Good Good Good Good Good Good	Good Good Good Good Good Good	 Limited international comparability Limited international comparability Limited international comparability Limited international comparability
Administrative sources Nordic type population registers Social security registers Migrant information ...	Good Good Good	Good Good Good	Limited Limited Limited	 Doctorate not always separately identified Doctorate not always separately identified

Source: OECD Secretariat.



Survey type and target population

Evolution of cohorts in time



While early destination surveys cover selected cohorts only, CDH captures all cohorts at a certain point in time: it is a cross-sectional retrospective survey.



Why a cross-sectional retrospective survey?

- Basic contextual data missing on the total number of doctorate holders and structure of the doctoral population in certain countries
- In others, possibility to draw from already existing data sources (censuses, registers) to get these numbers and/or constitute a sample to be surveyed
- All career stages are of interest (e.g. for mobility measurement)
- Possibility to look at aging
- Need to compare with other labour force data and populations of interest



The Careers of Doctorate Holders (CDH) project

- A joint OECD/Eurostat/UNESCO project launched by the OECD Secretariat in 2004 to collect data on personal, educational, labour market, employment and mobility characteristics of doctorate holders and their perception and satisfaction with work
- Technical guidelines, including a model questionnaire, developed by an expert group of statisticians, but varied data sources allowed
- The target population is all doctorate holders aged 70 years and below who reside on the national territory
- One pilot in 2005 and two large scale data collections in 2007 and 2010 covering 25 countries (2 to 2 1/2 million doctorate holders)
- Several analytical working papers, technical guidelines and indicators available on www.oecd.org/sti/cdh
- The project was in 2011-2012 funded as part of the EU FP 7 *KnowINNO* activities and involved a first exploitation of micro data coupled with analysis from early destination surveys → more detailed results for around 10 countries on early career, job-to-to job and international mobility



Survey infrastructure for Careers of Doctorate Holders

GRADUATE SURVEYS		OTHER DATA SOURCES
	<p>Early destination surveys</p> <p>↓</p> <p>Recent graduates</p>	<p>All graduates (including recent)</p>
Doctoral graduates	<p>(Canada)</p> <p>Japan</p>	<p>(Argentina) Croatia Iceland Malta Russia Turkey (Austria) (Cyprus) Israel Netherlan Serbia <u>CDH dedicated surveys:</u> Belgium (Czech Rep. Korea Poland (Slovak Rep.) Bulgaria (Estonia) Latvia Portugal Slovenia Chile Hungary Lithuania Romania Spain</p>
All graduates (includes doctoral graduates)	<p>France</p> <p>Switzerland</p> <p>United-Kingdom</p>	<p><u>Other graduate surveys</u></p> <p>Germany</p> <p>United States</p>
		<p>All graduates</p> <p>CDH ↔</p> <p><u>Administrative source</u> Chinese Taipei</p> <p><u>Register data</u> Denmark + Finland Norway + Sweden</p> <p><u>Labour force surveys</u> Germany Switzerland</p> <p><u>Censuses</u> Australia Canada United States</p>

Note: For the CDH dedicated surveys, the list of countries relates to those that have conducted a survey in 2010, those in parentheses conducted a survey in a preceding year while those in bold have conducted or will conduct a survey after 2010. Among those countries producing data from registers, Denmark (marked with '+') has also used a complementary survey in 2007 to report additional variables to those from registers and Norway plans to do so for the future data collection.

Footnote by Turkey:

The information in this document with reference to « Cyprus » relates to the southern part of the Island. There is no single authority representing both Turkish and Greek Cypriot people on the Island. Turkey recognizes the Turkish Republic of Northern Cyprus (TRNC). Until a lasting and equitable solution is found within the context of the United Nations, Turkey shall preserve its position concerning the "Cyprus issue".

Footnote by all the European Union Member States of the OECD and the European Commission

The Republic of Cyprus is recognised by all members of the United Nations with the exception of Turkey. The information in this document relates to the area under the effective control of the Government of the Republic of Cyprus.



Limitations of CDH surveys

- Difficulty to build and maintain registers of doctorate holders
- Diversity of the data sources used
- Difficulty to cover non-citizens and those having received their doctorate abroad
- In some cases, difficulty to cover those inactive, unemployed or having received their degree a long time ago



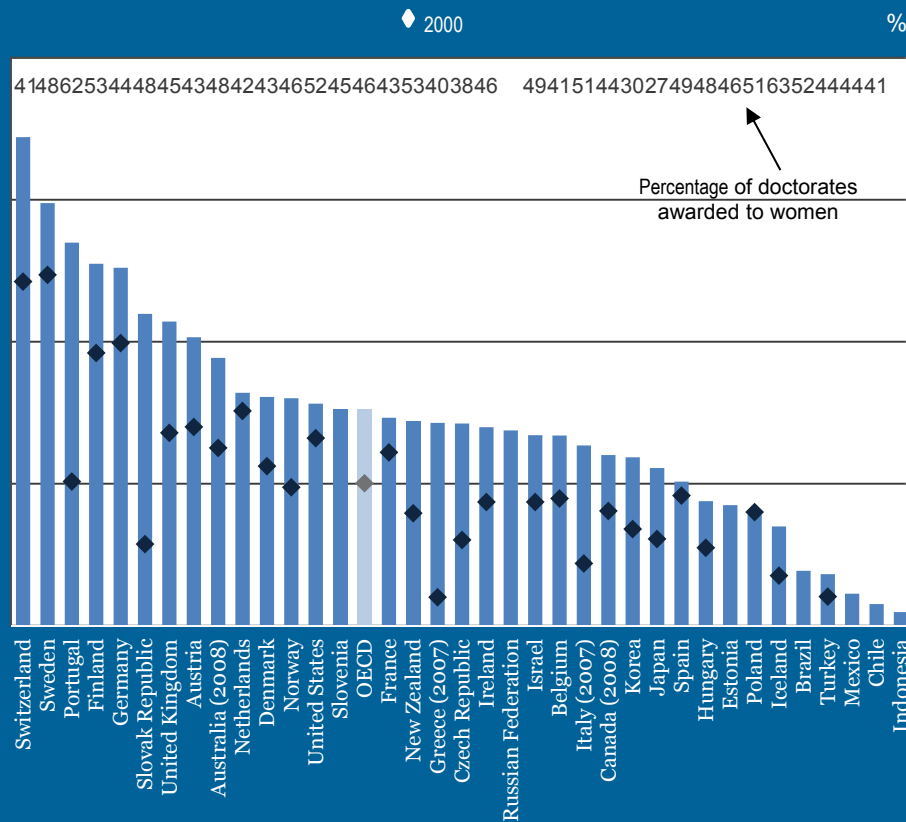
Results from the latest data collection

- Results from the second large scale CDH data collection conducted in 2010 for 25 countries.
- In addition to the analysis of aggregate indicators , a co-ordinated analysis of micro data from dedicated CDH surveys was undertaken.
- Expert teams from ten governmental agencies and research institutions have collaborated with the OECD to carry out econometric analyses on the factors that shape the labour market experience and performance of doctorate holders .
- Special effort to define common populations of doctorate holders among surveys of university graduates in France, Japan and the United Kingdom, and subsamples within CDH surveys carried out in other countries.
- The OECD secretariat also carried out a comparative analysis of microdata on doctorate holders and individuals holding other postgraduate qualifications for the United States and the United Kingdom.

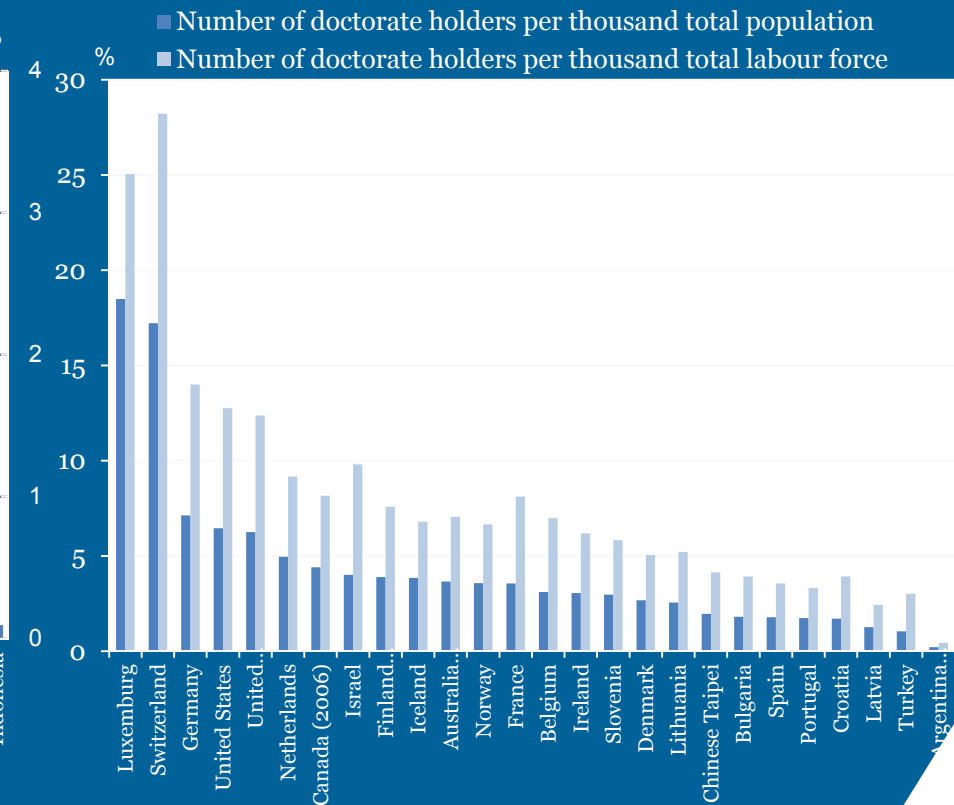


The supply of new graduates has increased raising the share of doctorates in the population

Graduation rates at doctoral level 2000 and 2009
As a percentage of population in reference age cohort



The relative importance of doctorate holders in the population
2009 or most recent year, doctorates per thousand



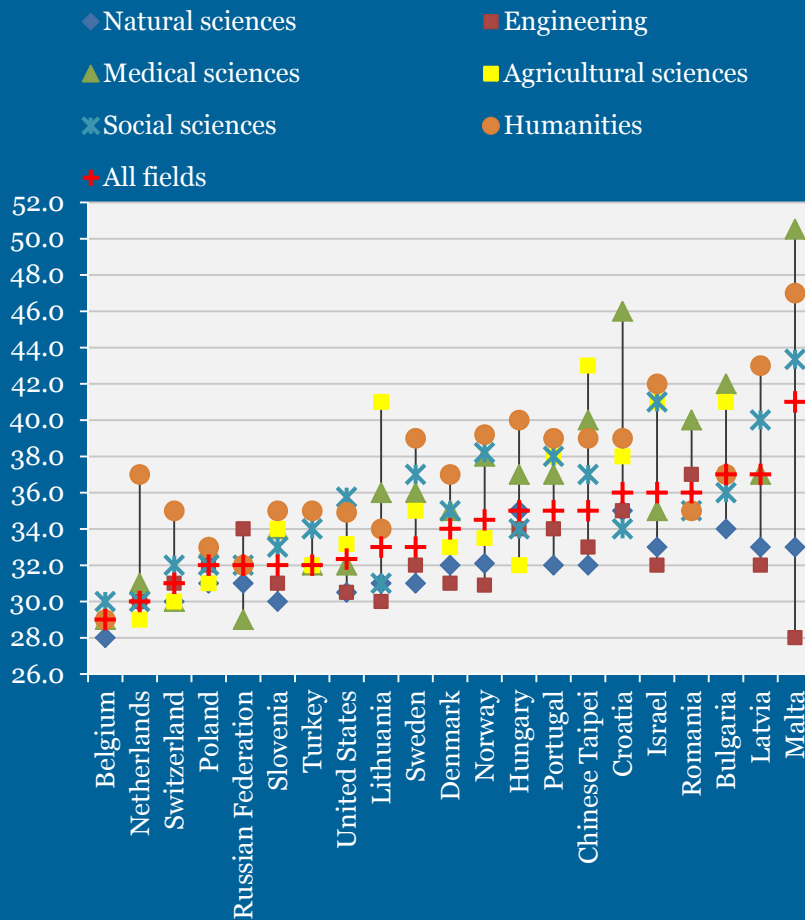
Source: OECD, based on OECD/UNESCO Institute for Statistics/Eurostat data collection on careers of doctorate holders 2010; OECD Main science and technology indicators, OECD Education attainment database, Education at a Glance Indicators 2009 and 2011, US Census Bureau (ACS, 2009).

Notes: Data for the Netherlands and Spain refer to graduation years 1990 onwards. For Spain, there is limited coverage of individuals who graduated over the years 2007 to 2009. Data for Chinese Taipei only include those doctorates in National Profiles of Human Resources in Science and Technology (NPHRST) made by STPI, NARL, Chinese Taipei.

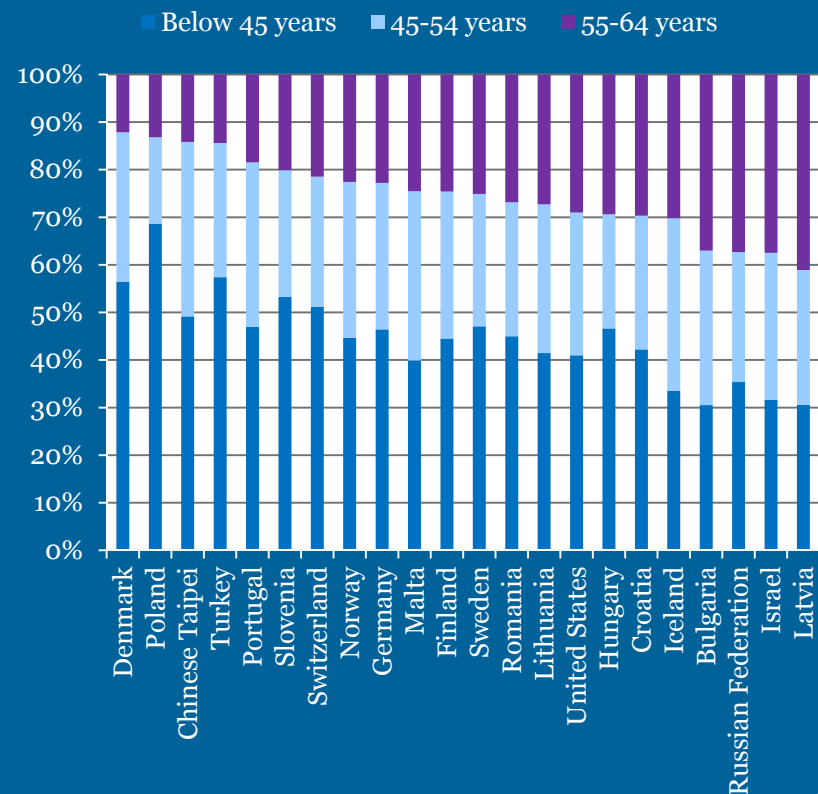


Doctorate holders arrive late on the labour market

Median age at graduation of recent doctorate holders



Age breakdown of doctorate holders, 2009

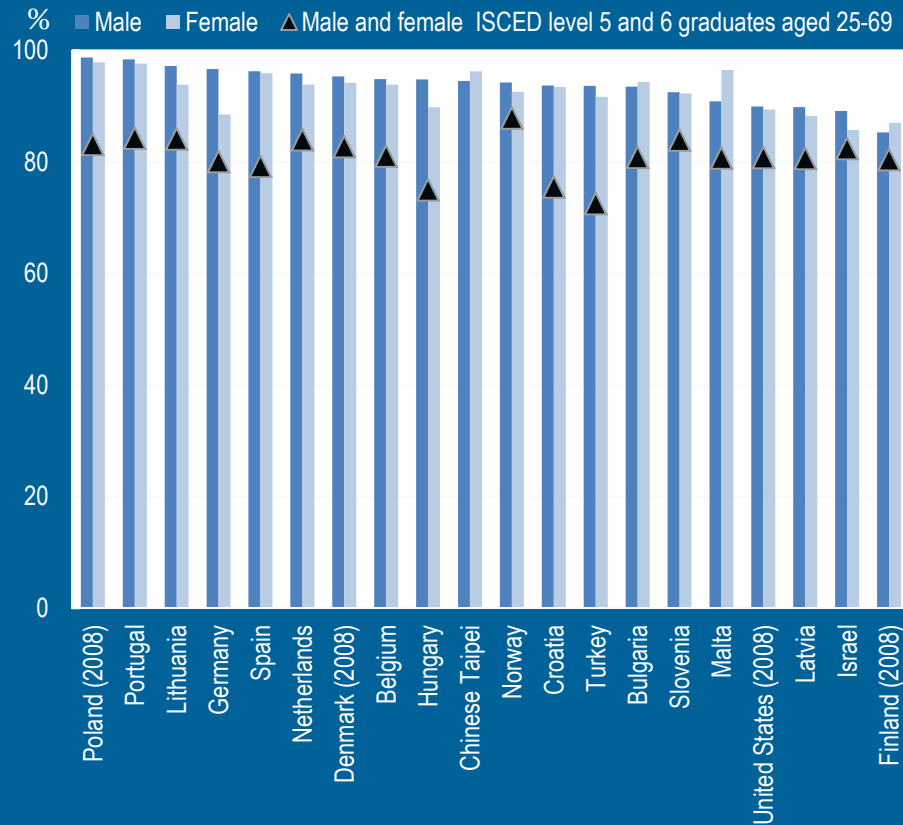


Source: OECD, OECD/UNESCO Institute for Statistics/Eurostat data collection on careers of doctorate holders 2010.



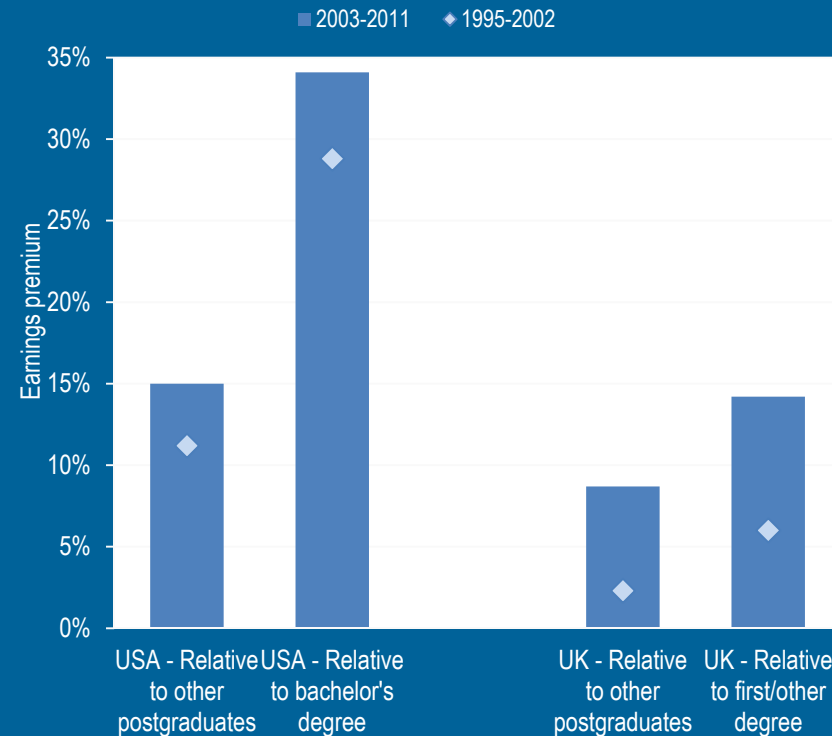
High demand for doctorates as revealed by employment and earnings 'premium'

Employment rate of doctorate holders by gender, 2009
As a percentage of total doctorate holders



Notes: Data for Belgium, Germany, Hungary, the Netherlands and Spain refer to graduation years 1990 onwards. *For Belgium and Malta, data for the 65-69 age class include doctorate holders aged 70 years and above. For Spain, there is limited coverage of doctorate holders for the years 2007 to 2009. Data for Chinese Taipei only include those PhD in National Profiles of Human Resources in Science and Technology made by STPI, NARL, Chinese Taipei: <http://hrst.stpi.narl.org.tw/index.htm#noticeChinese>. Data for Turkey exclude foreign citizens. For the United States, data exclude doctorate holders who received their degree abroad and who received a doctorate in humanities.
Source: OECD, based on OECD/UNESCO Institute for Statistics/Eurostat data collection on careers of doctorate holders 2010; Eurostat 2012; Education at a Glance 2012.

Doctorate wage premium in the United States and the United Kingdom
Estimated differences in log hourly earnings

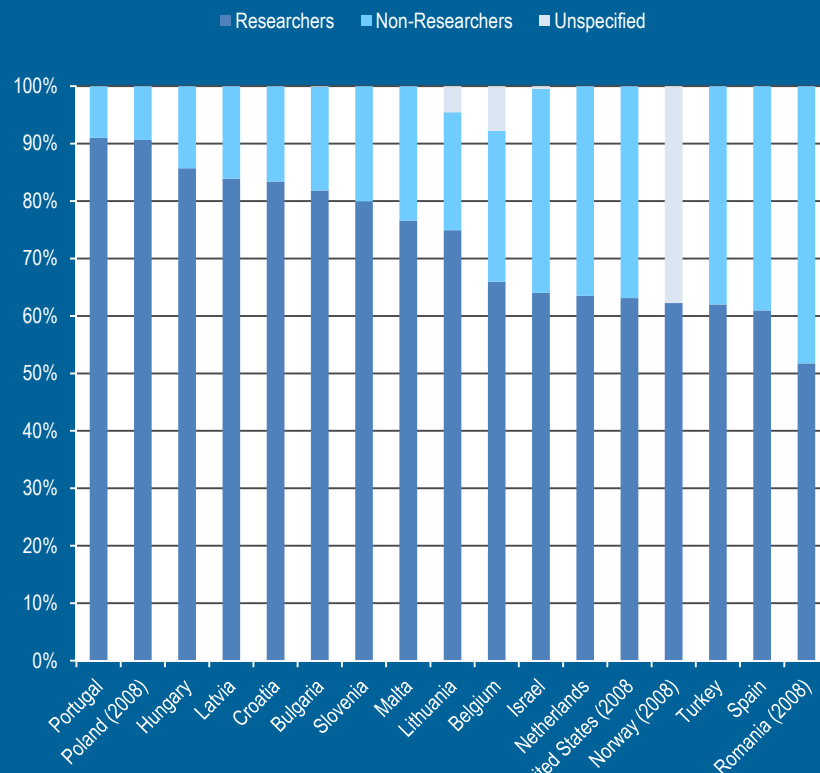


Notes: Based on ordinary least square regressions of log hourly earnings, controlling for other personal and job characteristics.
Source: OECD calculations based on the US Current Population Survey and the UK Labour Force Survey.

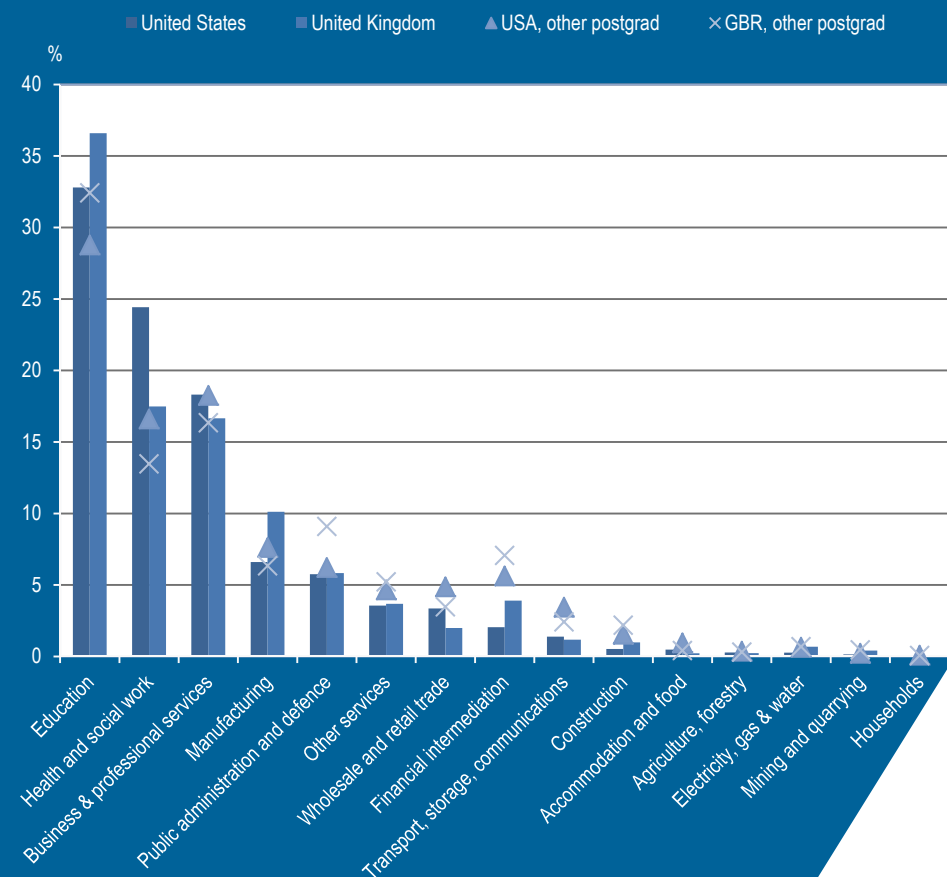


Higher education and academic careers are the main destination of doctorates but demand is apparent in other knowledge intensive sectors

Doctorates employed as researchers As a percentage of employed doctorate holders



The sector of economic activity for UK and US doctorates, 2003-2011 As a proportion of total doctorates or “other postgraduate” qualification group



Notes: Data for Belgium, Hungary, the Netherlands and Spain refer to graduation years 1990 onwards. For Belgium, Malta and the Russian Federation, data for the 65-69 age class include doctorate holders aged 70 years and above. For Spain, there is limited coverage of doctorate holders for the years 2007 to 2009. Data for Turkey exclude foreign citizens. For the United States, data exclude doctorate holders who received their degree abroad and who received a doctorate in humanities.

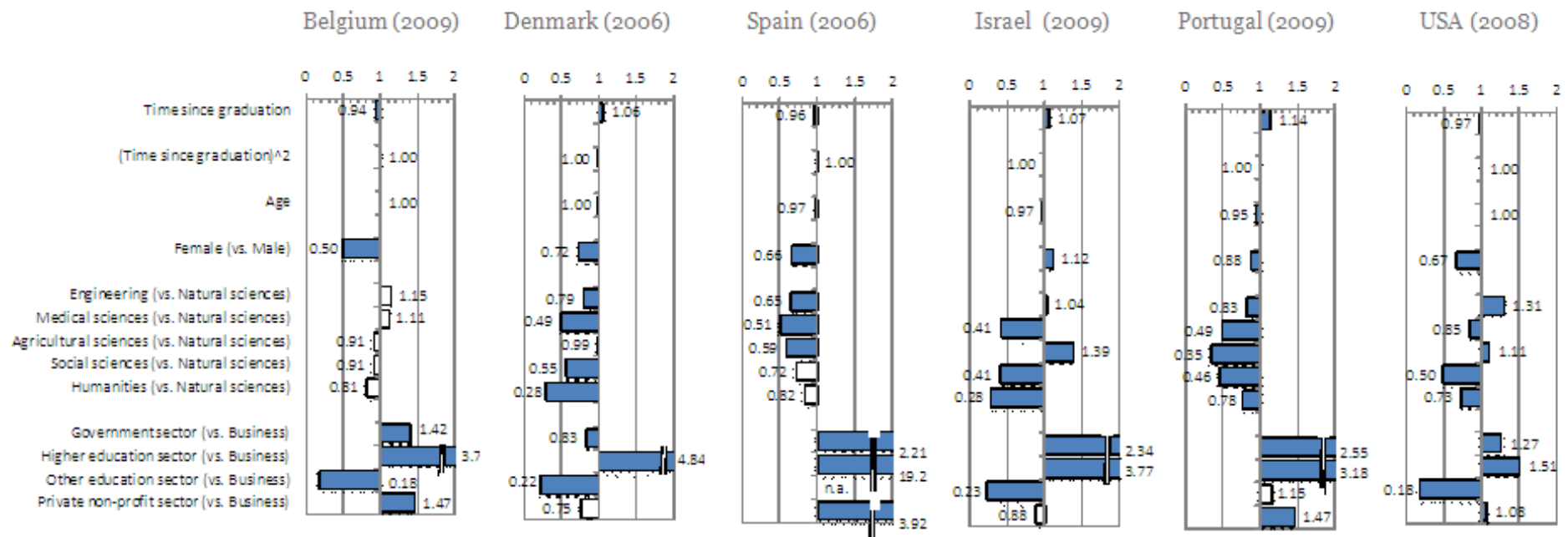
Source: OECD, based on OECD/UNESCO Institute for Statistics/Eurostat data collection on careers of doctorate holders 2010.

Source: OECD, estimates based on US Current Population Study and UK Labour Force Survey micro-data.



Certain categories of doctorates are more likely to work as researchers

Factors determining the probability of working as a researcher Odds ratios



Notes:

* The odds ratios from logistic regression analysis are shown and illustrate the odds of corresponding group of being a researcher relative to those of reference group, controlling for the other variables. For instance, for Belgium, the odds of being a researcher among doctorates employed in the higher education sector are 3.7 times higher than for those employed in the business sector.

* Filled boxes correspond to estimates that are statistically significantly different from one, with p-values less than 5 percent.

* For the United States, most individuals specialised in humanities are outside the scope of the survey.

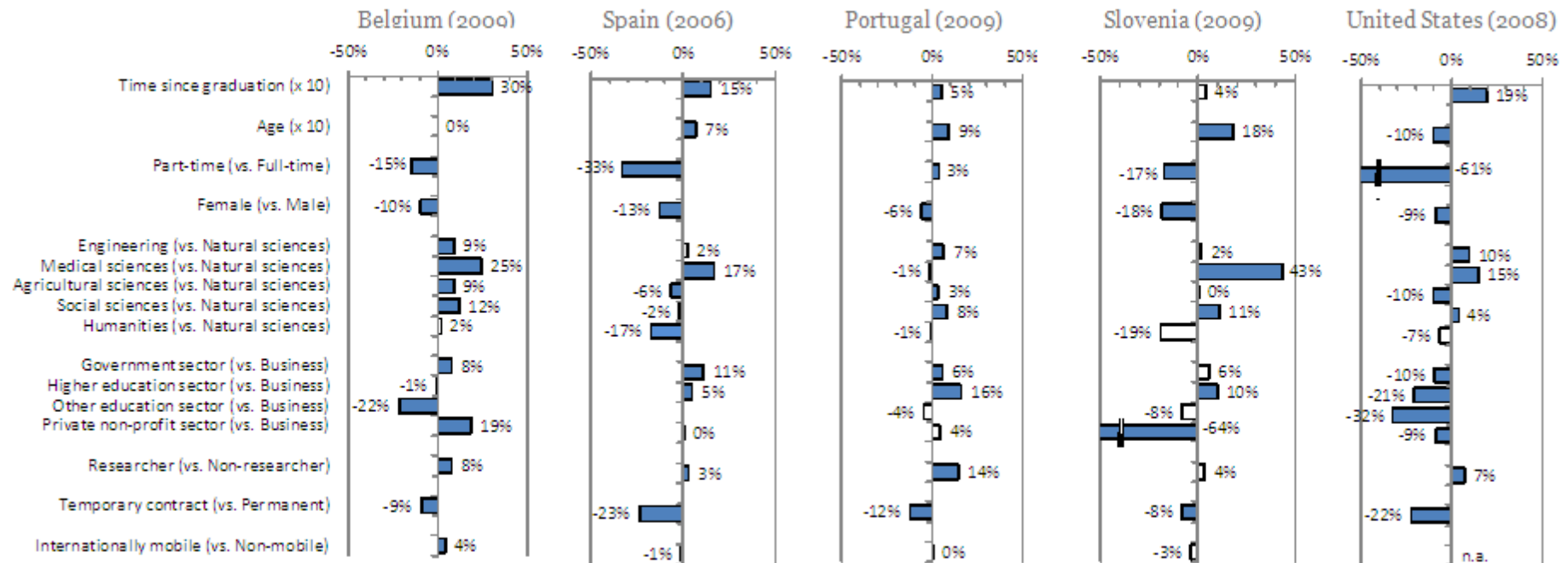
Source: OECD, based on ad hoc analysis of CDH micro data, October 2012.



Earnings vary across countries, gender, research premia, experience, sector pay, field of study, part time and temporary work...

Differences in annual earnings

Estimated coefficients from regressions of log earnings (i.e. percentage differences)



Notes:

* Results based on ordinary least square regressions of log annual earnings on individual and job characteristics.

* Filled boxes correspond to statistically significant estimates with p-values less than 0.05.

* For the United States, most of those specialised in humanities are outside the scope of the survey.

Source: OECD, based on an analysis of CDH micro data, November 2012.



Job perception and satisfaction

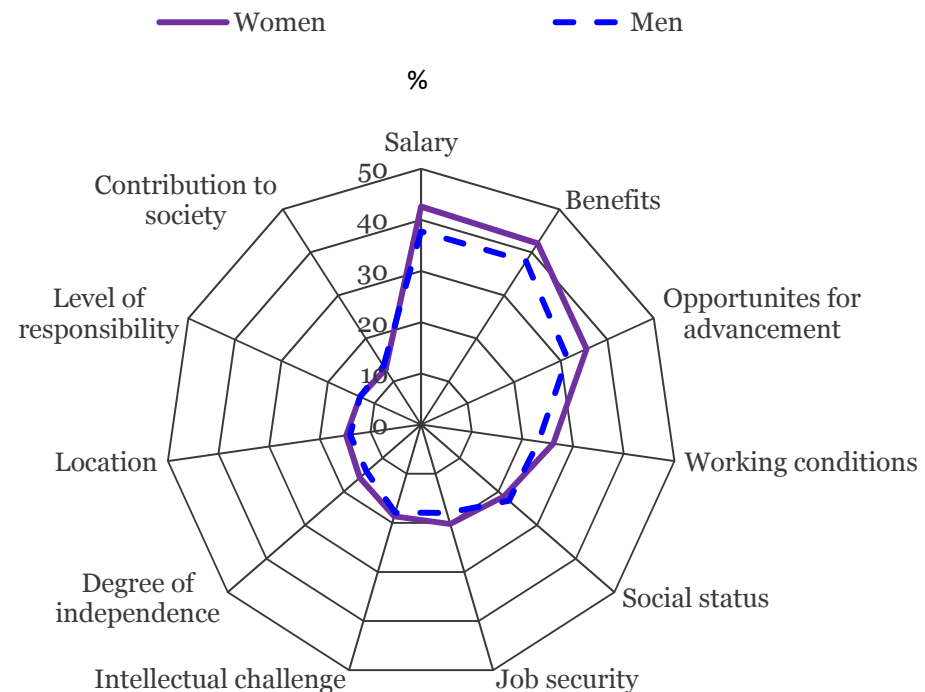
The share of doctorates employed in jobs related to their doctoral degree varies greatly across countries. In Belgium, Spain, the Netherlands and Latvia, between 15% and 30% of doctoral graduates consider their job not related to their field of specialisation.

The share of doctorates employed in jobs that are related to their degrees is higher for the younger cohorts in nearly half of the countries .

Overall, doctorate holders are satisfied with their employment situation, but less so with their salaries and benefits.

Satisfaction levels intellectual challenges and with opportunities for advancement are remarkably higher for those working as researchers.

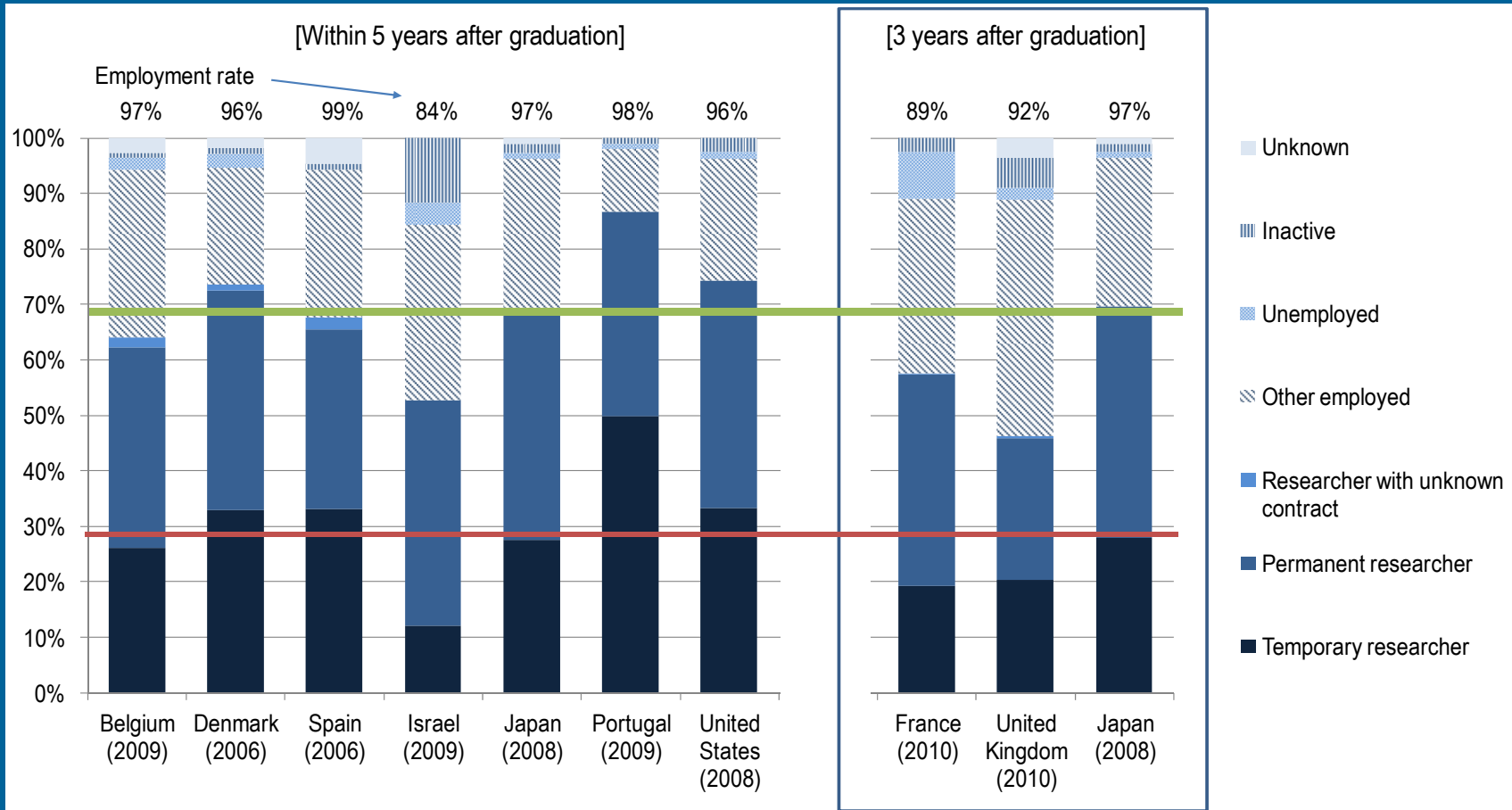
Percentage of DH dissatisfied with their employment situation, by reason of dissatisfaction, 2009



Source: OECD, OECD/UNESCO Institute for Statistics/Eurostat data collection on careers of doctorate holders 2010.



Employment status of recent doctoral graduates

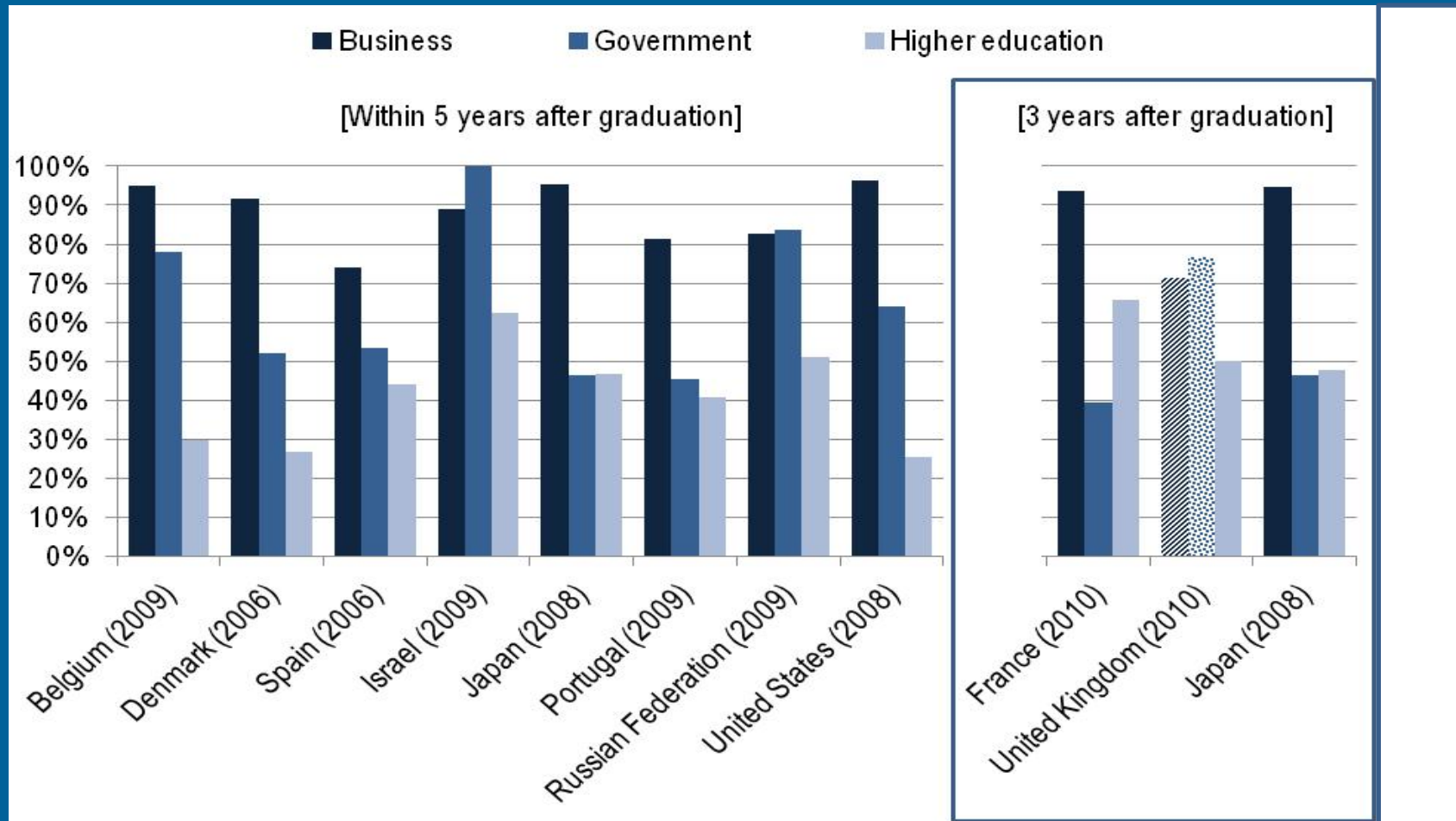


Notes:

- Only doctorate holders who obtained an advanced degree from the reporting country are considered for better comparability.
- * "Other employed" includes those with unknown research status.
- For France, only those graduates aged 35 years old or less were surveyed.
- For Japan, some higher education teaching personnel such as part-time lectures are also classified as researchers.
- Non-EU domiciled students are outside the scope of the survey for the United Kingdom. The research status was derived using a combination of information on employment sector and occupation and is not exactly the same as the Frascati definition.



The incidence of permanent contracts among recent doctoral graduates engaged in research



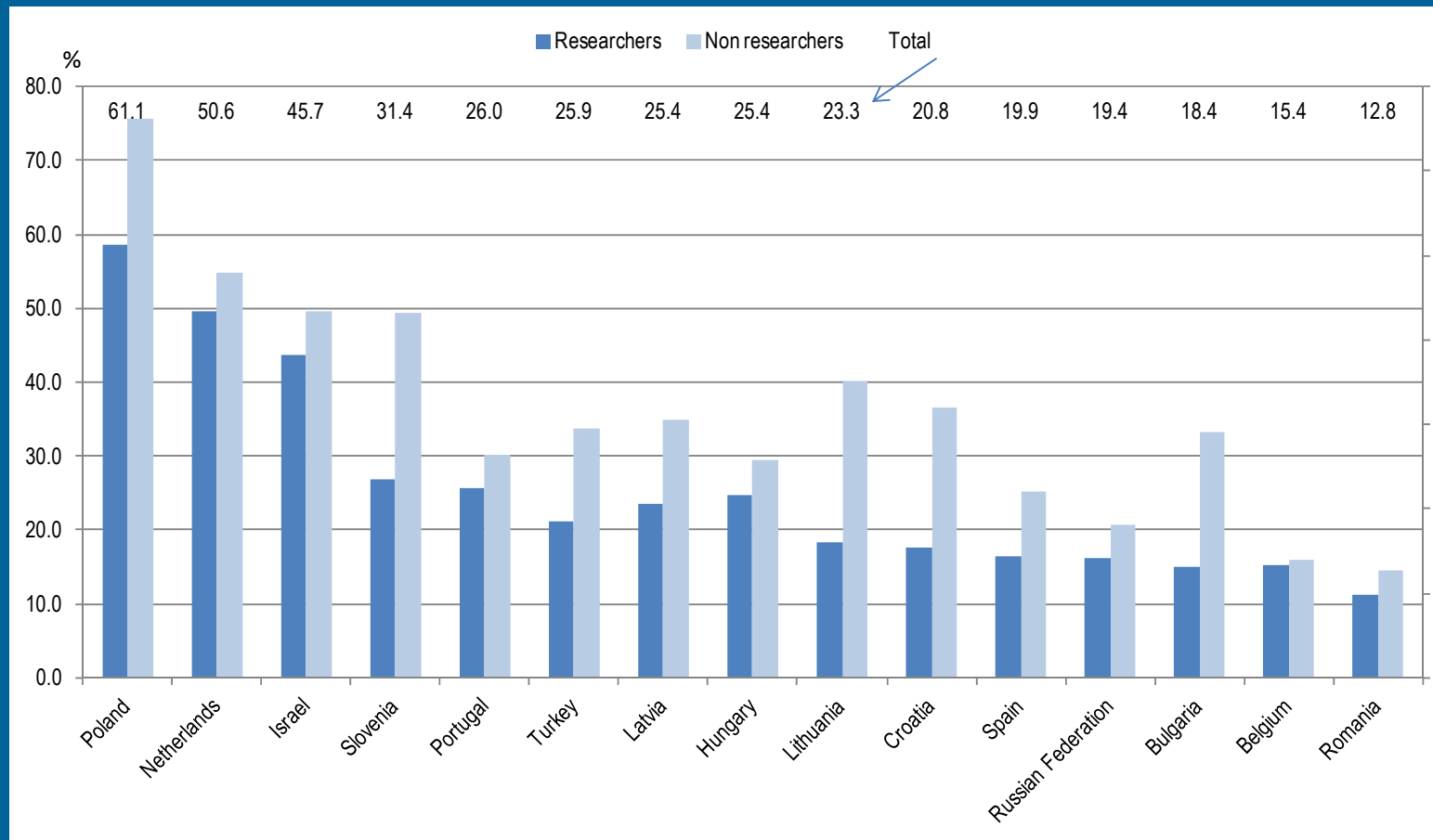
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- For France, only those graduates aged 35 years old or less were surveyed.
- For Japan, some higher education teaching personnel such as part-time lectures are also classified as researchers.
- Non-EU domiciled students are outside the scope of the survey for the United Kingdom. "Business" combines 'Finance business and IT', 'Manufacturing', 'R&D' and 'Other sectors'. "Government" corresponds to 'Health and social work' and 'public administration and defense'.



Doctorate holders who work as researchers are found to have been less mobile than their counterparts who do other types of jobs

The job mobility of doctorate holders
Percentage of doctorate holders who changed jobs in the last 10 years, 2009

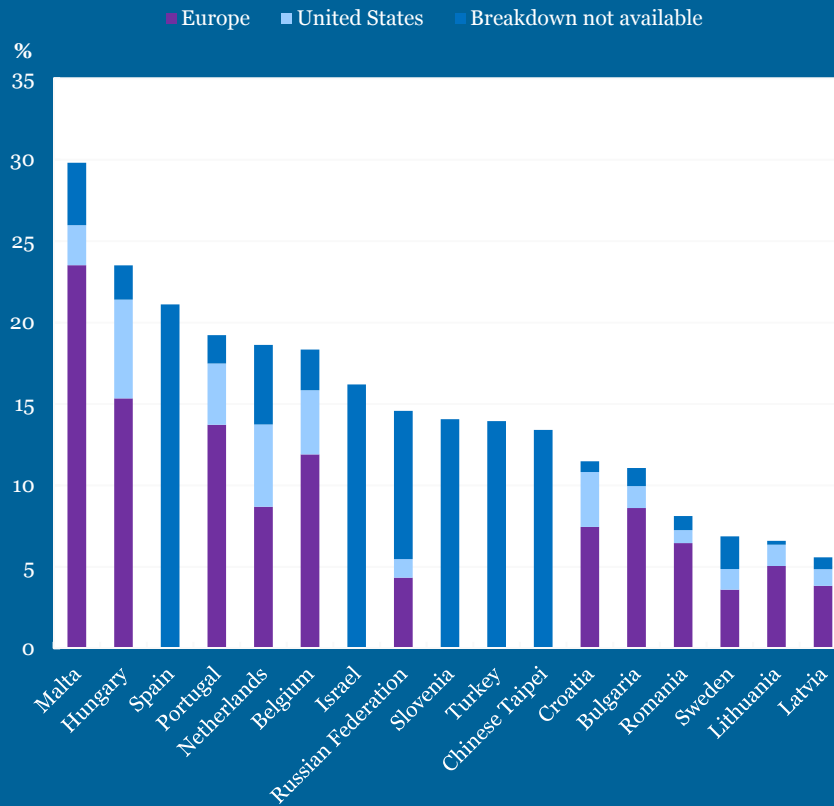


Notes: Data for Belgium, Germany, Hungary, the Netherlands and Spain refer to graduation years 1990 onwards. For the Russian Federation, data relate only to those doctoral graduates employed as researchers and teachers. For Spain, there is limited coverage of individuals who graduated between 2007 and 2009. Data for Turkey exclude foreign citizens.
Source: OECD, based on OECD/UNESCO Institute for Statistics/Eurostat data collection on careers of doctorate holders 2010.

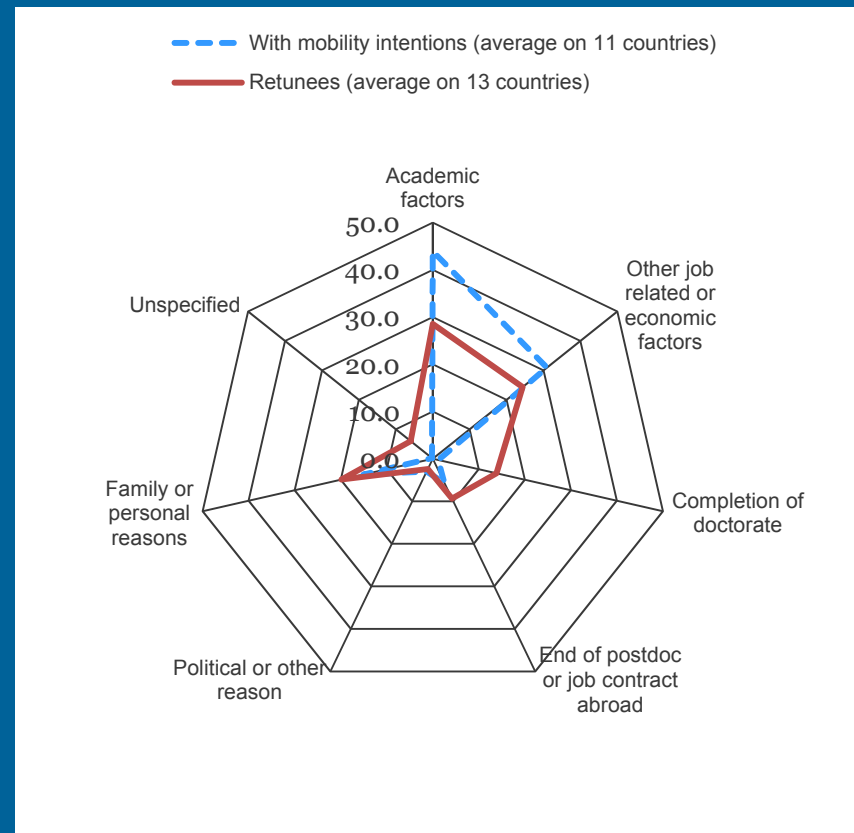


International mobility of doctorate holders

Percentage of national citizens with a doctorate having lived/stayed abroad in the past ten years, 2009



Reasons for going abroad or for returning to the home country, 2009





Conclusions and prospects

- This analysis showcase the potential of CDH data to inform policy questions, notably through the use of micro-data based econometric methods.
- This makes a strong case for improving researchers' access to data on doctorate holders with a view to promoting the coordinated use of micro-data across countries and conduct more in-depth analyses.
- Early destination surveys constitute important complementary data sources to look at the early stage of the career and developments should aim at harmonizing the questions and variables collected with those of CDH.
- The CDH initiative is continuously evolving and the revised methodological guidelines and model questionnaire include proposals for capturing new information such as competencies and skills.



Thank you!

Laudeline.auriol@oecd.org

www.oecd.org/sti/cdh