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**SUPER MoRRI – Scientific understanding and provision of an
enhanced and robust monitoring system for RRI**

D2.2: 1st Responsible Research and Innovation Monitoring Report

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List of Acronyms and Abbreviations

Table 1 Acronyms and abbreviations

Acronyms/Abbreviations	Definition
CCN	Country Correspondent Network
EU	European Union
GDP	Gross Domestic Product
GERD	Gross domestic Expenditure on Research and Development
R&D	Research & Development
RFO	Research Funding Organisation
RPO	Research Performing Organisation
RRI	Responsible Research and Innovation
SwafS	Science with and for Society



Executive Summary

The “Scientific understanding and provision of an enhanced and robust monitoring system for RRI” (SUPER MoRRI) project contributes to monitoring Responsible Research and Innovation (RRI). Over the project duration, three monitoring reports will be delivered. The report at hand (Deliverable 2.2) is the first in this small series.

In this 1st RRI Monitoring Report, a total of 26 indicators / metrics are presented. These are drawn from secondary data sources including Eurostat, She Figures, Web of Science and Unpaywall, and Eurobarometers. The majority of these were also included in the basket of indicators produced by the MoRRI project, which is the predecessor of SUPER MoRRI. These indicators relate particularly to the key RRI areas of gender equality and open access in the context of research and innovation, and report metrics at the national level. A small selection of metrics concerning the broader national research and innovation system has been added. Finally, in preparation for the 2nd RRI Monitoring Report, a number of time-series items from Eurobarometer surveys on public perceptions and engagement with science is included.

The successive monitoring reports, scheduled for April 2022 and August 2023, will convey the indicators / metrics resulting from the SUPER MoRRI empirical programme for primary data collection.



1 INTRODUCTION

1.1 Scope and Objectives of the Deliverable

The “Scientific understanding and provision of an enhanced and robust monitoring system for RRI” (SUPER MoRRI) project contributes to monitoring Responsible Research and Innovation (RRI). Over the project duration, three monitoring reports will be delivered. The report at hand (Deliverable 2.2) is the first in this small series.

The principles underpinning the SUPER MoRRI monitoring framework are outlined in the project’s Strategic Development Plan (Woolley et al. 2020) and the overall plan for implementing data collection activities within the framework is provided in the project’s Implementation Plan (Mejlgaard et al. 2020). Closely connected, the Case Study Co-creation Methodology Report (Wicher et al. 2020) presents targeted empirical research efforts supporting the development of appropriate indicators for RRI. These three documents collectively provide the background for SUPER MoRRI monitoring activities.

The SUPER MoRRI monitoring framework utilises existing resources and data and will also create new information from primary data collected as part of the project. It combines qualitative and quantitative approaches and covers different levels of the research and innovation system, including individuals, organisations, and countries. Through inclusion of stakeholders in co-creation processes, it aspires to ensure that any proposed indicators emerging from the project are relevant, credibly contextualised, and responsibly conveyed. The SUPER MoRRI monitoring framework strives for transparency and FAIR data sharing, and employs openly accessible research protocols for each component of the primary data collection.

Figure 1 presents a revised version of the main components of the SUPER MoRRI Implementation Plan. In light of the COVID-19 pandemic, the timing of these components have been adjusted.

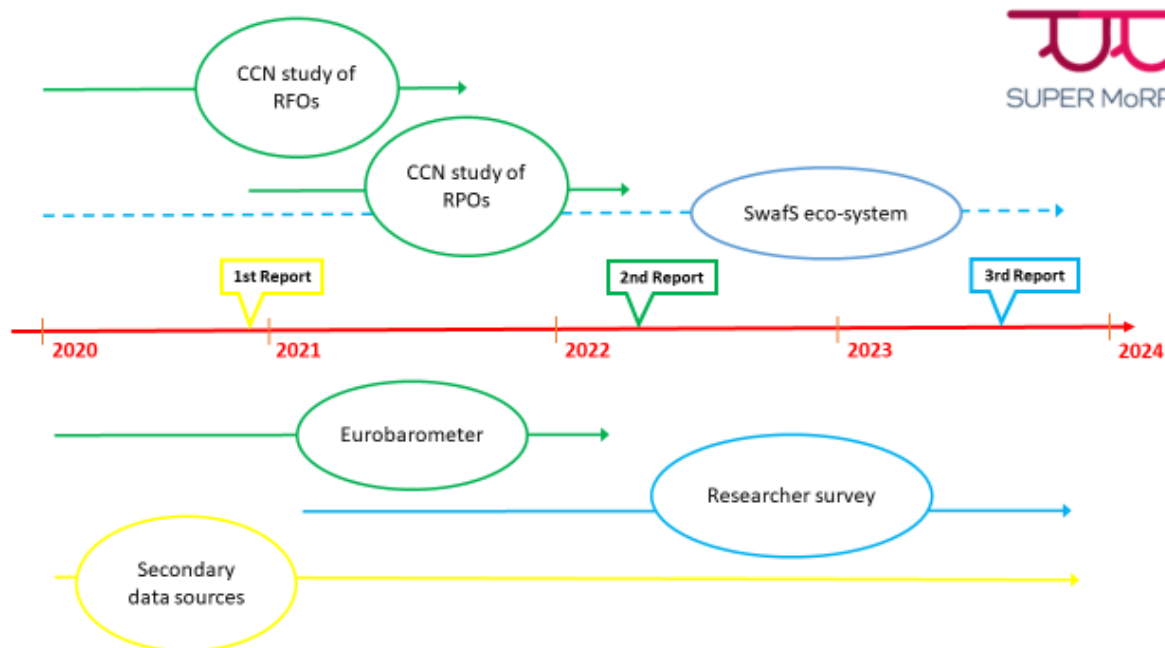


Figure 1 Revised timing of main data collection vehicles

The color-coding of Figure 1 illustrates the sequential inclusion of data from the empirical components of the Implementation Plan in the successive monitoring reports. The 1st RRI Monitoring Report (at hand, marked in yellow in the figure) includes only secondary data. It should be noted that all indicators / metrics presented here are reported at the country level. The 1st RRI Monitoring Report covers EU28 (mirroring the EU composition at the time of the most recent data points included in the report) along with Norway, which has been included with an eye to the coverage also of Norwegian RPOs and RFOs in the later stages of the SUPER MoRRI empirical programme.

The 2nd RRI Monitoring Report (green, to be delivered in April 2022) will be significantly more comprehensive, covering the results generated by two large-scale studies, of research funding organisations (RFOs) and research performing organisations (RPOs), conducted by the SUPER MoRRI Country Correspondent Network (CCN). It will also include results from a new Eurobarometer on public perceptions of research and innovation to be carried out under the auspices of the European Commission in spring 2021. Some of the items included in the 2021 Eurobarometer extend existing time-series from previous Eurobarometers. For example, items capturing citizens' level of interest in and informedness about science have been repeated in Eurobarometers from 1992 onwards. For convenience and preparation, we include these time-series in the report at hand (1st RRI Monitoring Report) and will update these with the inclusion of 2021 data points in the 2nd RRI Monitoring Report.

Finally the 3rd RRI Monitoring Report (blue, to be delivered in August 2023) will include results from a large-scale survey study about researchers' practices and perceptions in relation to RRI and it will present data and potential indicators generated as part of the project's ongoing interaction with the 'eco-system' of RRI-related projects funded under the European Union's Horizon 2020 'Science with and for Society' programme.



1.2 Relation to Other Tasks and Deliverables

The 1st RRI Monitoring Report is the first direct output relating to Tasks 2.5 (data collection) and 2.6 (basic analyses, data presentation, and transmission) in Work Package (WP) 2, as delineated by the SUPER MoRRI Grant Agreement. The contents of the report at hand were significantly informed by Tasks 1.2 (critical assessment of existing MoRRI indicators) and 1.8 (definition of continuing MoRRI indicator set) in WP 1. In turn, the data presented in this report will be transferred to the SUPER MoRRI dashboard developed in WP3, thus linking to Task 3.4 (technological platform development and deployment).

1.3 Deliverable Structure

This 1st RRI Monitoring Report is structured as follows:

The **Executive Summary** briefly presents the purpose and contents of this report.

Chapter 1 introduces the scope and objectives of the deliverable, its relation to other tasks within the project, and its structure.

Chapter 2 presents the secondary data collected as part of the early monitoring efforts of the project. The chapter is divided into two sections, one which presents data describing general aspects of the national research and innovation system, and one which presents data related to key areas of RRI.

References lists bibliographical references used in the report.



2 INDICATORS BASED ON SECONDARY DATA

The selection of indicators / metrics presented in this report is based on critical assessment of the basket of 42 indicators developed by the MoRRI project (see working paper appended to Woolley et al. 2020). MoRRI was the predecessor of the current SUPER MoRRI project. MoRRI produced a set of indicators based on the key RRI areas delineated by the European Commission (Peter et al. 2018). The MoRRI indicators were based in part on original data and in part on cherry-picking of relevant indicators from other sources.

The critical review of MoRRI indicators scrutinized content-, technical-, and external validity, relevance, and feasibility of the MoRRI indicator set. A limited set of MoRRI indicators were considered valid, relevant, and feasible in their original shape. These include indicators of gender equality (share of female researchers across sectors; Dissimilarity Index, glass ceiling index, gender wage gap, and share of female authors) and open access (share of open access publications). This set of indicators is included in this report and will be retained for inclusion in the SUPER MoRRI monitoring framework. A larger set of MoRRI indicators were considered possible candidates for inclusion contingent on modifications in terms of, for example, data collection method or indicator construction. This set of indicators is not included in this report but may re-emerge in new versions in other parts of the SUPER MoRRI empirical programme. For example, while MoRRI captured stakeholder and citizen inclusion in the funding decisions of RFOs using a survey instrument, SUPER MoRRI will cover this topical area through a dedicated qualitative study performed by the CCN. We refer to Table 2 of the SUPER MoRRI Strategic Plan (Woolley et al 2020: 19) for an overview of the MoRRI indicators to be potentially transferred to the SUPER MoRRI monitoring framework pending modifications.

In this 1st RRI Monitoring Report, a total of 26 indicators / metrics is presented. These are drawn from secondary data sources including Eurostat, She Figures, Web of Science and Unpaywall, and previous Eurobarometers. The majority of these were also included in the MoRRI basket of indicators, covering particularly the key RRI areas of gender equality and open access in the context of research and innovation. A small selection of metrics concerning the broader national research and innovation system has been added. These cover national spending on research and development (R&D) and patent application statistics and will be helpful for contextualising later monitoring results. Finally, in preparation of the 2nd RRI Monitoring Report, a number of time-series items from Eurobarometer surveys on public perceptions and engagement with science is included. These indicate aggregated trajectories of citizen interest, efficacy, knowledge, trust, and engagement with science, and will be complemented by updated data points in the 2nd RRI Monitoring Report upon completion of the scheduled 2021 Eurobarometer.

It should be noted that the indicators / metrics from secondary sources presented in this report were not developed with RRI as the driving concept. Hence, caution is required when using such indicators for the purpose of monitoring RRI. The collection presented here provides only a partial picture of the state of play, which will be supplemented through targeted, primary data collection efforts. Moreover, all indicators / metrics presented here come with technical limitations, data gaps, and other restrictions of applicability, which are outlined the data fiches. These should be considered carefully when interpreting the results. Table 2 shows the 26 indicators / metrics included in this report.



Table 2 Overview of indicators / metrics covered in the report

Indicator title	Source	Included in MORRI
Intramural R&D expenditure per inhabitant in all sectors	Eurostat	No
Intramural R&D expenditure as a percentage of GDP in all sectors	Eurostat	No
Patent applications to the EPO by priority year per million inhabitants	Eurostat	No
Share of female researchers by sectors of performance (all sectors)	Eurostat	Yes
Share of female researchers by sectors of performance (business enterprise sector)	Eurostat	Yes
Share of female researchers by sectors of performance (higher education sector)	Eurostat	Yes
Share of female researchers by sectors of performance (government sector)	Eurostat	Yes
The Glass Ceiling Index	She Figures	Yes
Dissimilarity Index (higher education sector)	She Figures	Yes
Dissimilarity Index (government sector)	She Figures	Yes
Gender pay gap (%) in the economic activity 'Scientific research & development'	She Figures	Yes
Percentage of a country's publications with a sex or gender dimension in their research content	She Figures	Yes
Women to men ratio of inventorships, all International Patent Classification (IPC) sections	She Figures	Yes
Women to men ratio of corresponding authorship in all fields of R&D	She Figures	Yes
Percentage of open access publications	WoS and Unpaywall	Yes
Percentage of open access publications (Green)	WoS and Unpaywall	Yes
Percentage of open access publications (Gold)	WoS and Unpaywall	Yes
Percentage of open access publications (Hybrid)	WoS and Unpaywall	Yes
Percentage of open access publications (Bronze)	WoS and Unpaywall	Yes
Percentage of publications classified as industry co-publications	WoS and Unpaywall	No



Indicator title	Source	Included in MORRI
Percentage of the EU-public interested in scientific discoveries	Eurobarometer	No
Percentage of the EU-public that feels informed about science	Eurobarometer	No
Percentage of correct science quiz answers in the EU-public	Eurobarometer	No
Percentage of the EU-public that believes that scientists are among the best qualified to explain the impact of scientific and technological developments	Eurobarometer	No
Percentage of the EU-public that attends public meetings or debates about science and technology	Eurobarometer	No
Percentage of the EU-public that sign petitions or join street demonstrations on science and technology matters	Eurobarometer	No

In the following, the 26 indicators / metrics are presented separately in two sections. The first section presents indicators / metrics describing general aspects of the national research and innovation system, and the second section presents indicators / metrics more closely related to key areas of RRI.

2.1 Metrics for contextualising Responsible Research and Innovation

The following metrics may provide a broad contextual understanding of the level of research and innovation activity across countries. They cover the level of national spending on R&D per inhabitant and as share of gross domestic product respectively, which may give an indication of the overall priority assigned to research and development in the national economy, and the number of patent applications filed to the European Patent Office per million inhabitants in a country, which can provide a very rough indication on trends in innovation activities at the national level.

2.1.1 Contextualisation using expenditure on research and innovation

2.1.1.1 Intramural R&D expenditure per inhabitant

Table 3 Intramural R&D expenditure per inhabitant

Metric/indicator	2.1.1.1 Intramural R&D expenditure (GERD) per inhabitant in all sectors [rd_e_gerdtot]
Source	Eurostat
	https://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=rd_e_gerdtot&lang=en



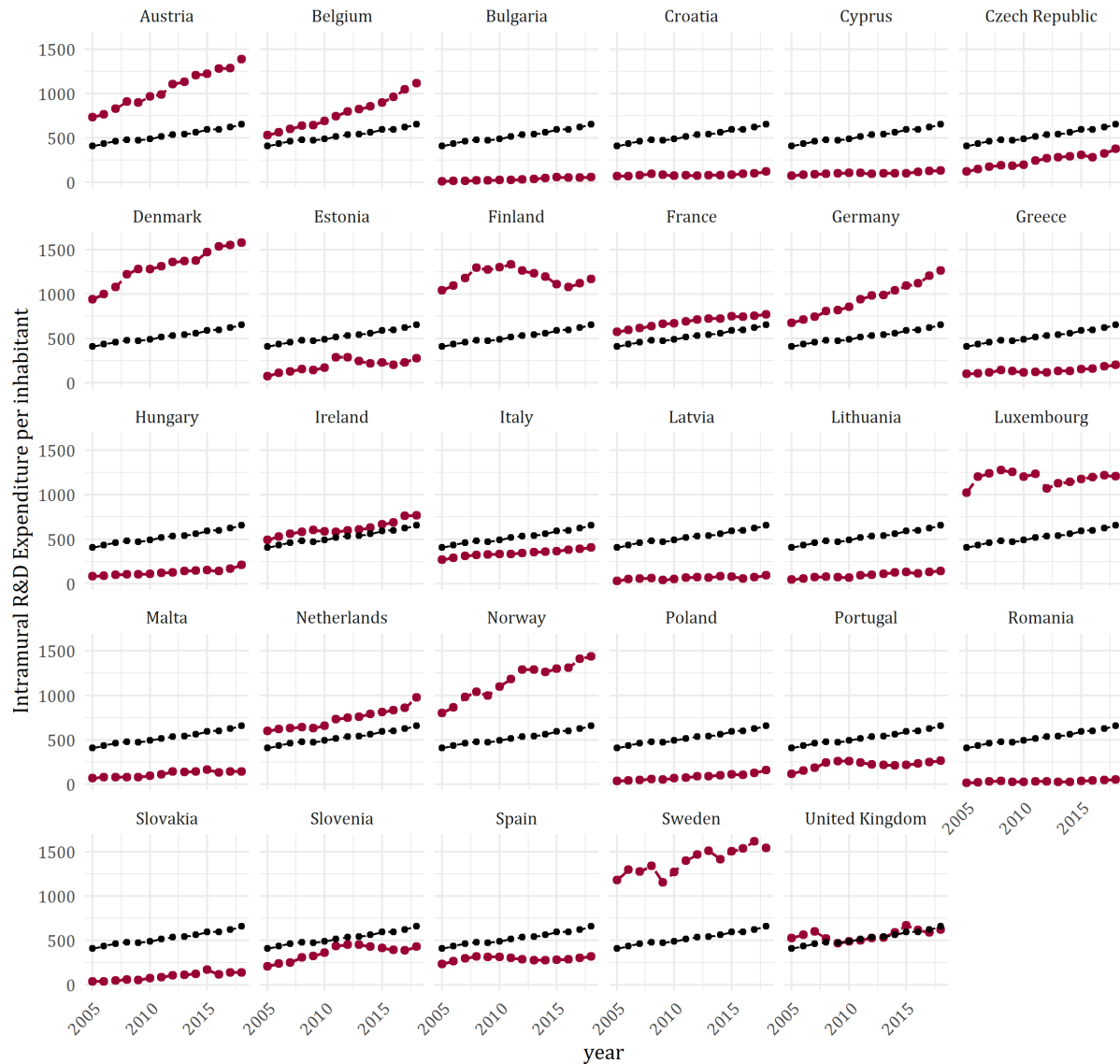
Metric/indicator	2.1.1.1 Intramural R&D expenditure (GERD) per inhabitant in all sectors [rd_e_gerdtot]
Source website and metadata	https://ec.europa.eu/eurostat/cache/metadata/en/rd_esms.htm
Source methodology	Member state gross domestic expenditure on research and development (GERD) divided by number of member state inhabitants (I). $GERD/I$ = Intramural R&D expenditure per inhabitant
Coverage	EU28+NO 2005-2017
Data Missing	No missing data
Flagged observations	Break in time series: DK (2007); EL (2008); FR (2010); IT (2016); LU (2012); NL (2011, 2012); PT (2008); RO (2011); SI (2008, 2011); SE (2005); UK (2011) Estimated: IE (2009-2014); EL (2006-2010); AT (2005, 2008, 2010, 2012, 2014); PT (2006); SE (2006, 2008, 2010, 2012, 2013, 2014); UK (2008-2010, 2012, 2014, 2016) Other: DK (2017); FR (2015, 2017); SE (2016); UK (2017)
Data comments	
Description	Current expenditures plus gross fixed expenditure for R&D performed in a country per inhabitant.
Extraction date	10-02-2020
Unit	Euro per inhabitant
Name in MoRRI	Not included in MoRRI
Important definitions	Intramural R&D expenditures are all current expenditures plus gross fixed expenditure for R&D performed within a statistical unit during a specific period, whatever the source of funds." (§ 4.10, Frascati Manual, OECD 2015). Countries provide basic compilations of national R&D statistics directly to Eurostat. Countries' data, including confidential data, are provided to Eurostat in basic unit national currency for R&D expenditures and in full-time equivalent (FTE) and in head count (HC) for R&D personnel. Derived indicators and aggregates are calculated by Eurostat on the basis of the collected data and other reference data from Eurobase.

Figure 3 depicts the Intramural R&D expenditure per inhabitant in all sectors for all 28 EU countries and Norway (EU28-NO) for the period 2005-2017.

The intramural R&D expenditure per inhabitant in the period from 2005 to 2018, measured in all sectors, has increased in all the included countries (EU28-NO). The EU average increased from 409€ in 2005 to 656,8€ in 2018. As depicted in Figure I below, this increase has varied from country to country. The largest increase was in Austria, from 735,2€ per inhabitant to 1388,1€ per inhabitant. The smallest increase was in Romania, from 15,3€ per inhabitant to 52,5€ per inhabitant. However, the relative



increase from 2005 to 2018 in Romania is one of the highest increases (more than threefold), only surpassed by other eastern European countries including Bulgaria, Estonia, Poland and Slovakia.



Coverage: EU28 & NO (2005-2017).
Black dashed line: Weighted average (EU28).

Figure 2 Intramural R&D expenditure per inhabitant in all sectors



2.1.1.2 Intramural R&D expenditure as a percentage of GDP

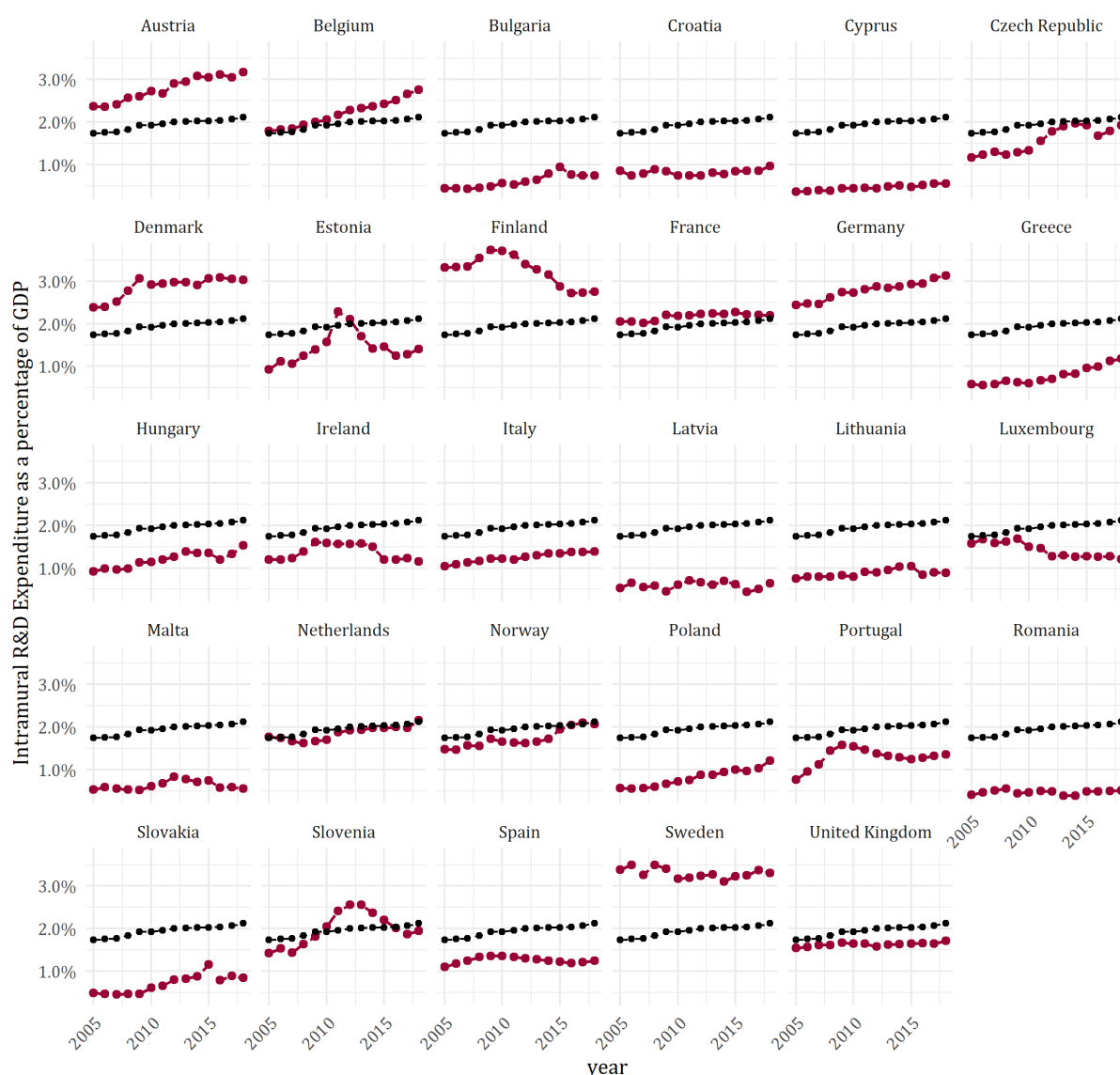
Table 4 Intramural R&D expenditure as a percentage of GDP

Metric/indicator	2.1.1.2 Intramural R&D expenditure (GERD) as a percentage of GDP in all sectors [rd_e_gerdtot]
Source	Eurostat
Source website and metadata	https://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=rd_e_gerdtot&lang=en https://ec.europa.eu/eurostat/cache/metadata/en/rd_esms.htm
Source methodology	Member state gross domestic expenditure on research and development (GERD) divided by member state gross domestic product (GDP). $GERD/GDP$ = Intramural R&D expenditure as a percentage of GDP
Coverage	EU28+NO 2005-2017
Data Missing	No missing data
Flagged observations	Break in time series: DK (2007); EL (2008); FR (2010); IT (2016); LU (2012); NL (2011, 2012); PT (2008); RO (2011); SI (2008, 2011); SE (2005); UK (2011) Estimated: IE (2009-2014); EL (2006-2010); AT (2005, 2008, 2010, 2012, 2014); PT (2006); SE (2006, 2008, 2010, 2012, 2013, 2014); UK (2008-2010, 2012, 2014, 2016) Other: DK (2017); FR (2015, 2017); SE (2016); UK (2017)
Data comments	
Description	Current expenditures plus gross fixed expenditure for R&D performed in a country as a percentage of GDP
Extraction date	10-02-2020
Unit	Percentage of GDP
Name in MoRRI	Not included in MoRRI
Important definitions	Intramural R&D expenditures are all current expenditures plus gross fixed expenditure for R&D performed within a statistical unit during a specific period, whatever the source of funds." (§ 4.10, Frascati Manual, OECD 2015). Countries provide basic compilations of national R&D statistics directly to Eurostat. Countries' data, including confidential data, are provided to Eurostat in basic unit national currency for R&D expenditures and in full-time equivalent (FTE) and in head count (HC) for R&D personnel. Derived indicators and aggregates are calculated by Eurostat on the basis of the collected data and other reference data from Eurobase.

Figure 3 depicts Intramural R&D expenditure as a percentage of GDP, by all performing sectors, for all countries (EU28-NO) for the period 2005-2017.



When relative intramural R&D expenditure is calculated as a percentage of GDP in the EU28-NO from 2005 to 2018, it can be seen that expenditure has not increased in all member states (Figure 3). This is the inverse of when the expenditure is calculated relative to number of inhabitants in EU member states. However, the overall expenditure as a percentage of GDP for the EU28-NO has increased from an average of 1,74% in 2005 to an average of 2,12% in 2018. The highest increase in intramural R&D expenditure relative to GDP was in Belgium, with an increase from 1,79% in 2005 to 2,76% in 2018. Relative expenditure in Finland contracted the most, from 3,32% of GDP in 2005 to 2,75% in 2018. Finland did, however, have the second highest relative intramural R&D expenditure in 2005 (3,32%), only 0,06% behind Sweden (3,38% of GDP). Overall, average expenditure on intramural R&D per inhabitant increased in all of the EU28-NO, while expenditure as a percentage of GDP also increased in all but countries except Ireland, Luxembourg, Finland and Sweden.



Coverage: EU28 & NO (2005-2017).
Black dashed line: Weighted average (EU28).

Figure 3 Intramural R&D expenditure as a percentage of GDP in all sectors



2.1.2 Contextualisation using patent applications

2.1.2.1 Patent applications to the EPO by priority year

Table 5 Patent applications to the EPO by priority year

Metric/indicator	2.1.2.1 Patent applications to the EPO by priority year per million inhabitants [pat_ep_ntot]
Source	Eurostat
Source website and metadata	https://ec.europa.eu/eurostat/databrowser/view/tsc00009/default/table?lang=en
Source methodology	Number of patent applications in a member state divided by member state inhabitants in millions.
Coverage	EU28+NO (2006-2017)
Data Missing	NO (2015-2017)
Flagged observations	Estimated EU28+NO (2013-2017) Break in time series EU28 (2015)
Data comments	none
Description	Number of patent applications to EPO per million inhabitants in a given period
Extraction date	12-02-2020
Unit	Patents per million inhabitants
Name in MoRRI	Not available in MoRRI
Important definitions	The total European patent applications refer to requests for protection of an invention directed either directly to the European Patent Office (EPO) or filed under the Patent Cooperation Treaty and designating the EPO (Euro-PCT), regardless of whether they are granted or not. The data shows the total number of applications per country. If one application has more than one inventor, the application is divided equally among all of them and subsequently among their countries of residence, thus avoiding double counting.

Figure 4 depicts development in the average number of patent applications to the European Patent Office (EPO) for the EU28-NO for the period 2006-2016. The development has been mostly stable in the period from 2006 to 2017, fluctuating between 117,65 applications on average per million inhabitants in 2006 and 106,84 applications on average in 2017. As with the average across the countries, the number of applications per million inhabitants in most of the countries fluctuated very little across the period. Only Denmark increased by more than 20 the number of applications per million inhabitants between 2006 and 2017, from 2010,05 to 246,61. Finland (21,43), Germany (64,13), Luxembourg (134,25) and the Netherlands (25,73) experienced a decrease of more than 20 in the number of applications per million inhabitants in the same period.

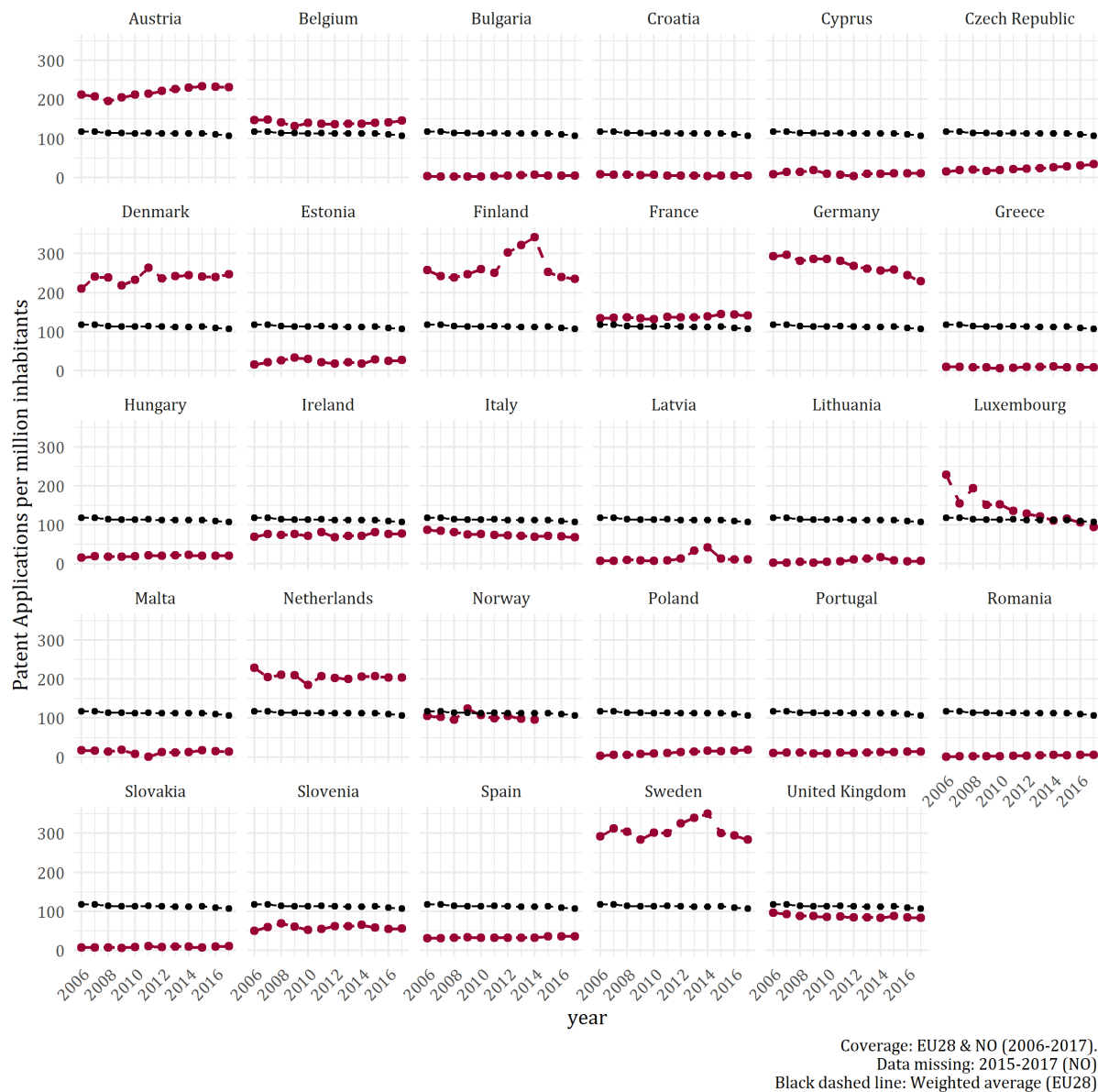


Figure 4 Patent applications to the EPO by priority year per million inhabitants



2.2 Metrics for monitoring Responsible Research and Innovation

The following metrics cover issues related to the notion of RRI, even if not tailored conceptually to that purpose.

For each of the reported metrics in this section, the report provides a description of the technical specifications of the indicator and an annotated figure illustrating the development of the metric over time for EU27, Norway and UK.

2.2.1 Monitoring RRI using labour market participation statistics

2.2.1.1 *Share of female researchers by sectors of performance (all sectors)*

She Figures compile this metric in their periodic reports, using the share of female researchers as an indicator of gender equality in labour participation within research and innovation. A range between 40% and 60% is considered “gender-balanced” (She Figures 2018). Approximately half of the EU countries fall below the 40% threshold.

An argument could be made that the general participation rate in each national labour market should also be reported alongside this metric. If the general participation rate of women is very low, reaching 40-60% will be more difficult than in a country that has a relatively higher overall participation rate. A metric monitoring the relationship between women’s participation in R&D and in the labour market overall (and potentially also the elasticity of this relationship) may also be worthy of future consideration.

Both the absolute share and growth in the share of women employed in R&D occupations can aid in monitoring gender equality in labour participation within research and innovation.

The metric is reported for 1) all sectors, 2) the business enterprise sector, 3) the higher education sector and 4) the government sector.

Data is collected biannually by member states and there are therefore many years with missing values (see data fiches). The data collection is performed with different methodologies in each country (samples, census data or administrative registers). Interpretation of the metric should be sensitive to this, both in terms of longitudinal and cross-country comparisons.

Table 6 Share of female researchers by sectors of performance (all sectors)

Metric/indicator	Share of female researchers by sectors of performance (all sectors) [rd_p_femres]
Source	Eurostat
Source website and metadata	https://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=rd_p_femres&lang=en https://ec.europa.eu/eurostat/cache/metadata/en/rd_esms.htm
Source methodology	At national level R&D data are compiled by the national statistical authorities: National Statistical Offices, Research Councils and Ministries. The data are collected through

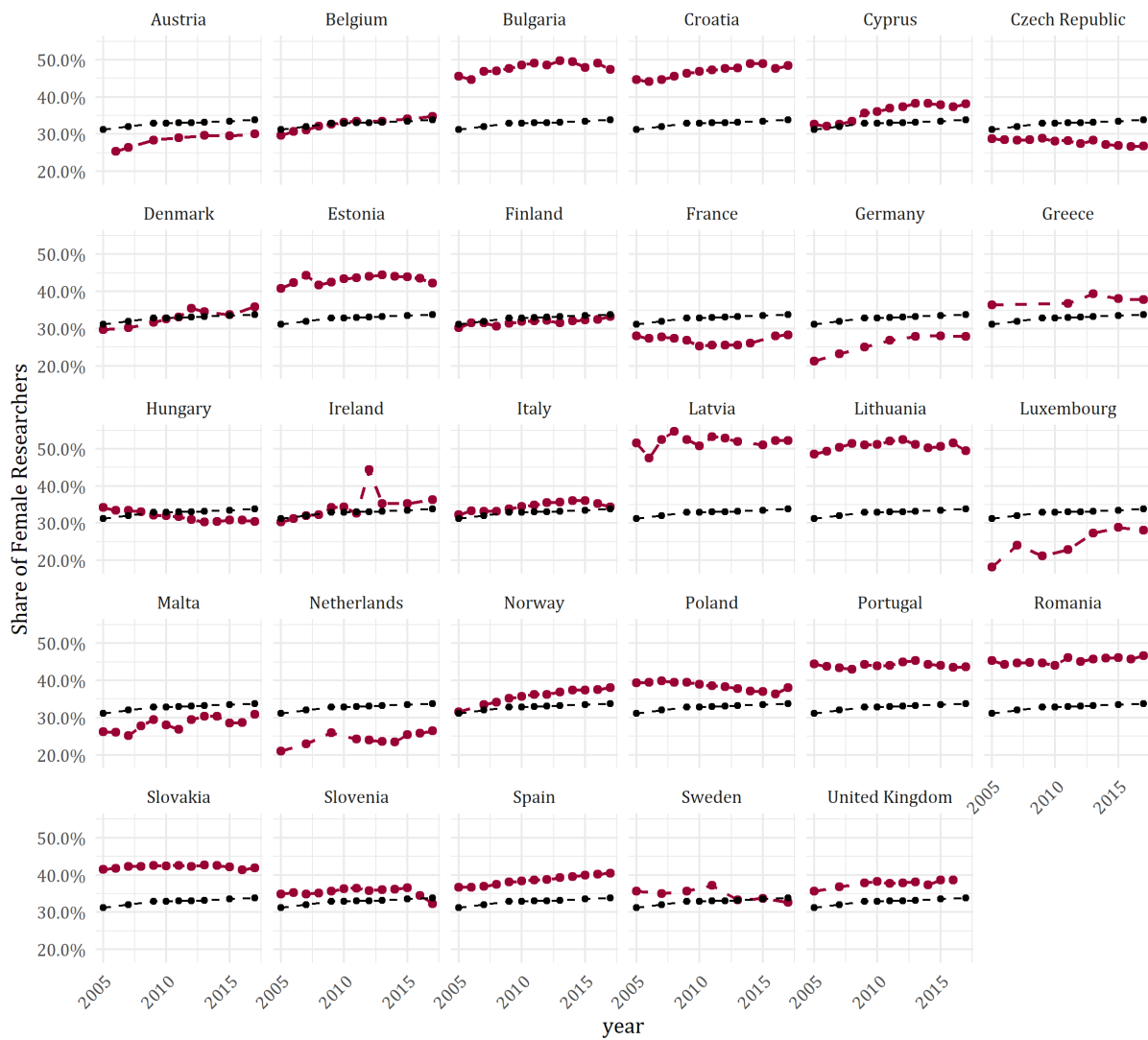


Metric/indicator	Share of female researchers by sectors of performance (all sectors) [rd_p_femres]
	sample or census surveys, from administrative registers or through a combination of sources.
Coverage	EU28 & NO (2005-2017)
Data Missing	2005 (AT); 2006 (DK, DE, EL, LU, NL, SE, UK, NO); 2007 (EL); 2008 (AT, DK, DE, EL, LU, NE, SE, UK); 2009 (EL); 2010 (AT, DE, EL, LU, NE, SE); 2012 (AT, BE, LU, SE); 2014 (AT, BE, DK, DE, EL, EI, LT, LU, SE); 2015 (FR); 2016 (AT, BE, DK, DE, EL, IE, LU, SE); 2017(UK)
Flagged observations	<p>Break in time series: 2005 (SE); 2007 (DK, SE); 2008 (PO, SI); 2009 (SE); 2010 (FR); 2011 (EL, NL, RO, SI); 2012 (NL); 2013 (PO, SE); 2014 (FR); 2016 (IT)</p> <p>Estimated: 2005 (EU28, EU27, SE, UK); 2006 (PT); 2007 (EU28, EU27, LU, SE, UK); 2009 (EU28, EU27, SE, UK); 2010 (EU28, DK, IE, FR, UK); 2011 (FR, UK); 2012 (EU28, FR, UK); 2013(FR, SE); 2014 (FR, UK); 2015 (EU28, EU27, SE); 2016 (SE); 2017 (EU28)</p> <p>Other: FR (2007, 2008, 2009, 2017); SE (2005); DK (2017)</p>
Data comments	Also reported in She Figures on the basis of Eurostat data
Description	The indicator provides an aggregate measure of how the labour market participation of women researchers is developing over time in the member states.
Extraction date	06.01.20
Unit	Percentage based on head count (HC)
Name in MoRRI	GE2.1
Important definitions	"Research and experimental development (R&D) comprise creative and systematic work undertaken in order to increase the stock of knowledge - including knowledge of humankind, culture and society - and to devise new applications of available knowledge." (§ 2.5, Frascati Manual, OECD 2015)."Researchers are professionals engaged in the conception or creation of new knowledge, products, processes, methods and systems and also in the management of the projects concerned." (§5.35, Frascati Manual, OECD 2015)

Figure 5 depicts the development in the share of female researchers in all sectors for the EU28-NO for the period 2005-2017.

In 2017 the Netherlands (26,4%) and the Czech Republic (26,8%) have the lowest shares of female researchers and Latvia (49,5%) and Lithuania (52,2%) have the highest shares in all sectors.

Luxembourg (9,9%) and Germany (6,6%) have experienced the highest growth in the share of female researchers in all sectors, while Hungary (3,7%) and Sweden (3,1%) experienced the greatest decrease.



Coverage: EU28 & NO (2005-2017).
 Data missing: 2005 (AT); 2006 (DK, DE, EL, LU, NL, SE, UK, NO); 2007 (EL);
 2008 (AT, DK, DE, EL, LU, NE, SE, UK); 2009 (EL); 2010 (AT, DE, EL, LU, NE, SE);
 2012 (AT, BE, LU, SE); 2014 (AT, BE, DK, DE, EL, EI, LT, LU, SE); 2015 (FR); 2016 (AT, BE, DK, DE, EL, IE, LU, SE); 2017 (UK).
 Black dashed line: Weighted average (EU28).

Figure 5 Share of female researchers in all sectors



2.2.1.2 Share of female researchers by sectors of performance (business enterprise sector)

Table 7 Share of female researchers by sectors of performance (business enterprise sector)

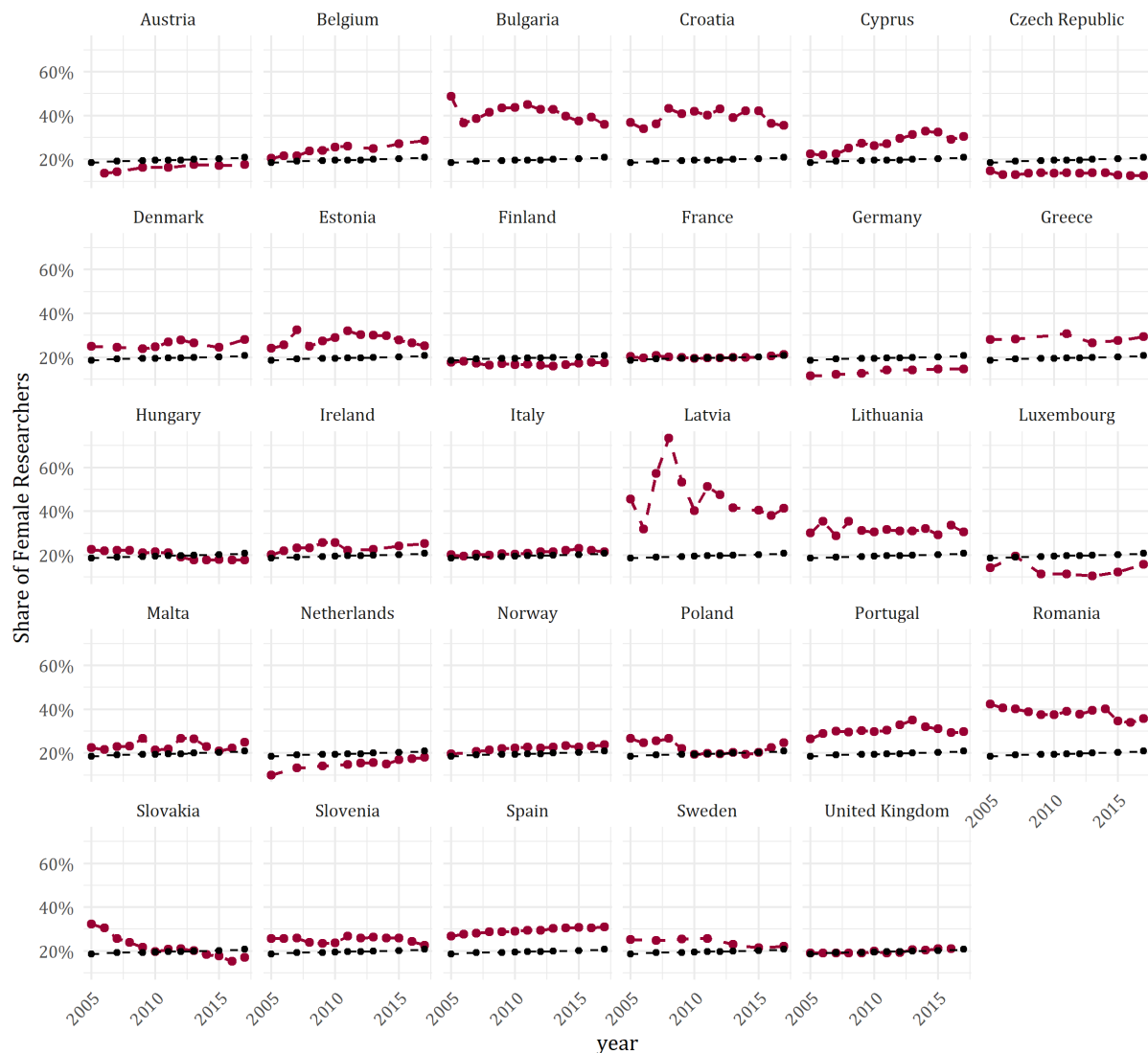
Metric/indicator	Share of female researchers by sectors of performance (business enterprise sector) [rd_p_femres]
Source	Eurostat
Source website and metadata	https://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=rd_p_femres&lang=en https://ec.europa.eu/eurostat/cache/metadata/en/rd_esms.htm
Source methodology	At national level R&D data are compiled by the national statistical authorities: National Statistical Offices, Research Councils and Ministries. The data are collected through sample or census surveys, from administrative registers or through a combination of sources.
Coverage	EU28+NO (2005-2017)
Data Missing	2005 (AT); 2006 (DK, DE, EL, LU, NE, SE); 2008 (DK, DE, LU, NE, AT, SE); 2009 (EL); 2010 (DE, EL, LU, NI, AT, SE); 2012 (BE, DE, IE, EL, LU, SE); 2014(BE, DK, DE, IE, EL, LT, LU, AT, SE); 2015 (FR); 2016 (BE, DK, DE, LU, AT, SE); 2017 (UK)
Flagged observations	Break in time series: 2005 (SE); 2006 (FR); 2007 (DK, SE); 2008 (SI); 2011 (EL, NL, RO, SI); 2012 (NL); 2013 (PO, SE); 2016 (IT) Estimated: EU28 (2005, 2009, 2010, 2012, 2015, 2017); EU27 (2005, 2009, 2015); DK (2010); IE (2010); LU (2007); PO (2006); UK (2005-2009) Other: NO (2007-2014); DK (2017); FR (2017)
Data comments	Also reported in She-figures on the basis of Eurostat data
Description	The indicator provides an aggregate measure of how the labour market participation of women researchers is developing over time in the member states.
Extraction date	06.01.20
Unit	Percentage based on head count (HC)
Name in MoRRI	GE2.2
Important definitions	"Research and experimental development (R&D) comprise creative and systematic work undertaken in order to increase the stock of knowledge - including knowledge of humankind, culture and society - and to devise new applications of available knowledge." (§ 2.5, Frascati Manual, OECD 2015). "Researchers are professionals engaged in the conception or creation of new knowledge, products, processes, methods and systems and also in the management of the projects concerned." (§5.35, Frascati Manual, OECD 2015)

Figure 6 depicts the development in the share of female researchers in the business enterprise sector for the EU28-NO for the period 2005-2017.



In 2017 the Czech Republic and Germany have the lowest shares of female researchers and Latvia and Bulgaria have the highest. Overall, the span is fairly wide from 12,5% female researchers in the business enterprise sector in the Czech Republic to 41,5% in Latvia.

Belgium and the Netherlands have seen growth in the share of female researchers in the business enterprise sector, with an increase of 8,2 percentage points in both countries, while Slovakia and Bulgaria experienced a decrease of 15,4 and 12,8 percentage points respectively.



Coverage: EU28 & NO (2005-2017).
Data missing: 2005 (AT); 2006 (DK, DE, EL, LU, NE, SE); 2008 (DK, DE, LU, NE, AT, SE); 2009 (EL); 2010 (DE, EL, LU, NI, AT, SE),
2012 (BE, DE, IE, EL, LU, SE); 2014 (BE, DK, DE, IE, EL, LT, LU, AT, SE); 2015 (FR); 2016 (BE, DK, DE, LU, AT, SE); 2017 (UK).
Black dashed line: Weighted average (EU28).

Figure 6 Share of female researchers in the business sector



2.2.1.3 Share of female researchers by sectors of performance (higher education sector)

Table 8 Share of female researchers by sectors of performance (higher education sector)

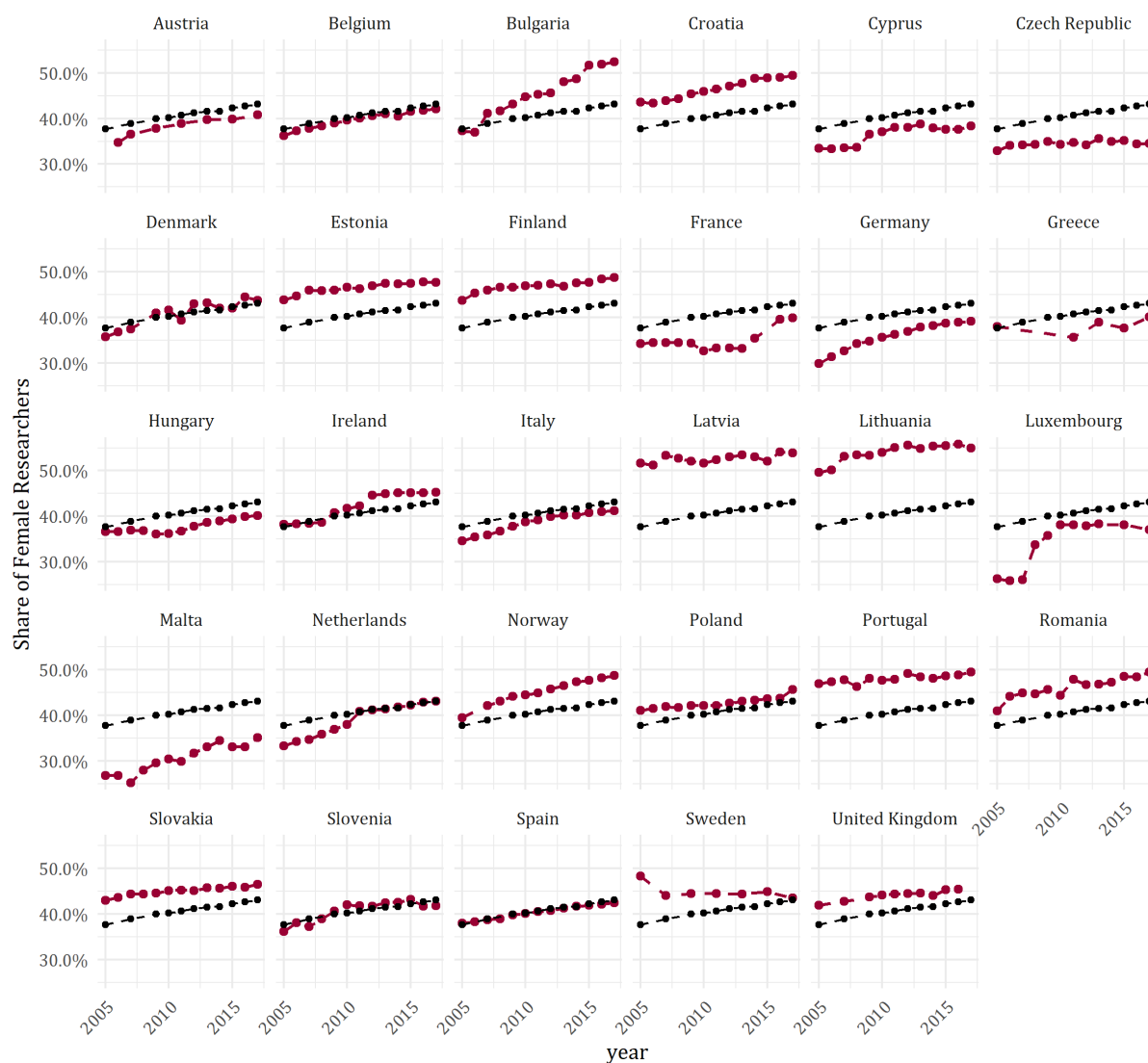
Metric/indicator	Share of female researchers by sectors of performance (higher education sector) [rd_p_femres]
Source	Eurostat
Source website and metadata	https://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=rd_p_femres&lang=en https://ec.europa.eu/eurostat/cache/metadata/en/rd_esms.htm
Source methodology	At national level R&D data are compiled by the national statistical authorities: National Statistical Offices, Research Councils and Ministries. The data are collected through sample or census surveys, from administrative registers or through a combination of sources.
Coverage	EU28 & NO (2005-2017)
Data Missing	Data missing: DK (08), EL (06, 07, 08, 09, 10, 14, 16), FR (15), LU (14, 16); AT (05, 08, 10, 12, 14, 16) SE (06, 08, 10 ,12, 14, 16) UK (06, 08, 17))
Flagged observations	Break in time series: DK (2007); EL (2011); FR (2014); IT (2005); PO (2008), 2013), RO (2011); SI (2011); SE (2015) Estimated: EU28 (2005, 2007, 2009, 2010, 2012, 2014, 2015, 2016, 2017); EU27 (2005-2010, 2012, 2014, 2015, 2016); IR (2007, 2011); FR (2010-2014); IT (2015-2017); LU (2007); PO(2006); UK (2008, 2010. 2012, 2014, 2015, 2016) Other: DK (2017), FR (2017)
Data comments	Also reported in She-figures on the basis of Eurostat data
Description	The indicator provides an aggregate measure of how the labour market participation of women researchers is developing over time in the member states.
Extraction date	06.01.20
Unit	Percentage based on head count (HC)
Name in MoRRI	GE2.4
Important definitions	"Research and experimental development (R&D) comprise creative and systematic work undertaken in order to increase the stock of knowledge - including knowledge of humankind, culture and society - and to devise new applications of available knowledge." (§ 2.5, Frascati Manual, OECD 2015)."Researchers are professionals engaged in the conception or creation of new knowledge, products, processes, methods and systems and also in the management of the projects concerned." (§5.35, Frascati Manual, OECD 2015)

Figure 7 depicts the development in the share of female researchers in the higher education sector for the EU28-NO for the period 2005-2017.

The figure shows a trend of steady growth in shares of female researchers can be detected across the EU28-NO. Bulgaria and Luxembourg have experienced a 15,1 and 10,8 percentage points increase in



share of female researchers in the higher education sector respectively. Sweden is an exception as the only country that experienced negative growth, with a decrease of 8,8 percentage points.



Coverage: EU28 & NO (2005-2017).
Data missing: DK (08), EL (06, 07, 08, 09, 10, 14, 16), FR (15), LU (14, 16);
AT (05, 08, 10, 12, 14, 16) SE (06, 08, 10, 12, 14, 16) UK (06, 08, 17)).
Black dashed line: Weighted average (EU28).

Figure 7 Share of female researchers in the higher education sector



2.2.1.4 Share of female researchers by sectors of performance (government sector)

Table 9 Share of female researchers by sectors of performance (government sector)

Metric/indicator	Share of female researchers by sectors of performance (government sector) [rd_p_femres]
Source	Eurostat
Source website and metadata	https://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=rd_p_femres&lang=en https://ec.europa.eu/eurostat/cache/metadata/en/rd_esms.htm
Source methodology	At national level R&D data are compiled by the national statistical authorities: National Statistical Offices, Research Councils and Ministries. The data are collected through sample or census surveys, from administrative registers or through a combination of sources.
Coverage	EU28 & NO (2005-2017)
Data Missing	Data missing: EL (06-10, 12, 14, 16) IE (16), LU (08, 14, 16), AT (05, 08, 10, 12, 14, 16) SE (06, 08, 10, 12, 14, 16)
Flagged observations	Break in time series: BE (2012); DK (2007); DE (2014); EL(2011); FR (2010); NL (2012); PO (2013); RO (2011); SI(2011); SE (2005, 2007, 2011, 2013); Estimated: EU28 (2005-2010, 2012, 2014-2017); EU27 (2005-2010, 2012, 2014-2016); FR(2011-2014); SE (2005, 2007, 2009, 2011, 2013, 2015) Other: DK (2017), DE (2015-2017); FR (2005-2009, 2017); HR (2012-2017); NL (2005-2017); SK (2005-2014); SE (2005); NO (2005, 2007-2009)
Data comments	Also reported in She-figures on the basis of Eurostat data
Description	The indicator provides an aggregate measure of how the labour market participation of women researchers is developing over time in the member states.
Extraction date	06.01.20
Unit	Percentage based on head count (HC)
Name in MoRRI	GE2.3
Important definitions	"Research and experimental development (R&D) comprise creative and systematic work undertaken in order to increase the stock of knowledge - including knowledge of humankind, culture and society - and to devise new applications of available knowledge." (§ 2.5, Frascati Manual, OECD 2015)."Researchers are professionals engaged in the conception or creation of new knowledge, products, processes, methods and systems and also in the management of the projects concerned." (§5.35, Frascati Manual, OECD 2015)

Figure 8 depicts the development in the share of female researchers in the government sector for the EU28-NO for the period 2005-2017.



In the most recent year covered, 2017, Germany and Malta have the lowest share of female researchers in the government sector which Portugal and Estonia have the highest. Denmark and Sweden have seen the highest rate of growth in the share of female researchers in the government sector with an increase of 15,8 and 15,3 percentage points respectively. Malta experienced a considerable negative growth of 22,2 percentage points.

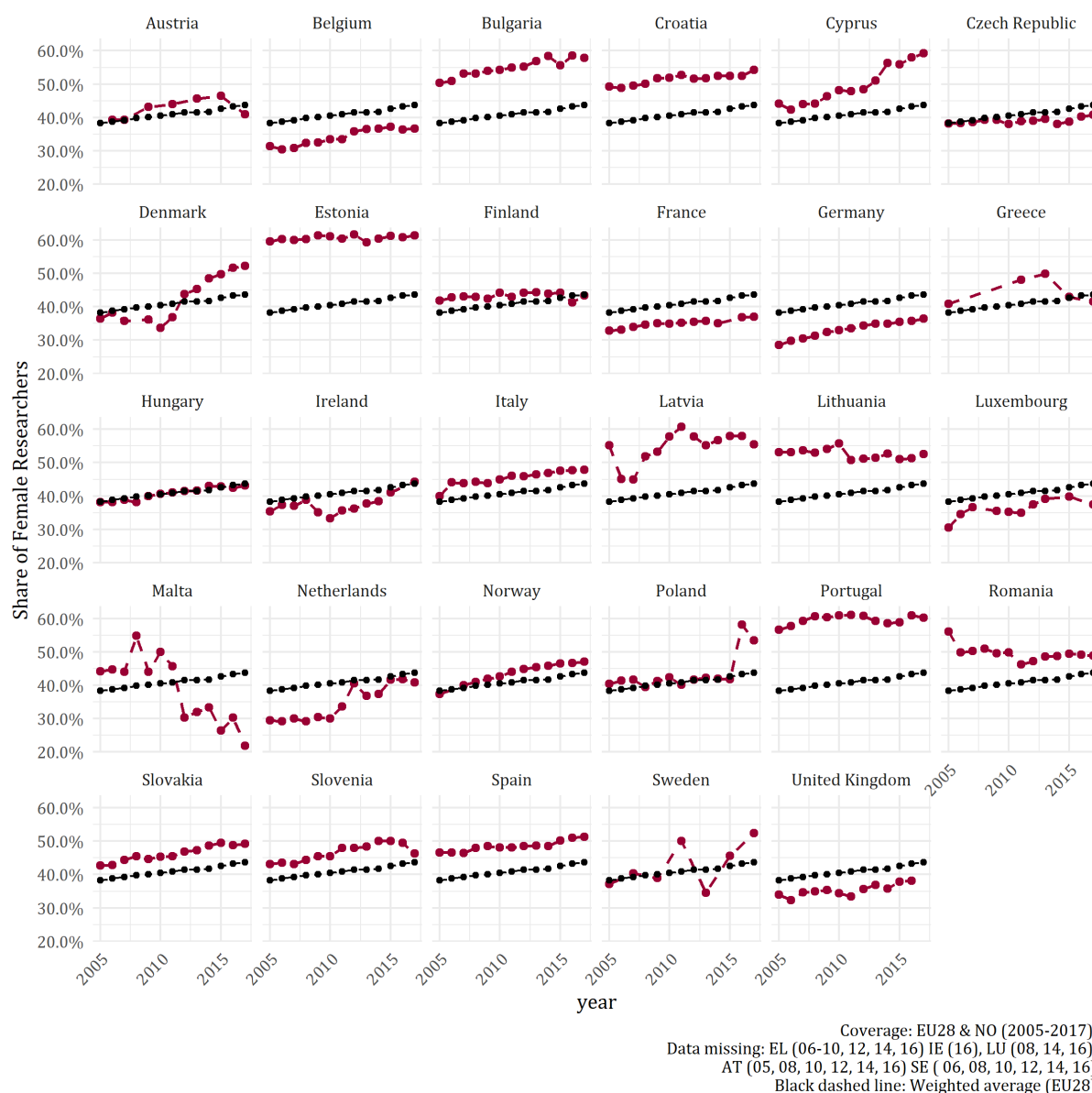


Figure 8 Share of female researchers in the government sector



2.2.1.5 Glass Ceiling Index

The Glass Ceiling Index is aimed at measuring gender inequality, and provides a partial picture of the degree of inequality in terms of reaching the top academic positions. Details are provided in Table 10 and the index is discussed in She Figures reports.

Table 10 The Glass Ceiling Index

Metric/indicator	The Glass Ceiling Index
Source	She Figures 2018
Source website and metadata	https://data.europa.eu/euodp/en/data/dataset/she-figures-2018-gender-in-research-and-innovation https://op.europa.eu/en/publication-detail/-/publication/09d777dc-447c-11e9-a8ed-01aa75ed71a1/language-en
Source methodology	<p>Based on Women in Science database, DG Research and Innovation.</p> <p>The Glass Ceiling Index (GCI) is a relative index comparing the proportion of women in academia (grades A, B, and C) with the proportion of women in top academic positions (grade A positions; equivalent to full professors in most countries) in a given year. The GCI can range from 0 to infinity. A GCI of 1 indicates that there is no difference between women and men in terms of their chances of being promoted. A score of less than 1 means that women are more represented at the grade A level than in academia generally (grades A, B, and C) and a GCI score of more than 1 indicates the presence of a glass ceiling effect, meaning that women are less represented in grade A positions than in academia generally (grades A, B, and C). In other words, the interpretation of the GCI is that the higher the value, the stronger the glass ceiling effect and the more difficult it is for women to move into a higher position.</p>
Coverage	EU28 & NO (2013 & 2016)
Data Missing	CZ, EE, LT, MT (2013), EE, CZ (2016).
Flagged observations	<p>Exceptions to the reference years: FR: 2012-2015; IE, CY, HU, AT, SI, SE: 2013-2015; BG: 2013-2017; CZ, EE: 2014-2015; RO, UK: 2014-2016; HR: 2014-2017; LU, IL: 2015-2016; IS: 2012; MT (Malta College for Arts, Science and Technology): 2017</p> <p>Others: Data are in headcounts (HC);</p> <p>Break in time series: DE (Grades B - C): 2016; ES: 2015; UK: 2014; Estimated data: RO (Grade A, 2014); The same person may be counted in several grades and fields of R&D: BE (French speaking community), SE; Totals adjusted to avoid double-counting: SE; Data rounded to nearest multiple of 5: UK; Data do not include persons of unknown sex:</p> <p>PL; Private colleges and other smaller institutions are not included: IE; Grade C data include some persons with M.Sc. only: LT, SK; The base reference population is that of 'Researchers' as defined in the Frascati Manual (OECD, 2015), with the exception of the following countries which used 'Academic staff' based on the UOE Manual (UNESCO/OECD/Eurostat, 2017): BG, DE, IE, EL, IT, LV, LT, NL, SI, SK, SE, IS, IL.</p>

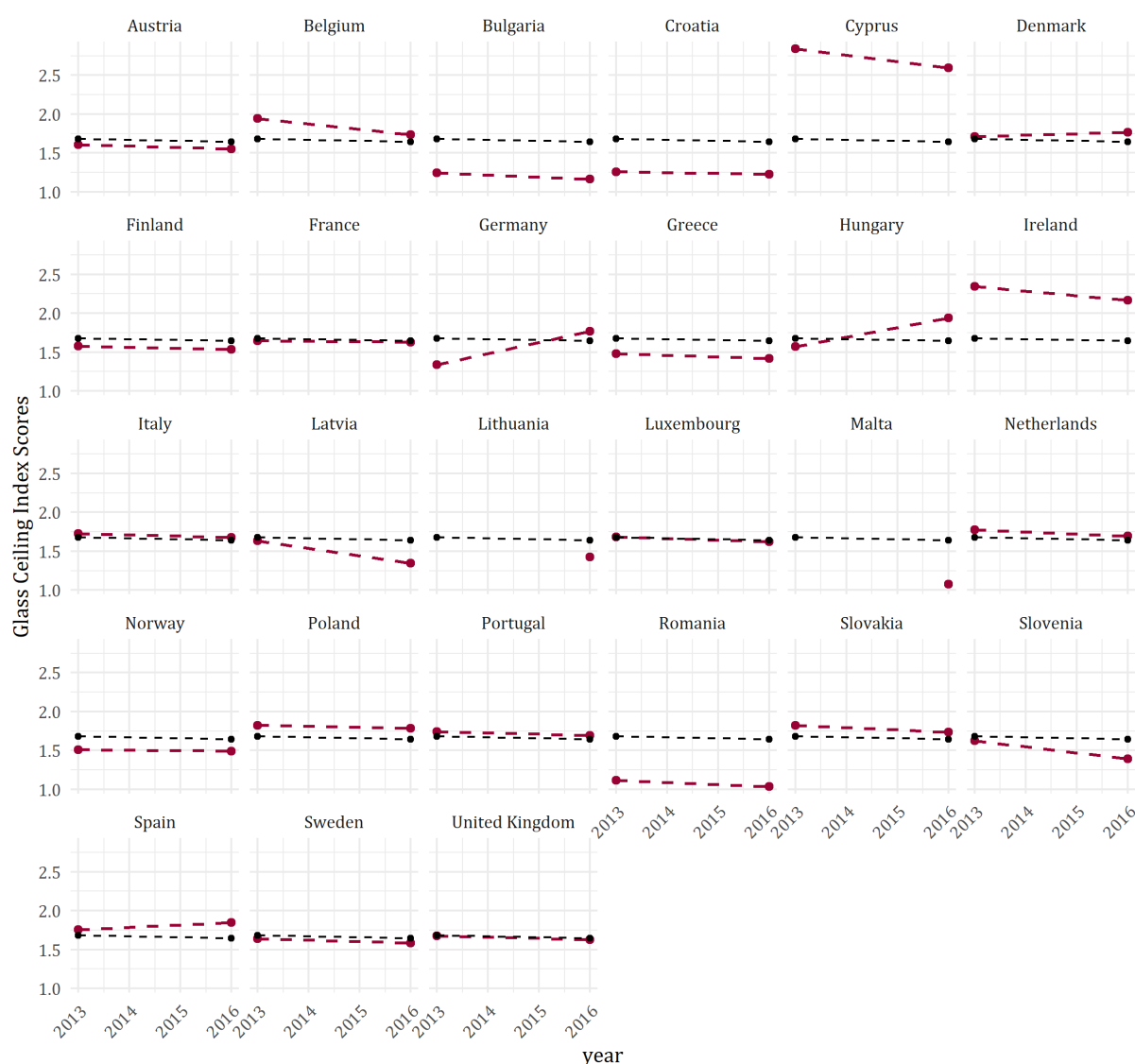


Metric/indicator	The Glass Ceiling Index
Data comments	All asterisk notes are copied from the She Figures report. Data is not consistent between She Figures reports, it is therefore not possible to create longer time series.
Description	The Glass Ceiling Index (GCI) is a relative index comparing the proportion of women in academia (grades A, B, and C) to the proportion of women in top academic positions (grade A positions; equivalent to full professorships in most countries), for a given year.
Extraction date	27.11.19
Unit	Index [0-infinite]
Name in MoRRI	GE6
Important definitions	The grades presented in the She Figures reports are based upon national mappings according to the following definitions: <ul style="list-style-type: none">A) The single highest grade / post at which research is normally conducted within the institutional or corporate systemB) All researchers working in positions which are not as senior as the top position (A) but definitely more senior than the newly qualified PhD holders (C); i.e. below A and above CC) The first grade/post into which a newly qualified PhD (ISCED 8) graduate would normally be recruited within the institutional or corporate systemD) Either postgraduate students not yet holding a PhD (ISCED 8) degree who are engaged as researchers (on the payroll) or researchers working in posts that do not normally require a PhD.

Figure 9 shows development in the Glass Ceiling Index for all the EU28-NO from 2013 to 2016.

There are notable differences across Europe. In countries such as Cyprus and Ireland, the proportion of women in top academic positions is significantly lower than the proportion of women in academia in general, but both countries have seen improvements from 2013 to 2016. In Romania and Malta, on the other hand, the score is close to 1, signalling that the proportion of women at the top level is on par with the proportion of women in academia in general.

Out of 26 countries with data points for both 2013 and 2016, only four experienced an increase in their Glass Ceiling Index score.



Coverage: EU28 & NO (2013 & 2016).
Data missing: 2013 (CZ, EE, LT, MT), 2016 (EE, CZ).
Black dashed line: Weighted average (EU28).

Figure 9 Glass Ceiling Index scores for 2013 & 2016

2.2.1.6 Dissimilarity Index (higher education sector)

The Dissimilarity Index provides a theoretical measurement of the percentage of women and men in a field of R&D, who would have to move to another field of R&D to ensure that the proportions of women were the same across all the possible fields of R&D. It can therefore be interpreted as the hypothetical distance from a balanced sex distribution across fields of R&D, based upon the overriding proportion of women (National Science Foundation 2000).



Table 11 Dissimilarity Index (higher education sector)

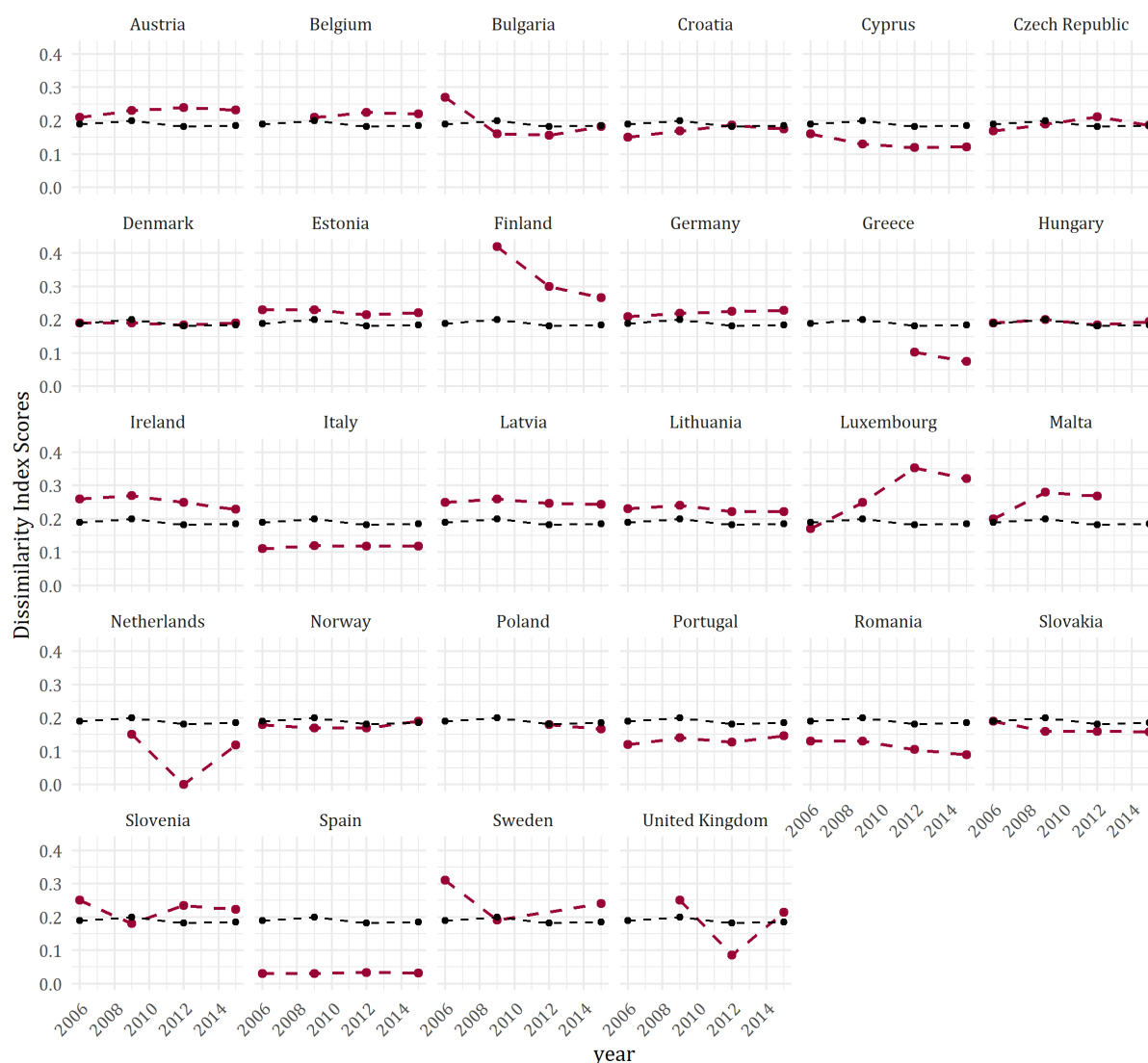
Metric/indicator	Dissimilarity Index (higher education sector)
Source	<p>She Figures 2018, 2012 & 2009</p> <p>Based on Eurostat – Statistics on research and development (online data code: rd_p_perssci), UNESCO Institute of Statistics (Researchers by sector of employment and field of R&D).</p>
Source website and metadata	<p>https://data.europa.eu/euodp/en/data/dataset/she-figures-2018-gender-in-research-and-innovation</p> <p>https://op.europa.eu/en/publication-detail/-/publication/ba8dc59b-61b8-4c03-9176-373fd9ddac82/language-en/format-PDF/source-121851667</p> <p>https://op.europa.eu/en/publication-detail/-/publication/6358e1d9-385c-4961-946e-52ed66de5bbb/language-en/format-PDF/source-121851729</p> <p>https://op.europa.eu/en/publication-detail/-/publication/09d777dc-447c-11e9-a8ed-01aa75ed71a1/language-en</p> <p>She Figures 2012 (p. 77), She Figures 2009 (p. 64)</p>
Source methodology	<p>$DI = 1/2 \sum_i Fi / F - Mi / M$</p> <p>Where:</p> <p>(F) Number of female researchers across all fields of R&D. Unit: Head count.</p> <p>(Fi) Number of female researchers in each field of R&D. Unit: Head count.</p> <p>(M) Number of male researchers across all fields of R&D. Unit: Head count.</p> <p>(Mi) Number of male researchers in each field of R&D. Unit: Head count.</p> <p><i>i</i> denotes a particular R&D field.</p>
Coverage	EU28 & NO (2006, 2009, 2012 & 2015)
Data Missing	Data missing: 2006 (BE, EL, FI, FR, NL, PL, UK); 2009 (EL, FR, PL); 2012 (FR, SE); 2015 (FR, MT)
Flagged observations	<p>From She Figures report 2018:</p> <p>Notes: Exceptions to the reference year: UK: 2013; BG:2014 (HES); Data unavailable for: EU-28, FR, AL, IL, FO, TN; Break in time series for: DE (fields of R&D: natural sciences, engineering and technology, social sciences, humanities); Definition differs for: ME; DE (fields of R&D: social sciences, humanities); FI, NL (GOV); Data estimated for: ES; IT, UK (HES); SE (GOV); PL (2015, GOV, fields of R&D medical sciences, agricultural sciences); MT was excluded due to low number of observations (<30) in each field of R&D; IS (2012) was excluded due to lack of comparability with 2015.</p> <p>Others: ‘.’ indicates that data are unavailable; In HES, ‘not specified’ field of R&D was considered for countries with no available data. In GOV, no country had data in this</p>



Metric/indicator	Dissimilarity Index (higher education sector)
	<p>category; Proportions are shown with two decimal digits but the text discusses them at full precision; DI computed from data in head count (HC).</p> <p>She Figures report 2015</p> <p>Notes: Exceptions to the reference year: 2011: BE, IE, EL, HR, AT, SE, IS, ME, RS; 2010: DK, PL; 2009: MK; Data unavailable for: EU-28, FR, LI, CH, AL, BA, IL, FO, MD; Definition differs for: NL, SK, FI, SE; Data (HES) estimated for: UK, BE, IE; Break in time series for: EL, SE (GOV); Confidential: PL (GOV);</p> <p>Others: Reference year is 2012; ‘.’ indicates that data are unavailable.</p> <p>She Figures report 2012</p> <p>Exceptions to the reference year: PL, JP: 2008; FI, UK: 2007. Data unavailable: EU-27, EU-25, EU-15, EL, FR, MK, IS, CH, IL, US. Data estimated: BE, IE.</p> <p>She Figures report 2009</p> <p>Exceptions to the reference year: HES: CZ, EE, MT, SK, NO: 2007; LU, PT, SE: 2005; GOV: CZ, EE, IE, MT, SK: 2007; BE, LU, PT, NO: 2005; TR: 2004; SE: 2003 Data unavailable: EL, FR, NL, FI, UK, IS, CH, IL, BE (HES), PL (HES) Provisional data: HES: MT (2007); GOV: IE (2007), MT (2007) Data estimated: EU-27, EU-25, EU-15 (by DG Research)</p>
Data comments	PL 2009 not included because the index is 0.86 which seems like an outlier.
Description	The Dissimilarity Index (DI) indicates the percentage of either women or men (all scientific fields combined) who would have to move across different scientific fields to ensure that the proportions of women (out of the total number of women across all scientific fields) and men (out of the total number of men across all scientific fields) were equal in each scientific field. Note that this does not ensure parity of the sexes in each scientific field.
Extraction date	06.01.20
Unit	Index [0-1]
Name in MoRRI	GE4.1
Important definitions	Researchers are professionals engaged in the conception or creation of new knowledge. They conduct research and improve or develop concepts, theories, models, techniques instrumentation, software or operational methods (§5.35, Frascati Manual, OECD, 2015).

Figure 10 depicts shows Dissimilarity Index scores in the higher education sector for the EU28-NO for 2006, 2009, 2012, and 2015.

The majority of countries covered have had fairly stable trajectories, indicating only moderate change in the level of imbalanced female representation across R&D areas. Finland has seen decreasing Dissimilarity Index scores signalling a levelling out of imbalances in distribution of women across R&D areas. Spain stands out with a stable low score on the index.



Coverage: EU28 & NO (2006, 2009, 2012 & 2015).
 Data missing: 2006 (BE, EL, FI, FR, NL, PL, UK); 2009 (EL, FR, PL); 2012 (FR, SE); 2015 (FR, MT).
 Data Comment: PL 2009 not included because the index is 0.86 which seems like an outlier.
 Black dashed line: Non-weighted average (EU28 & NO).

Figure 10 Dissimilarity Index scores for the higher education sector



2.2.1.7 Dissimilarity Index (government sector)

Table 12 Dissimilarity Index (government sector)

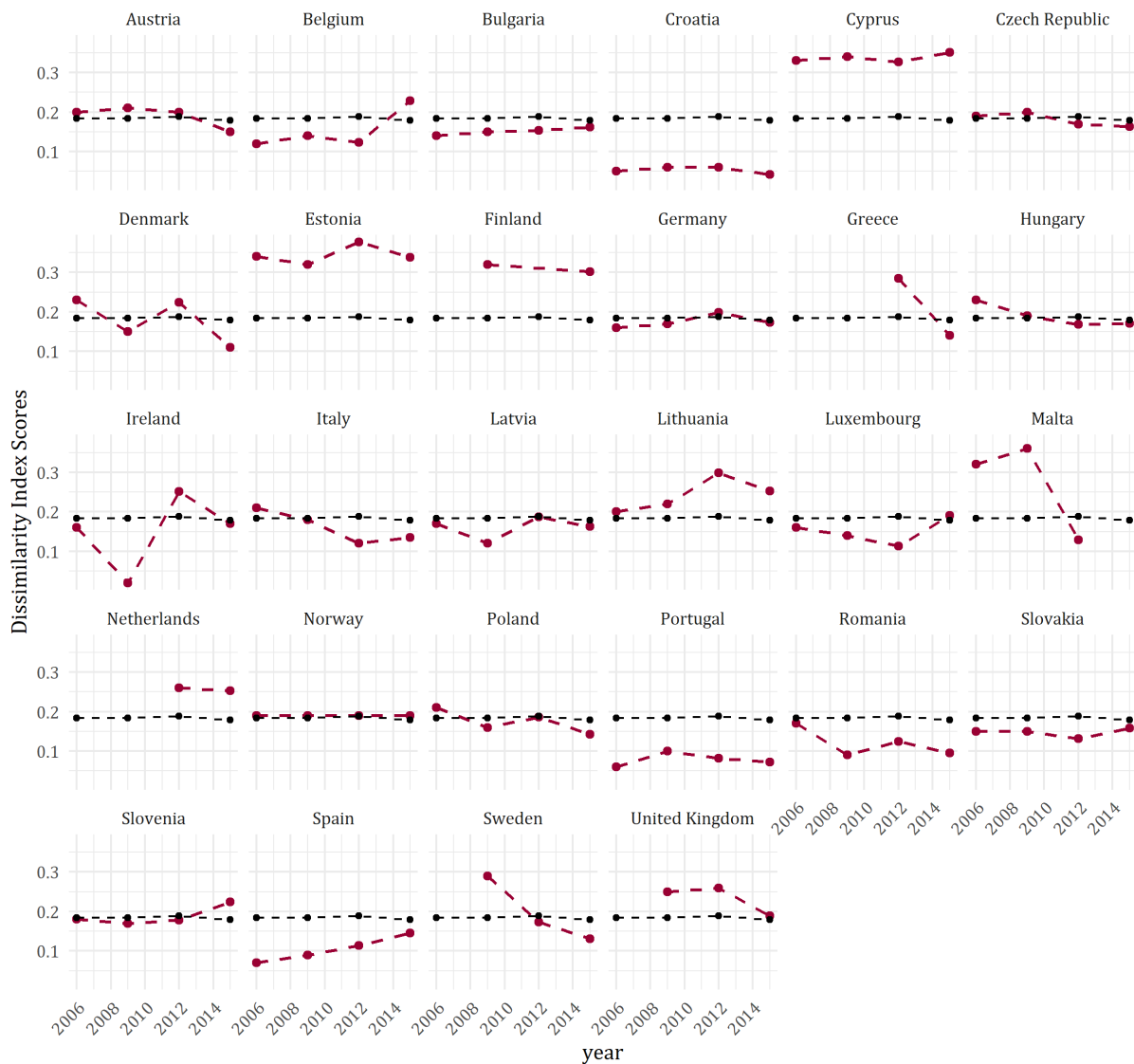
Metric/indicator	Dissimilarity Index (government sector)
Source	She Figures 2018, 2012 & 2009
Source website and metadata	<p>https://data.europa.eu/euodp/en/data/dataset/she-figures-2018-gender-in-research-and-innovation</p> <p>https://op.europa.eu/en/publication-detail/-/publication/ba8dc59b-61b8-4c03-9176-373fd9ddac82/language-en/format-PDF/source-121851667</p> <p>https://op.europa.eu/en/publication-detail/-/publication/6358e1d9-385c-4961-946e-52ed66de5bbb/language-en/format-PDF/source-121851729</p> <p>https://op.europa.eu/en/publication-detail/-/publication/09d777dc-447c-11e9-a8ed-01aa75ed71a1/language-en</p> <p>She Figures 2012 (p. 77), She Figures 2009 (p. 64)</p>
Source methodology	$DI = 1/2 \sum_i Fi / F - Mi / M $ <p>Where:</p> <p>(F) Number of female researchers across all fields of R&D. Unit: Head count.</p> <p>(Fi) Number of female researchers in each field of R&D. Unit: Head count.</p> <p>(M) Number of male researchers across all fields of R&D. Unit: Head count.</p> <p>(Mi) Number of male researchers in each field of R&D. Unit: Head count.</p> <p><i>i</i> denotes a particular R&D field.</p>
Coverage	EU28 & NO (2006, 2009, 2012 & 2015)
Data Missing	Data missing: 2006 (BE, EL, FI, FR, NL, PL, UK); 2009 (EL, FR, PL); 2012 (FR, SE); 2015 (FR, MT)
Flagged observations	<p>From She Figures report 2018:</p> <p>Notes: Exceptions to the reference year: UK: 2013; BG:2014 (HES); Data unavailable for: EU-28, FR, AL, IL, FO, TN; Break in time series for: DE (fields of R&D: natural sciences, engineering and technology, social sciences, humanities); Definition differs for: ME; DE (fields of R&D: social sciences, humanities); FI, NL (GOV); Data estimated for: ES; IT, UK (HES); SE (GOV); PL (2015, GOV, fields of R&D medical sciences, agricultural sciences); MT was excluded due to low number of observations (<30) in each field of R&D; IS (2012) was excluded due to lack of comparability with 2015.</p> <p>Others: ‘.’ indicates that data are unavailable; In HES, ‘not specified’ field of R&D was considered for countries with no available data. In GOV, no country had data in this category; Proportions are shown with two decimal digits but the text discusses them at full precision; DI computed from data in head count (HC).</p> <p>She Figures report 2015</p>



Metric/indicator	Dissimilarity Index (government sector)
	<p>Notes: Exceptions to the reference year: 2011: BE, IE, EL, HR, AT, SE, IS, ME, RS; 2010: DK, PL; 2009: MK; Data unavailable for: EU-28, FR, LI, CH, AL, BA, IL, FO, MD; Definition differs for: NL, SK, FI, SE; Data (HES) estimated for: UK, BE, IE; Break in time series for: EL, SE (GOV); Confidential: PL (GOV);</p> <p>Others: Reference year is 2012; ‘.’ indicates that data are unavailable.</p> <p>She Figures report 2012</p> <p>Exceptions to the reference year: PL, JP: 2008; FI, UK: 2007. Data unavailable: EU-27, EU-25, EU-15, EL, FR, MK, IS, CH, IL, US. Data estimated: BE, IE.</p> <p>She Figures report 2009</p> <p>Exceptions to the reference year: HES: CZ, EE, MT, SK, NO: 2007; LU, PT, SE: 2005; GOV: CZ, EE, IE, MT, SK: 2007; BE, LU, PT, NO: 2005; TR: 2004; SE: 2003 Data unavailable: EL, FR, NL, FI, UK, IS, CH, IL, BE (HES), PL (HES) Provisional data: HES: MT (2007); GOV: IE (2007), MT (2007) Data estimated: EU-27, EU-25, EU-15 (by DG Research)</p>
Data comments	Flagged observations text is taken from each of the She Figures reports and reported as direct quotes.
Description	The Dissimilarity Index (DI) indicates the percentage of either women or men (all scientific fields combined) who would have to move across different scientific fields to ensure that the proportions of women (out of the total number of women across all scientific fields) and men (out of the total number of men across all scientific fields) were equal in each scientific field. Note that this does not ensure parity of the sexes in each scientific field.
Extraction date	06.01.20
Unit	Index [0-1]
Name in MoRRI	GE4.2
Important definitions	Researchers are professionals engaged in the conception or creation of new knowledge. They conduct research and improve or develop concepts, theories, models, techniques instrumentation, software or operational methods (\$5.35, Frascati Manual, OECD, 2015).

Figure 11 shows Dissimilarity Index scores in the government sector for the EU28-NO for 2006, 2009, 2012, and 2015.

The average across Europe is stable from 2006 til 2015. Croatia has a remarkably low score indicating a balanced representation of women across R&D areas in the government sector.



Coverage: EU28 & NO (2006, 2009, 2012 & 2015).
 Data missing: 2006 (BE, EL, FI, FR, NL, PL, UK); 2009 (EL, FR, PL); 2012 (FR, SE); 2015 (FR, MT).
 Black dashed line: Non-weighted average (EU28 & NO).

Figure 11 Dissimilarity Index scores for the government sector



2.2.1.8 Gender pay gap within scientific research & development

Table 13 Gender pay gap within scientific research & development

Metric/indicator	Gender pay gap (%) in the economic activity 'Scientific research & development' (NACE Rev. 2, Division 72)
Source	She Figures 2018
Source website and metadata	https://data.europa.eu/euodp/en/data/dataset/she-figures-2018-gender-in-research-and-innovation https://data.europa.eu/euodp/en/data/dataset/she-figures-2015-gender-in-research-and-innovation
Source methodology	<p>Source: Eurostat – Structure of Earnings Survey (SES) (custom extraction based on online data code: earn_ses14_12).</p> <p>Gender Pay Gap (GPG) = $(Mi - Fi) / Mi$</p> <p>Where:</p> <p>(Fi) Average gross hourly earnings of female employees by economic activity. Unit: National Currency per hour.</p> <p>(Mi) Average gross hourly earnings of male employees by economic activity. Unit: National Currency per hour.</p> <p>(i) Denotes selected two defined sets of NACE economic activities: scientific and development research – Section M, Division 72; total economy, defined here as the aggregate of Sections B to S, excluding Section O.</p>
Coverage	EU28 & NO (2010 & 2014)
Data Missing	Data missing: MT (2010, 2014)
Flagged observations	None
Data comments	Also reported in She-figures 2018 and 2015 on the basis of Eurostat data
Description	The indicator provides a metric of the difference between the average gross hourly earnings of paid male employees and of paid female employees as a percentage of the average gross hourly earnings of paid male employees.
Extraction date	06.01.20
Unit	Wage gap as percentage
Name in MoRRI	GE7.1
Important definitions	Scientific research & development services statistics ('Sci. R&D services statistics') are based on NACE Rev. 2 Division 72; Total economy is based on NACE Rev. 2 Sections B to S, excluding Section O (public administration and defence; compulsory social security); Data were computed by Eurostat (NACE 72 data are not available online).



Figure 12 depicts the development of the Gender Pay Gap within the economic activity of scientific research & development for the EU28-NO from 2010 to 2014.

Across the full set of countries, only a modest development towards closing the gap between salaries for women and men in R&D can be detected from 2010 to 2014. In Romania, Luxembourg, and Bulgaria, the gap has been closed, while Hungary and Ireland have seen a widening of the gap.

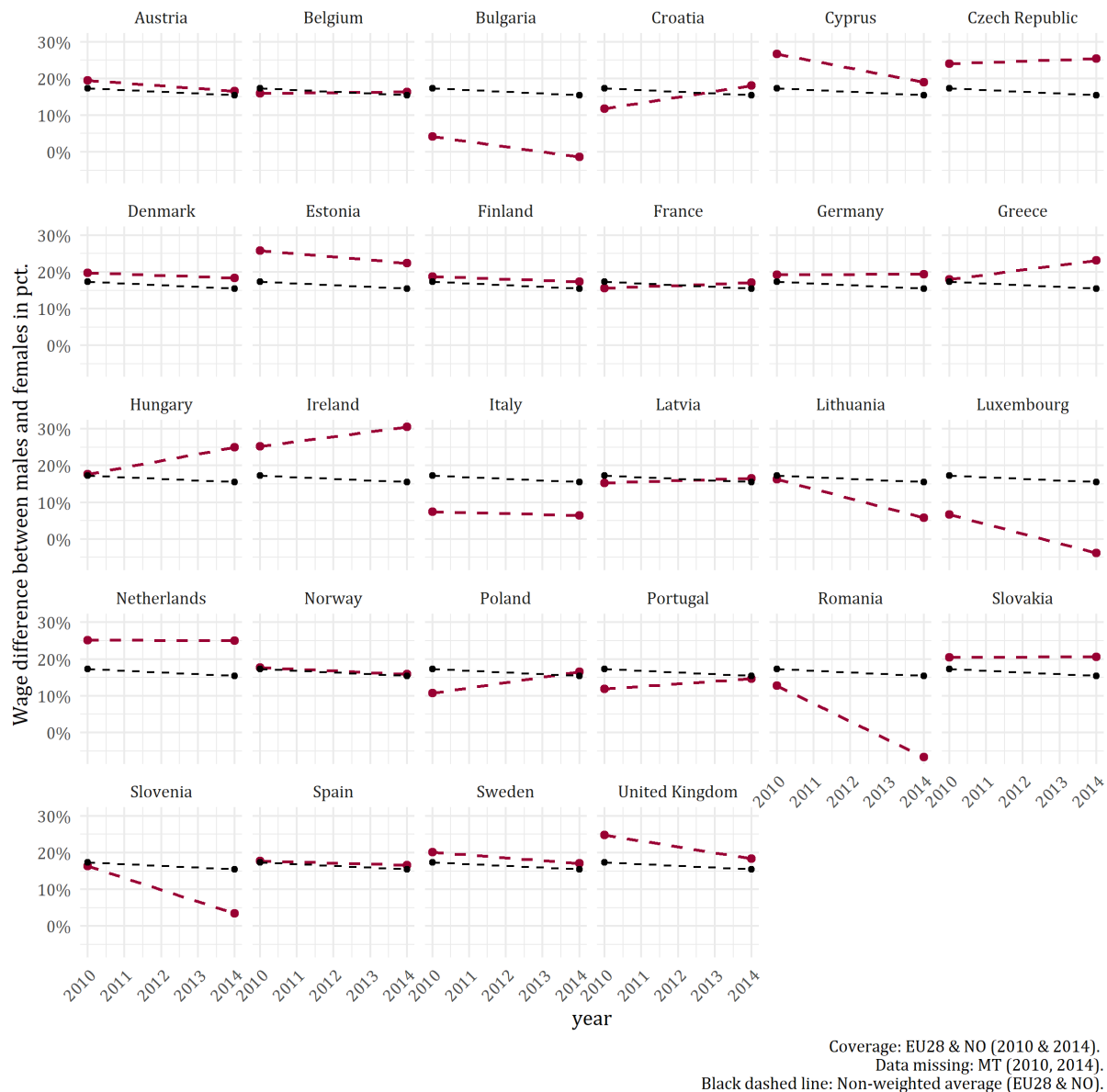


Figure 12 Gender pay gap within scientific research & development



2.2.2 Monitoring RRI using bibliometric data on research and innovation outputs

2.2.2.1 Percentage of publications with a sex or gender dimension

Table 14 Percentage of publications with a sex or gender dimension

Metric/indicator	Percentage of a country's publications with a sex or gender dimension in their research content
Source	She Figures 2018
Source website and metadata	https://data.europa.eu/euodp/en/data/dataset/she-figures-2018-gender-in-research-and-innovation https://op.europa.eu/en/publication-detail/-/publication/09d777dc-447c-11e9-a8ed-01aa75ed71a1/language-en
Source methodology	<p>Described in more detail She Figures Handbook 2018</p> <p>(Percent of a country's publications integrating SGDRCCYS) $CYS = \frac{PSGDRCCYS}{Pcys}$</p> <p>Where:</p> <p>(<i>Pcys</i>) Number of publications in a given country (C), year (Y) and field (S). Unit: Number.</p> <p>(<i>PSGDRCCYS</i>) Number of publications integrating SGDRCC in a given country (C), year (Y) and field (S). Unit: Number</p>
Coverage	EU28 & NO (2013-2017 Pooled)
Data Missing	Data missing: none
Flagged observations	None
Data comments	Reported in She-figures 2018 on the basis of scopus data
Description	The indicator shows the proportion of peer-reviewed publications that integrate gender or sex-sensitive analysis
Extraction date	06.01.20
Unit	Percentage of publications
Name in MoRRI	Not available in MoRRI
Important definitions	This indicator shows the number of a country's publications that have a sex or gender dimension in their research content, divided by the total number of publications from this country and then converted to a percentage. Sex and gender related content is thereby identified through a search query using the title and the abstract of the scientific publications.



Figure 13 illustrates the share of publications from 2013-2017 with a sex or gender dimension in their research content for the EU28-NO. The dotted horizontal line indicates the average percentage for the EU28 countries.

There is some variation across countries with shares ranging from 3,33% in Sweden to 0,54% in Romania.

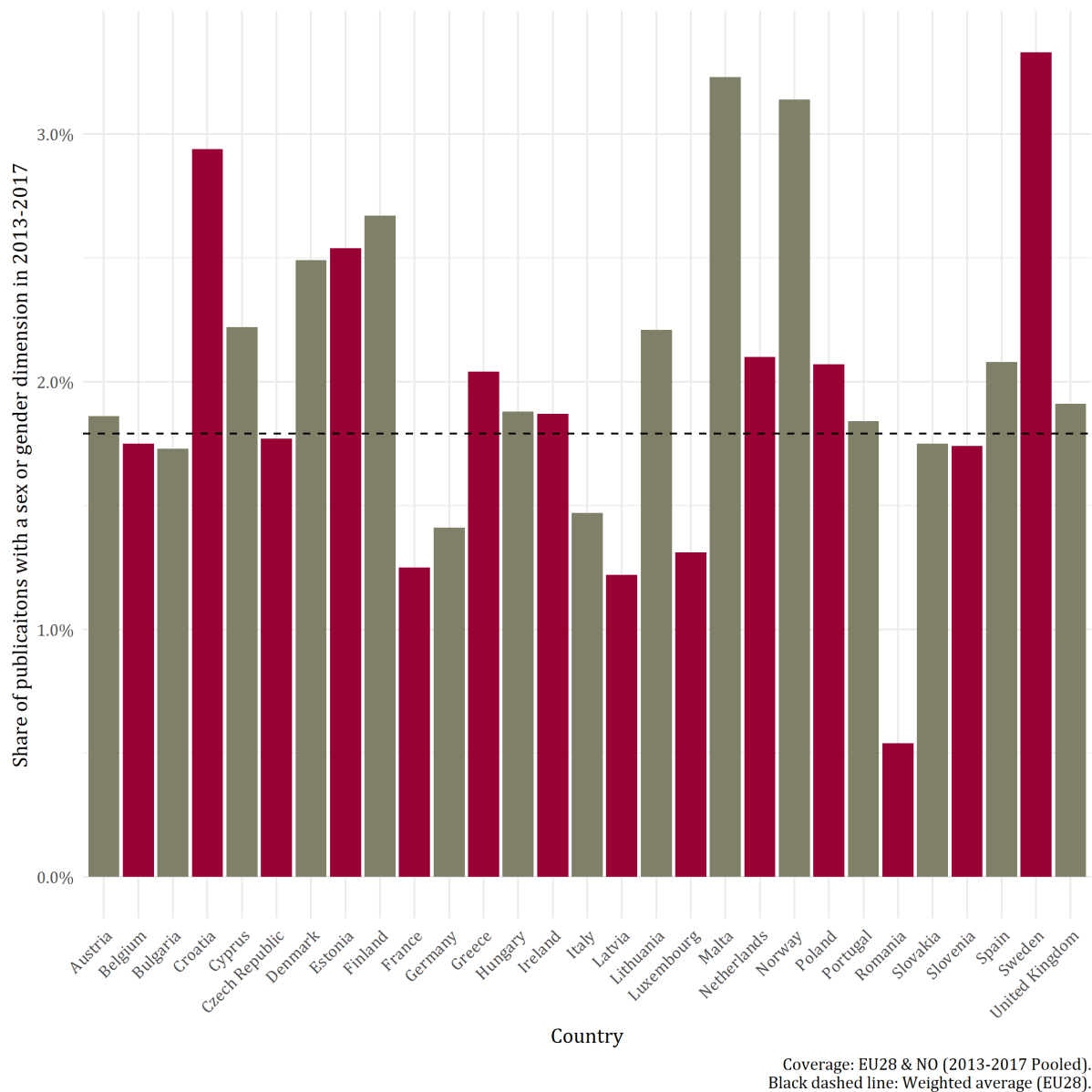


Figure 13 Percentage of publications with a sex or gender dimension in their research content



2.2.2.2 The women to men ratio in number of inventorships

Table 15 The women to men ratio in number of inventorships

Metric/indicator	Women to men ratio of inventorships, all International Patent Classification (IPC) sections
Source	She Figures 2018, 2015 (based on Patstat)
Source website and metadata	https://data.europa.eu/euodp/en/data/dataset/she-figures-2018-gender-in-research-and-innovation https://data.europa.eu/euodp/en/data/dataset/she-figures-2015-gender-in-research-and-innovation
Source methodology	<p>Source: Computed by Science-Metrix using European patent applications in PATSTAT</p> <p>Ratio of inventorships for Women to Men, for a given country (C), year (Y) and IPC section (I) = $WICYI/TICYI/MICYI/TICYI = WICYI/MICYI$</p> <p>Where:</p> <p>(WICYI) Sum of fractionalised inventorships for women in a given country (C), year (Y) and section (I, based on the International Patent Classification [IPC]). Unit: Total of fractionalized counts.</p> <p>(MICYI) Sum of fractionalised inventorships for men in a given country (C), year (Y) and IPC section (I). Unit: Total of fractionalized counts.</p> <p>(TICYI) Sum of fractionalized inventorships across women and men in a given country (C), year (Y) and IPC section (I). Unit: Total of fractionalized counts.</p> <p>(NCYI) Total number of fractionalized inventorships in a given country (C), year (Y) and IPC section (I). Unit: Total of fractionalized counts.</p>
Coverage	EU28 & NO (2010-2013 Pooled & 2013-2016 Pooled)
Data Missing	Data missing: none
Flagged observations	None
Data comments	<p>Other: Error bars represent the 90 % confidence intervals, accounting for potential biases due to the inability to infer the sex of inventors on some patent applications. It assumes that the attribution of a sex to an inventor's name is 100 % accurate (i.e. that the gender attributed to a given inventor name is always the correct one; in other words, that there are no misattributions).</p> <p>Source: Computed by using European patent applications (kind codes A1 and A2) in PATSTAT.cable for: MT, FO, AL, ME, MK, BA, MD; Exceptions to the reference period: MT: 2002–2013;</p>
Description	This indicator is the ratio of women to men inventorships, or equivalently, the ratio of the proportion of women inventorships (in total inventorships) compared to the equivalent proportion for men. The absolute number of inventorships used in computing this indicator is based on fractionalised counts of patent applications across



Metric/indicator	Women to men ratio of inventorships, all International Patent Classification (IPC) sections
	their corresponding inventors: for example, if a patent application involves 10 inventors, each inventor is attributed an equal fraction of the inventorships (i.e. 1/10 of the invention). A score above 1 indicates that women in a given country produced a larger proportion of the country's inventions than men, whereas a score below 1 means the opposite.
Extraction date	06.01.20
Unit	
Name in MoRRI	GE10.2
Important definitions	

Figure 14 depicts the development in the women to men ratio of inventorships, according to International Patent Classification, for EU28-NO for the two periods 2010-2013 and 2013-2016.

Again, there are significant differences across countries and no distinct trend from the first to the second period covered. Latvia stands out with a comparatively higher ratio of women to men inventorships.

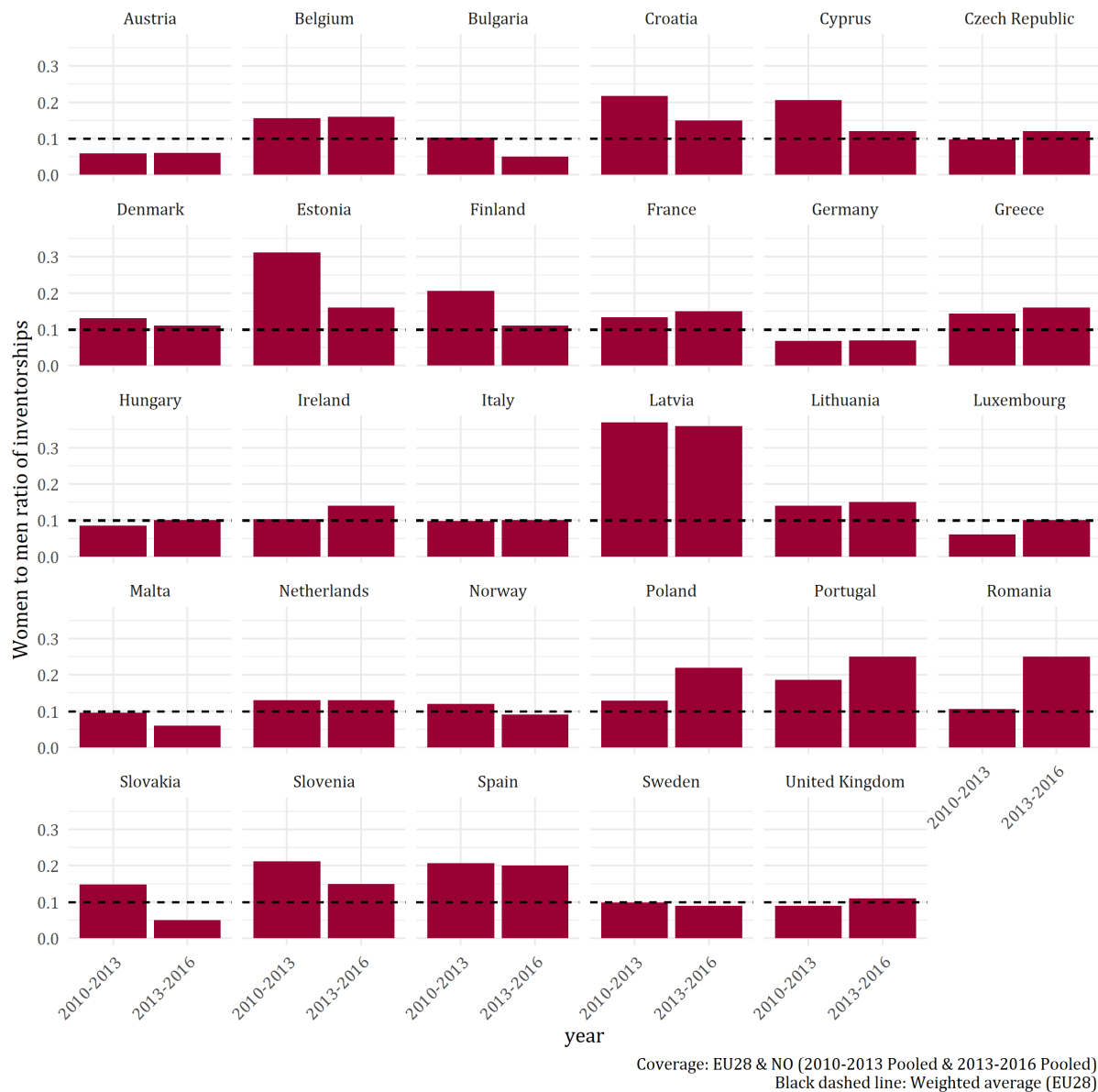


Figure 14 Women to men ratio in number of inventorships



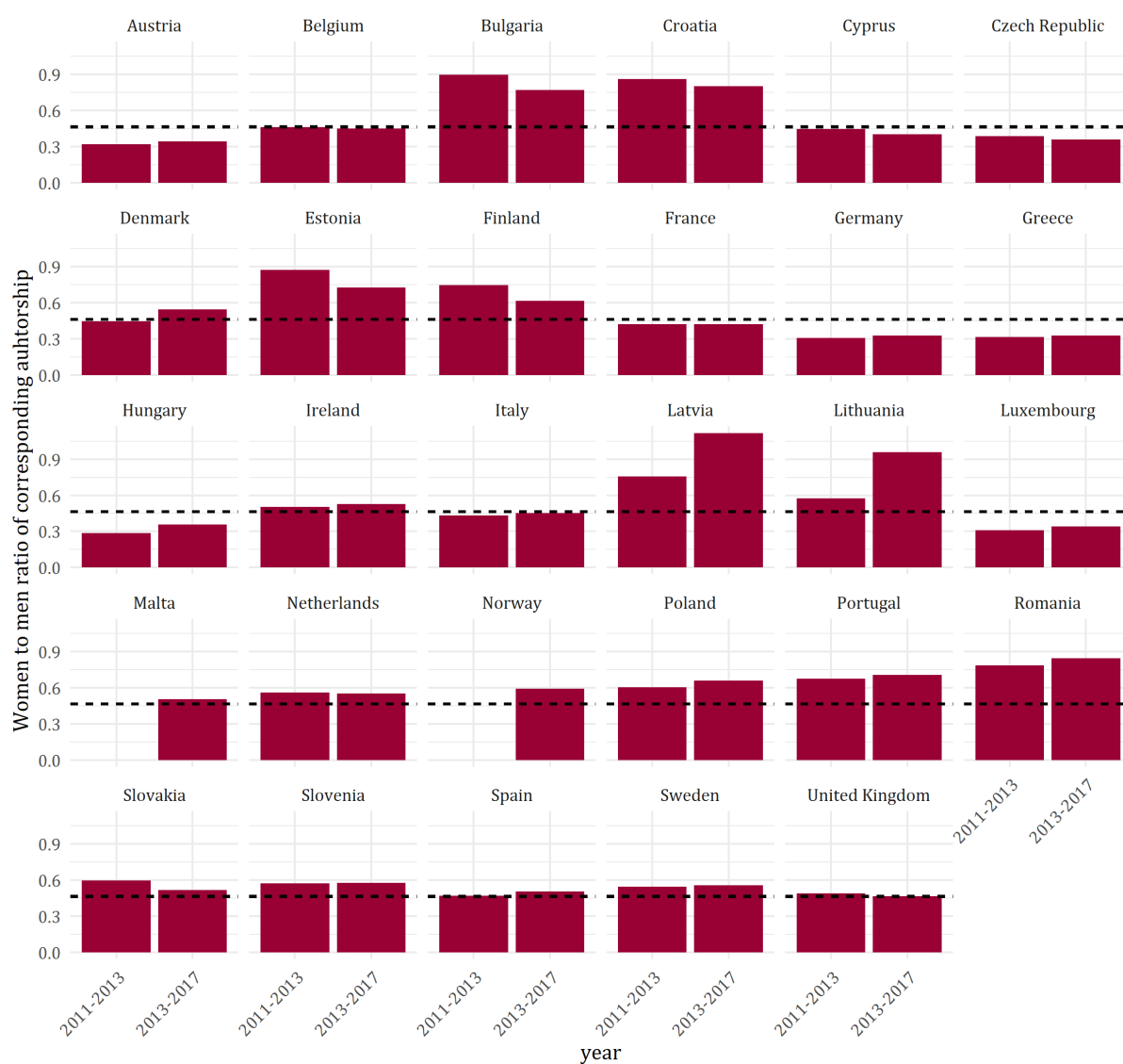
2.2.2.3 The women to men ratio in number of corresponding authorships

Table 16 The women to men ratio in number of corresponding authorships

Metric/indicator	Women to men ratio of corresponding authorship in all fields of R&D
Source	She Figures 2018, 2015
Source website and metadata	https://data.europa.eu/euodp/en/data/dataset/she-figures-2018-gender-in-research-and-innovation https://data.europa.eu/euodp/en/data/dataset/she-figures-2015-gender-in-research-and-innovation
Source methodology	See She Figures handbook 2018
Coverage	EU28 & NO (2011-2013 Pooled & 2013-2017 Pooled)
Data Missing	Data missing: MT and NO (2011)
Flagged observations	None
Data comments	Values represent the average yearly ratio for the period 2013-2017
Description	This indicator is the ratio of publications authored by a woman to those authored by men. It is based on peer-reviewed scientific publications (articles, reviews, conference papers). A score above 1 indicates that women in a given country contribute more to the research output than men whereas a score below 1 means the opposite
Extraction date	06.01.20
Unit	Ratio
Name in MoRRI	GE10.1
Important definitions	

Figure 15 depicts the development in the women to men ratio of corresponding authorships in all fields of R&D for the EU28-NO for the two periods 2010-2013 and 2013-2017.

In the 2013-2017 period, Latvia and Portugal have the highest women to men ratio of corresponding authorship in all fields of R&D. Latvia is the only country with more women than men as corresponding authors.



Coverage: EU28 & NO (2011-2013 Pooled & 2013-2017 Pooled).
Data missing: 2011-2013 (MT, NO).
Black dashed line: Weighted average (EU28).

Figure 15 Women to men ratio in number of corresponding authorships within R&D



2.2.2.4 Percentage of open access publications

Table 17 Percentage of open access publications

Metric/indicator	Percentage of open access publications
Source	CWTS Leiden based on WoS and Unpaywall data
Source website and metadata	https://www.cwts.nl/blog?article=n-r2w2a4&title=indicators-of-open-access-publishing-in-the-cwts-leiden-ranking-2019 https://unpaywall.org/
Source methodology	<p>Martín-Martín, A., Costas, R., van Leeuwen, T., & Delgado López-Cózar, E. (2018). Evidence of open access of scientific publications in Google Scholar: A large-scale analysis. <i>Journal of Informetrics</i>, 12(3), 819-841. https://doi.org/10.1016/j.joi.2018.06.012</p> <p>Piwowar, H., Priem, J., Larivière, V., Alperin, J. P., Matthias, L., Norlander, B., ... Haustein, S. (2018). The state of OA: a large-scale analysis of the prevalence and impact of Open Access articles. <i>PeerJ</i>, 6, e4375. https://doi.org/10.7717/peerj.4375</p> <p>van Leeuwen, T.N., Meijer, I., Yegros-Yegros, A., & Costas, R. (2017). Developing indicators on open access by combining evidence from diverse data sources. In <i>Proceedings of the 2017 STI Conference</i>. https://arxiv.org/abs/1802.02827</p>
Coverage	EU28 & NO (2010-2019)
Data Missing	No data missing
Flagged observations	None
Data comments	<p>Data is a linking of Unpaywall data to WoS data. An issue is the way the data are linked, namely via DOIs, whereby Unpaywall is a fully DOI-based system, while WoS is not.</p> <p>If we would measure OA uptake across all WoS publications, including the ones that do not carry a DOI, we would create a somewhat distorted perspective on OA uptake, which is underrepresenting the real situation. Therefore we take out the WoS publications without a DOI, and do produce OA uptake percentages after this has been taken care off. This is now more accurate, but one has to keep in mind that this is only a partial representation of OA uptake, given this a-symmetry between WoS and Unpaywall, on top of already known problems with WoS coverage regarding some domains (SSH in particular).</p>
Description	Proportion of publications from WoS (with DOI) that are registered as published in an open access publication by Unpaywall in a given year for a given country.
Extraction date	07/10/2020
Unit	Percentage of publications
Name in MoRRI	OA1.1
Important definitions	



Figure 16 shows the development in the percentage of open access publications for the EU28-NO from 2010 to 2019.

The trend is fairly uniform across countries, with higher proportions of overall publication output (as covered by the databases) becoming openly accessible.

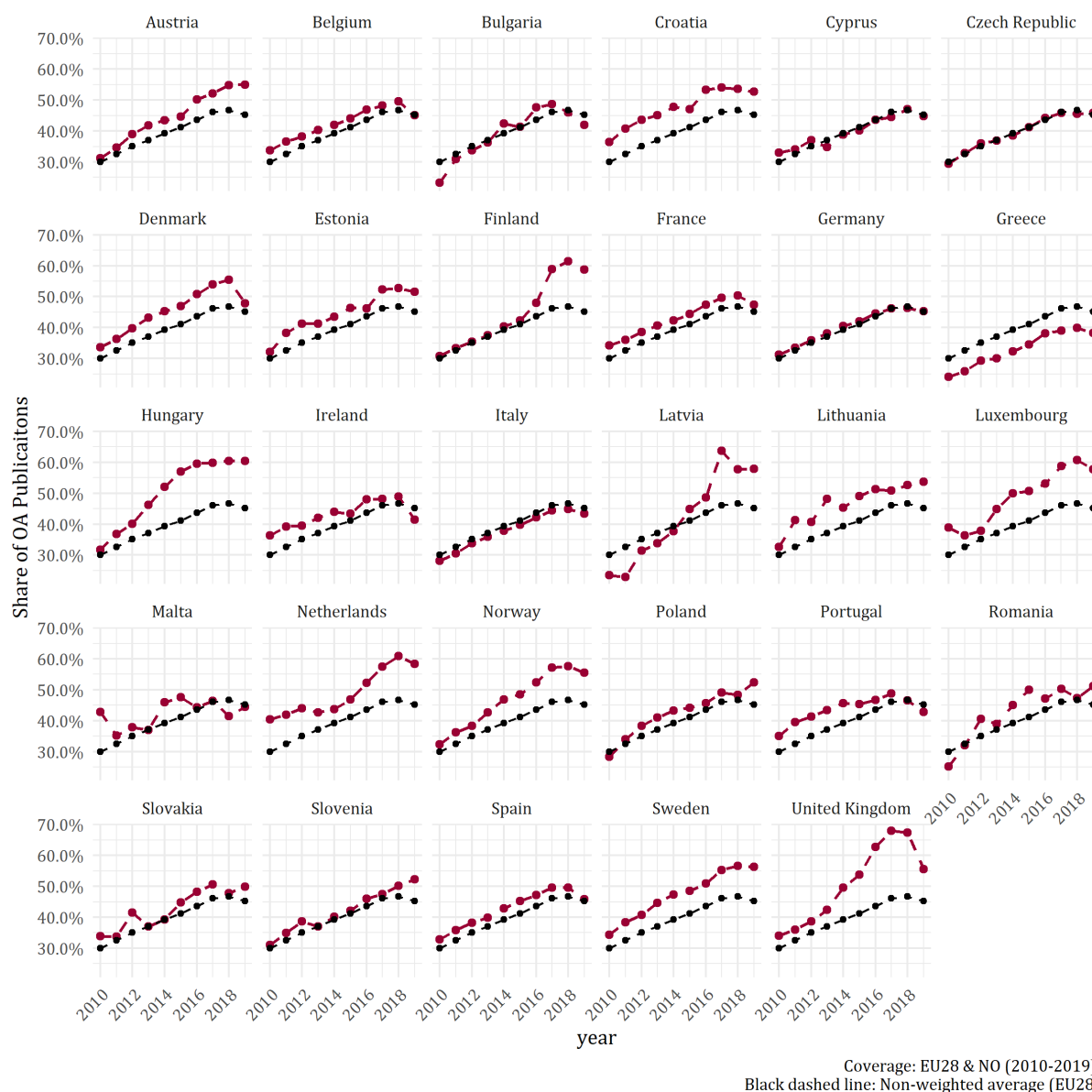


Figure 16 Percentage of open access publications



2.2.2.5 Percentage of open access publications (Green)

Table 18 Percentage of open access publications (Green)

Metric/indicator	Percentage of open access publications (Green)
Source	CWTS Leiden based on WoS and Unpaywall data
Source website and metadata	https://www.cwts.nl/blog?article=n-r2w2a4&title=indicators-of-open-access-publishing-in-the-cwts-leiden-ranking-2019 https://unpaywall.org/
Source methodology	Martín-Martín, A., Costas, R., van Leeuwen, T., & Delgado López-Cózar, E. (2018). Evidence of open access of scientific publications in Google Scholar: A large-scale analysis. <i>Journal of Informetrics</i> , 12(3), 819-841. https://doi.org/10.1016/j.joi.2018.06.012 Piwowar, H., Priem, J., Larivière, V., Alperin, J. P., Matthias, L., Norlander, B., ... Haustein, S. (2018). The state of OA: a large-scale analysis of the prevalence and impact of Open Access articles. <i>PeerJ</i> , 6, e4375. https://doi.org/10.7717/peerj.4375 van Leeuwen, T.N., Meijer, I., Yegros-Yegros, A., & Costas, R. (2017). Developing indicators on open access by combining evidence from diverse data sources. In <i>Proceedings of the 2017 STI Conference</i> . https://arxiv.org/abs/1802.02827
Coverage	EU28 & NO (2010-2019)
Data Missing	No data missing
Flagged observations	No flagged date
Data comments	Data is a linking of Unpaywall data to WoS data. An issue is the way the data are linked, namely via DOIs, whereby Unpaywall is a fully DOI-based system, while WoS is not. If we would measure OA uptake across all WoS publications, including the ones that do not carry a DOI, we would create a somewhat distorted perspective on OA uptake, which is underrepresenting the real situation. Therefore we take out the WoS publications without a DOI, and do produce OA uptake percentages after this has been taken care off. This is now more accurate, but one has to keep in mind that this is only a partial representation of OA uptake, given this a-symmetry between WoS and Unpaywall, on top of already known problems with WoS coverage regarding some domains (SSH in particular).
Description	Proportion of publications from WoS (with DOI) that are registered as published in an open access publication by Unpaywall in a given year for a given country.
Extraction date	07/10/2020
Unit	Percentage of publications
Name in MoRRI	OA1.1
Important definitions	Green OA is a form of OA publishing in which publications are stored in an openly accessible database, also called an archive or repository.



Figure 17 depicts the development in the percentage of *green* open access publications for the EU28-NO for the period 2010-2019. Green open access is a form of open access publishing in which a version of the author's manuscript is placed in an openly accessible archive or repository.

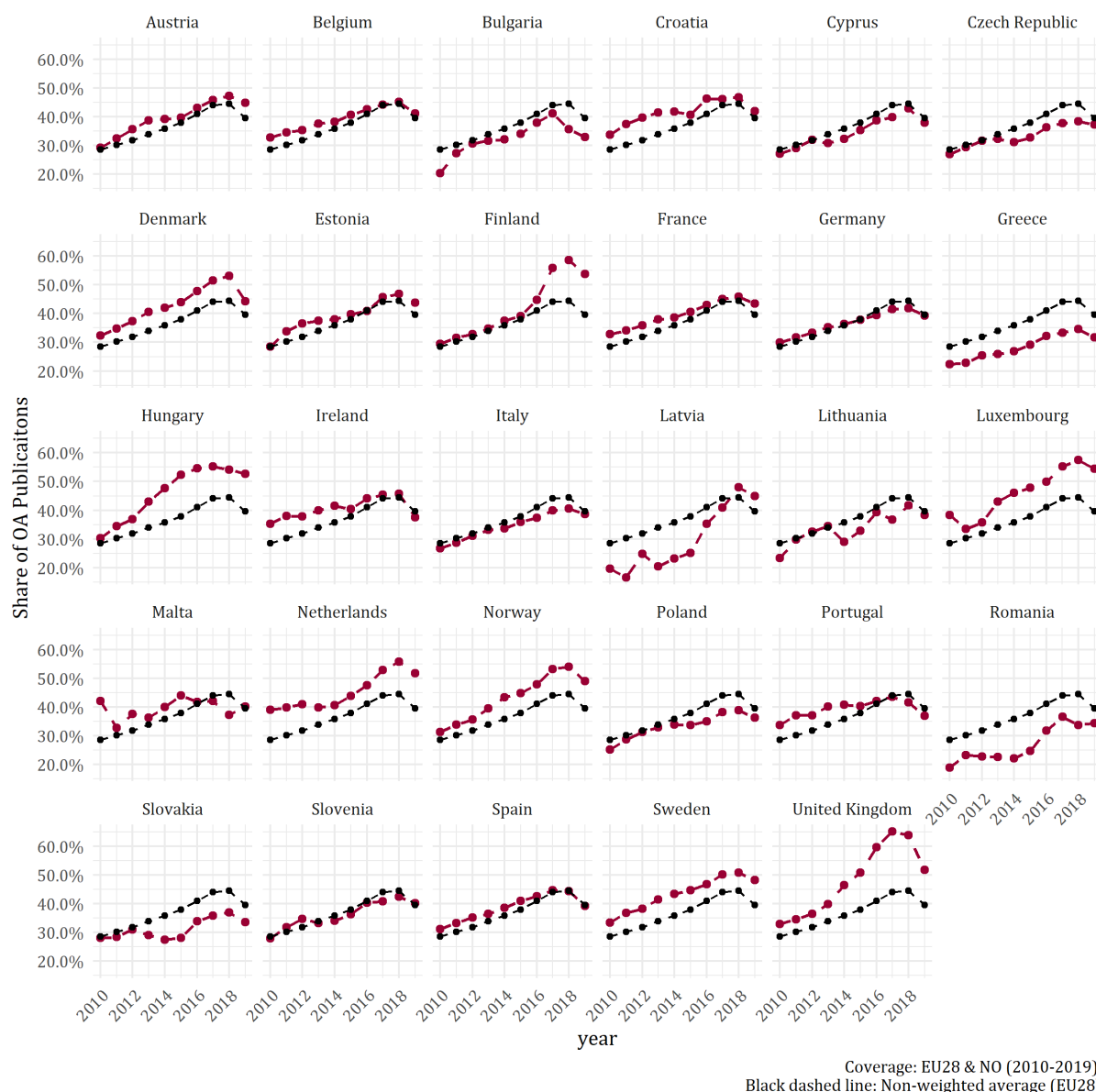


Figure 17 Percentage of open access publications (Green)



2.2.2.6 Percentage of open access publications (Gold)

Table 19 Percentage of open access publications (Gold)

Metric/indicator	Percentage of open access publications (Gold)
Source	CWTS Leiden based on WoS and Unpaywall data
Source website and metadata	https://www.cwts.nl/blog?article=n-r2w2a4&title=indicators-of-open-access-publishing-in-the-cwts-leiden-ranking-2019 https://unpaywall.org/
Source methodology	<p>Martín-Martín, A., Costas, R., van Leeuwen, T., & Delgado López-Cózar, E. (2018). Evidence of open access of scientific publications in Google Scholar: A large-scale analysis. <i>Journal of Informetrics</i>, 12(3), 819-841. https://doi.org/10.1016/j.joi.2018.06.012</p> <p>Piwowar, H., Priem, J., Larivière, V., Alperin, J. P., Matthias, L., Norlander, B., ... Haustein, S. (2018). The state of OA: a large-scale analysis of the prevalence and impact of Open Access articles. <i>PeerJ</i>, 6, e4375. https://doi.org/10.7717/peerj.4375</p> <p>van Leeuwen, T.N., Meijer, I., Yegros-Yegros, A., & Costas, R. (2017). Developing indicators on open access by combining evidence from diverse data sources. In <i>Proceedings of the 2017 STI Conference</i>. https://arxiv.org/abs/1802.02827</p>
Coverage	EU28 & NO (2010-2019)
Data Missing	No data missing
Flagged observations	No flagged date
Data comments	<p>Data is a linking of Unpaywall data to WoS data. An issue is the way the data are linked, namely via DOIs, whereby Unpaywall is a fully DOI-based system, while WoS is not.</p> <p>If we would measure OA uptake across all WoS publications, including the ones that do not carry a DOI, we would create a somewhat distorted perspective on OA uptake, which is underrepresenting the real situation. Therefore we take out the WoS publications without a DOI, and do produce OA uptake percentages after this has been taken care off. This is now more accurate, but one has to keep in mind that this is only a partial representation of OA uptake, given this a-symmetry between WoS and Unpaywall, on top of already known problems with WoS coverage regarding some domains (SSH in particular).</p>
Description	Proportion of publications from WoS (with DOI) that are registered as published in an open access publication by Unpaywall in a given year for a given country.
Extraction date	07/10/2020
Unit	Percentage of publications
Name in MoRRI	OA1.1



Metric/indicator	Percentage of open access publications (Gold)
Important definitions	Gold OA relates to publications in OA journals. To identify Gold OA publications, we expand beyond the Directory of Open Access Journals list and select publications identified by Unpaywall in OA journals in general.

Figure 18 depicts the development in the percentage of *gold* open access publications for the EU28-NO for the period 2010-2019. Gold open access ensures that the final version of the publication is made fully and permanently accessible immediately.

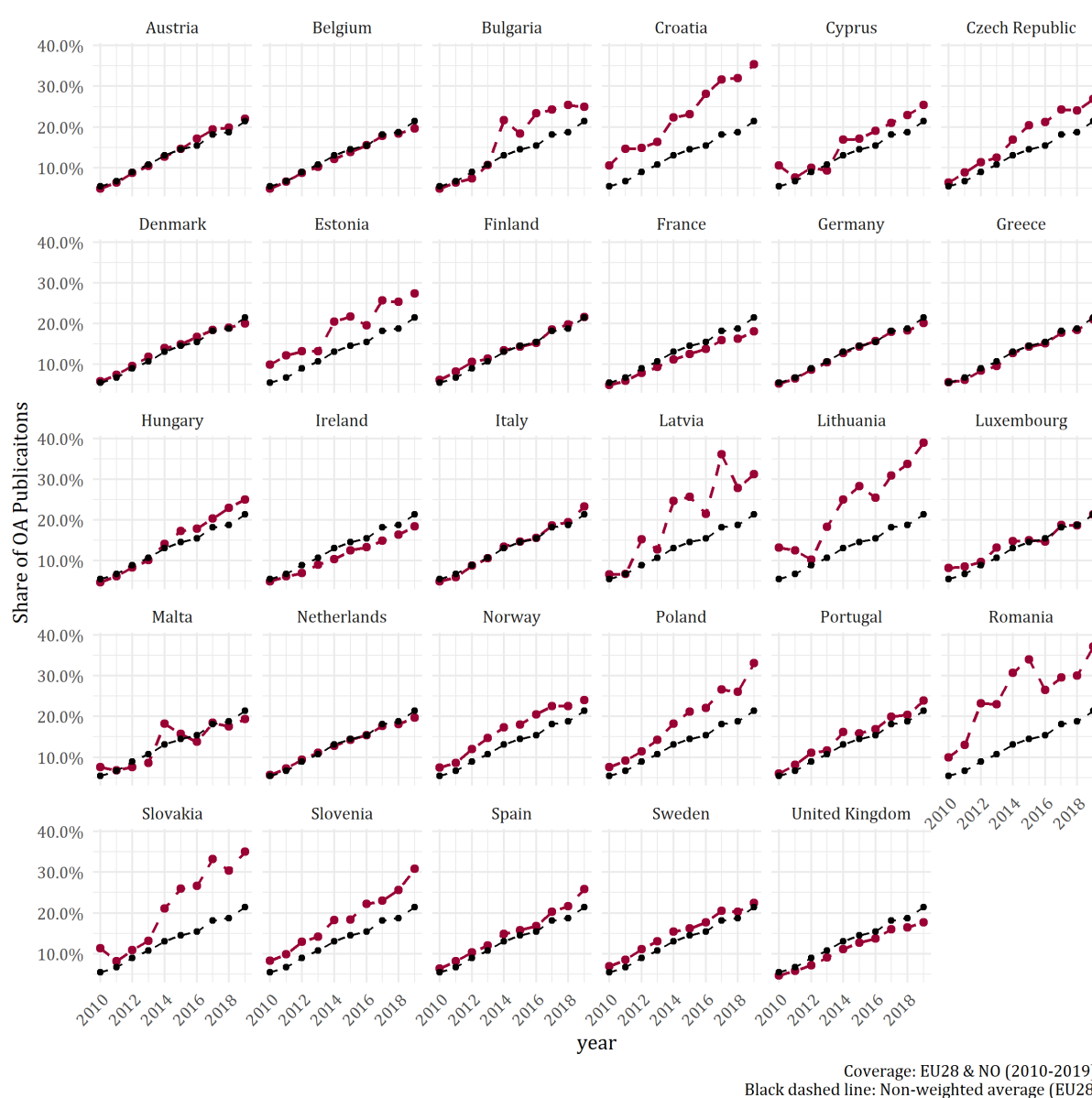


Figure 18 Percentage of open access publications (Gold)



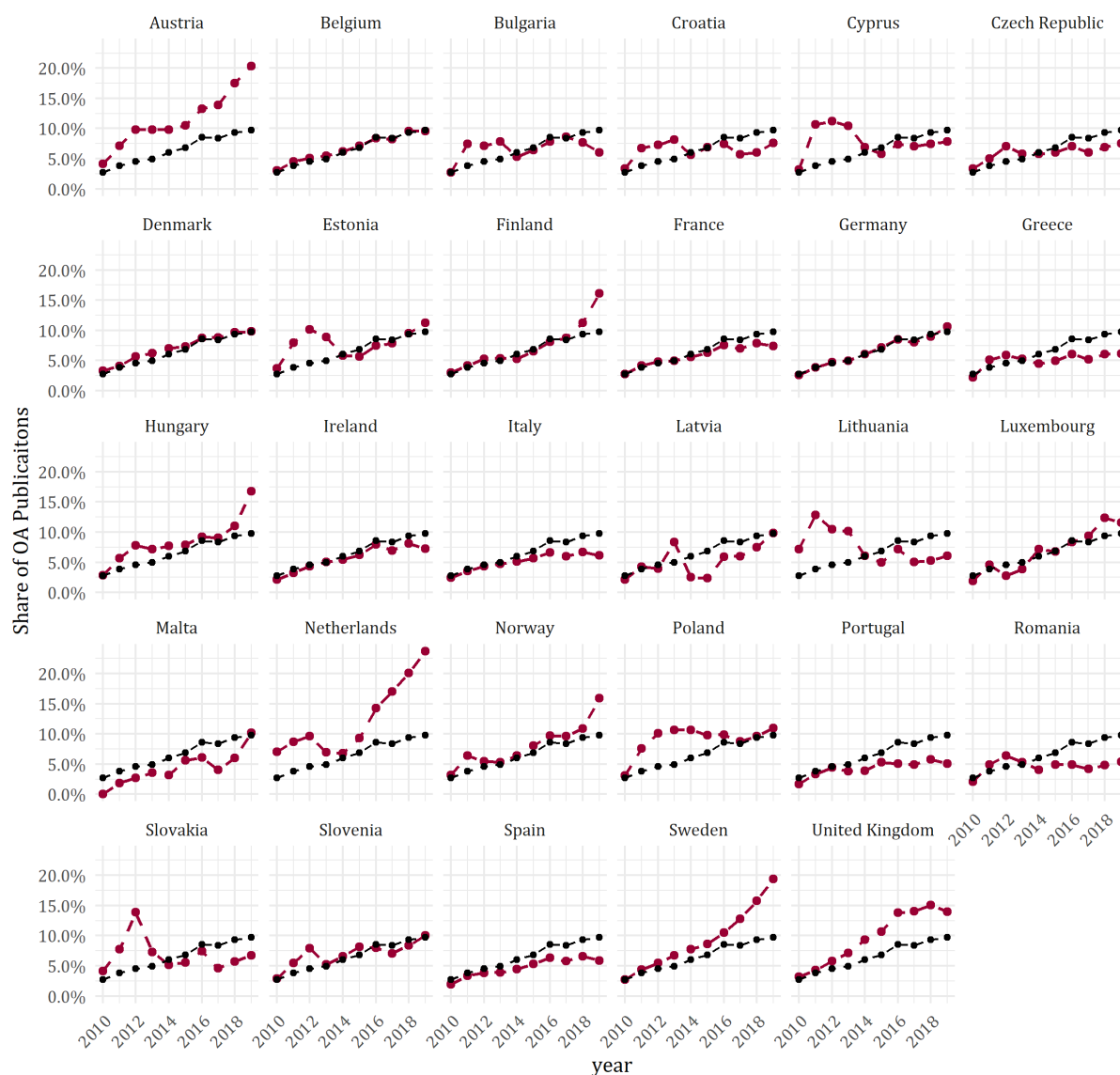
2.2.2.7 Percentage of open access publications (Hybrid)

Table 20 Percentage of open access publications (Hybrid)

Metric/indicator	Percentage of open access publications (Hybrid)
Source	CWTS Leiden based on WoS and Unpaywall data
Source website and metadata	https://www.cwts.nl/blog?article=n-r2w2a4&title=indicators-of-open-access-publishing-in-the-cwts-leiden-ranking-2019 https://unpaywall.org/
Source methodology	<p>Martín-Martín, A., Costas, R., van Leeuwen, T., & Delgado López-Cózar, E. (2018). Evidence of open access of scientific publications in Google Scholar: A large-scale analysis. <i>Journal of Informetrics</i>, 12(3), 819-841. https://doi.org/10.1016/j.joi.2018.06.012</p> <p>Piwowar, H., Priem, J., Larivière, V., Alperin, J. P., Matthias, L., Norlander, B., ... Haustein, S. (2018). The state of OA: a large-scale analysis of the prevalence and impact of Open Access articles. <i>PeerJ</i>, 6, e4375. https://doi.org/10.7717/peerj.4375</p> <p>van Leeuwen, T.N., Meijer, I., Yegros-Yegros, A., & Costas, R. (2017). Developing indicators on open access by combining evidence from diverse data sources. In <i>Proceedings of the 2017 STI Conference</i>. https://arxiv.org/abs/1802.02827</p>
Coverage	EU28 & NO (2010-2019)
Data Missing	No data missing
Flagged observations	No flagged date
Data comments	<p>Data is a linking of Unpaywall data to WoS data. An issue is the way the data are linked, namely via DOIs, whereby Unpaywall is a fully DOI-based system, while WoS is not.</p> <p>If we would measure OA uptake across all WoS publications, including the ones that do not carry a DOI, we would create a somewhat distorted perspective on OA uptake, which is underrepresenting the real situation. Therefore we take out the WoS publications without a DOI, and do produce OA uptake percentages after this has been taken care off. This is now more accurate, but one has to keep in mind that this is only a partial representation of OA uptake, given this a-symmetry between WoS and Unpaywall, on top of already known problems with WoS coverage regarding some domains (SSH in particular).</p>
Description	Proportion of publications from WoS (with DOI) that are registered as published in an open access publication by Unpaywall in a given year for a given country.
Extraction date	07/10/2020
Unit	Percentage of publications
Name in MoRRI	Not included in MoRRI
Important definitions	Hybrid OA is a form of OA publishing in which the author(s) of a publication pay for OA publishing in a non-OA journal, thereby creating open accessibility to a single publication in an otherwise toll access journal.



Figure 19Figure 18 depicts the development in the percentage of *hybrid* open access publications for the EU28-NO for the period 2010-2019. Hybrid open access is a form of open access publishing in which the author(s) of a publication pay for open access publishing in a non-open access journal, thereby creating open accessibility to a single publication in an otherwise toll access journal.



Coverage: EU28 & NO (2010-2019).
Black dashed line: Non-weighted average (EU28)

Figure 19 Percentage of open access publications (Hybrid)



2.2.2.8 Percentage of open access publications (Bronze)

Table 21 Percentage of open access publications (Bronze)

Metric/indicator	Percentage of open access publications (Bronze)
Source	CWTS Leiden based on WoS and Unpaywall data
Source website and metadata	https://www.cwts.nl/blog?article=n-r2w2a4&title=indicators-of-open-access-publishing-in-the-cwts-leiden-ranking-2019 https://unpaywall.org/
Source methodology	<p>Martín-Martín, A., Costas, R., van Leeuwen, T., & Delgado López-Cózar, E. (2018). Evidence of open access of scientific publications in Google Scholar: A large-scale analysis. <i>Journal of Informetrics</i>, 12(3), 819-841. https://doi.org/10.1016/j.joi.2018.06.012</p> <p>Piwowar, H., Priem, J., Larivière, V., Alperin, J. P., Matthias, L., Norlander, B., ... Haustein, S. (2018). The state of OA: a large-scale analysis of the prevalence and impact of Open Access articles. <i>PeerJ</i>, 6, e4375. https://doi.org/10.7717/peerj.4375</p> <p>van Leeuwen, T.N., Meijer, I., Yegros-Yegros, A., & Costas, R. (2017). Developing indicators on open access by combining evidence from diverse data sources. In <i>Proceedings of the 2017 STI Conference</i>. https://arxiv.org/abs/1802.02827</p>
Coverage	EU28 & NO (2010-2019)
Data Missing	No data missing
Flagged observations	No flagged date
Data comments	<p>Data is a linking of Unpaywall data to WoS data. An issue is the way the data are linked, namely via DOIs, whereby Unpaywall is a fully DOI-based system, while WoS is not.</p> <p>If we would measure OA uptake across all WoS publications, including the ones that do not carry a DOI, we would create a somewhat distorted perspective on OA uptake, which is underrepresenting the real situation. Therefore we take out the WoS publications without a DOI, and do produce OA uptake percentages after this has been taken care off. This is now more accurate, but one has to keep in mind that this is only a partial representation of OA uptake, given this a-symmetry between WoS and Unpaywall, on top of already known problems with WoS coverage regarding some domains (SSH in particular).</p>
Description	Proportion of publications from WoS (with DOI) that are registered as published in an open access publication by Unpaywall in a given year for a given country.
Extraction date	07/10/2020
Unit	Percentage of publications
Name in MoRRI	Not included in MoRRI
Important definitions	Bronze OA is a form of OA publishing where publishers make publications openly accessible without a clear license. According to the criteria outlined above, this is not a sustainable form of OA. However, for reasons of completeness, we have chosen to



Metric/indicator	Percentage of open access publications (Bronze)
	report Bronze OA as a separate OA category in the Leiden Ranking 2019, and consequently Bronze OA is also included in the overall counting of OA publications.

Figure 20 depicts the development in the percentage of *bronze* open access publications for the EU28-NO for the period 2010-2019. Bronze open access is a form of open access publishing where publishers make publications openly accessible without a clear license.

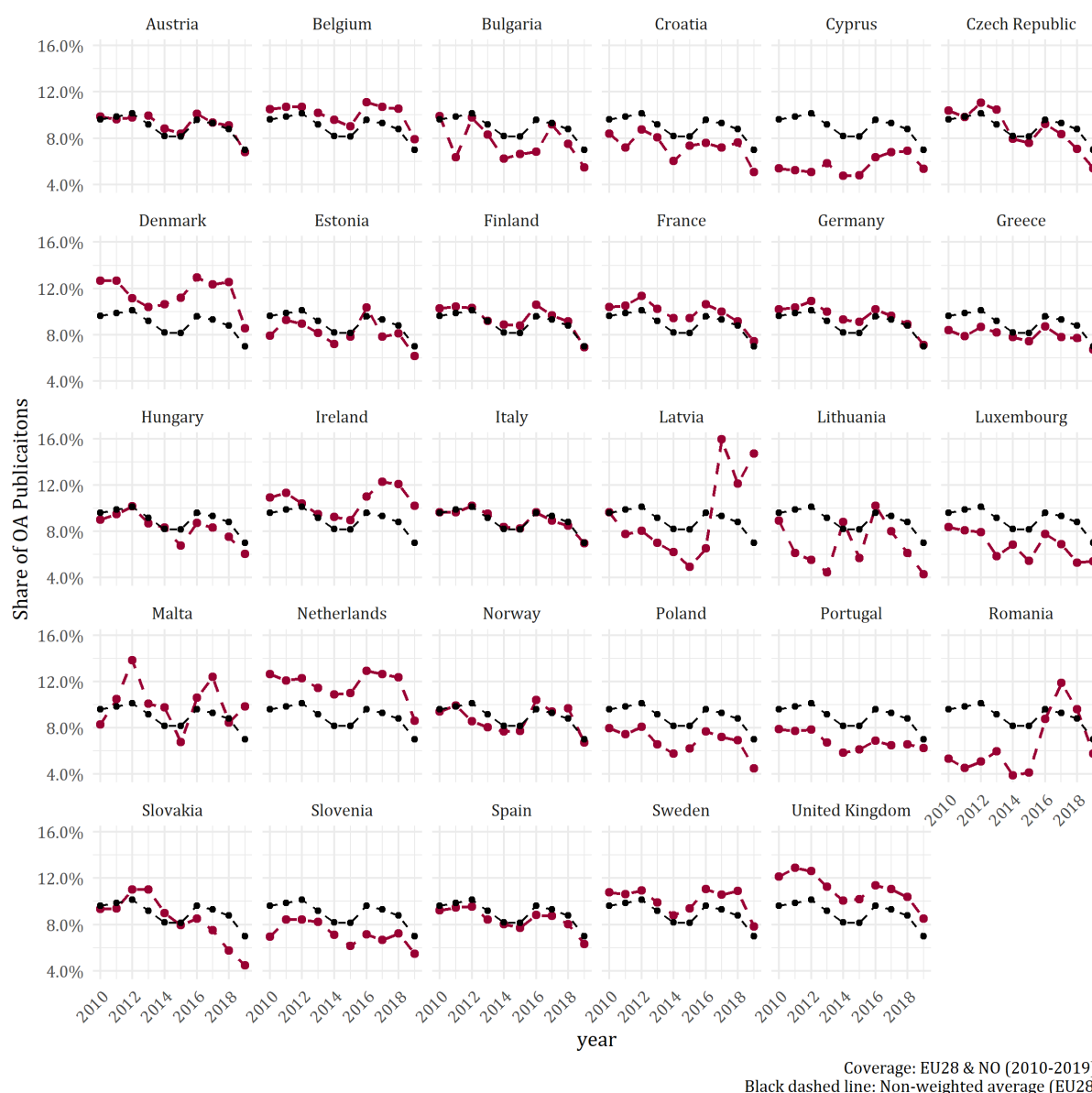


Figure 20 Percentage of open access publications (Bronze)



2.2.2.9 Percentage of co-publications with industry

Table 22 Percentage of co-publications with industry

Metric/indicator	Percentage of publications classified as industry co-publications
Source	CWTS Leiden based on WoS and Unpaywall data
Source website and metadata	https://www.leidenranking.com/information/indicators#collaboration-indicators https://unpaywall.org/
Source methodology	Number of publications with industry collaboration(IC) divided by the number of publications (P) times 100. $IC/P*100$
Coverage	2010-2019 EU28 + NO
Data Missing	No data missing
Flagged observations	No flagged
Data comments	
Description	Proportion of publications from WoS that are categorised as being part of a collaboration between a University actor and an industry actor.
Extraction date	07/10/2020
Unit	Percentage of publications
Name in MoRRI	Not included in MoRRI
Important definitions	

Figure 21 illustrates the development in the percentage of publications classified as industry co-publications for the EU28-NO from 2010 to 2019.

On European average, there is no significant developemt over time concerning the share of publications produced in a university-industry collaboration. In 2019, Slovenia and Germany have the highest percentage of industry co-publications, with a share of 3,9% and 3,5% respectively.

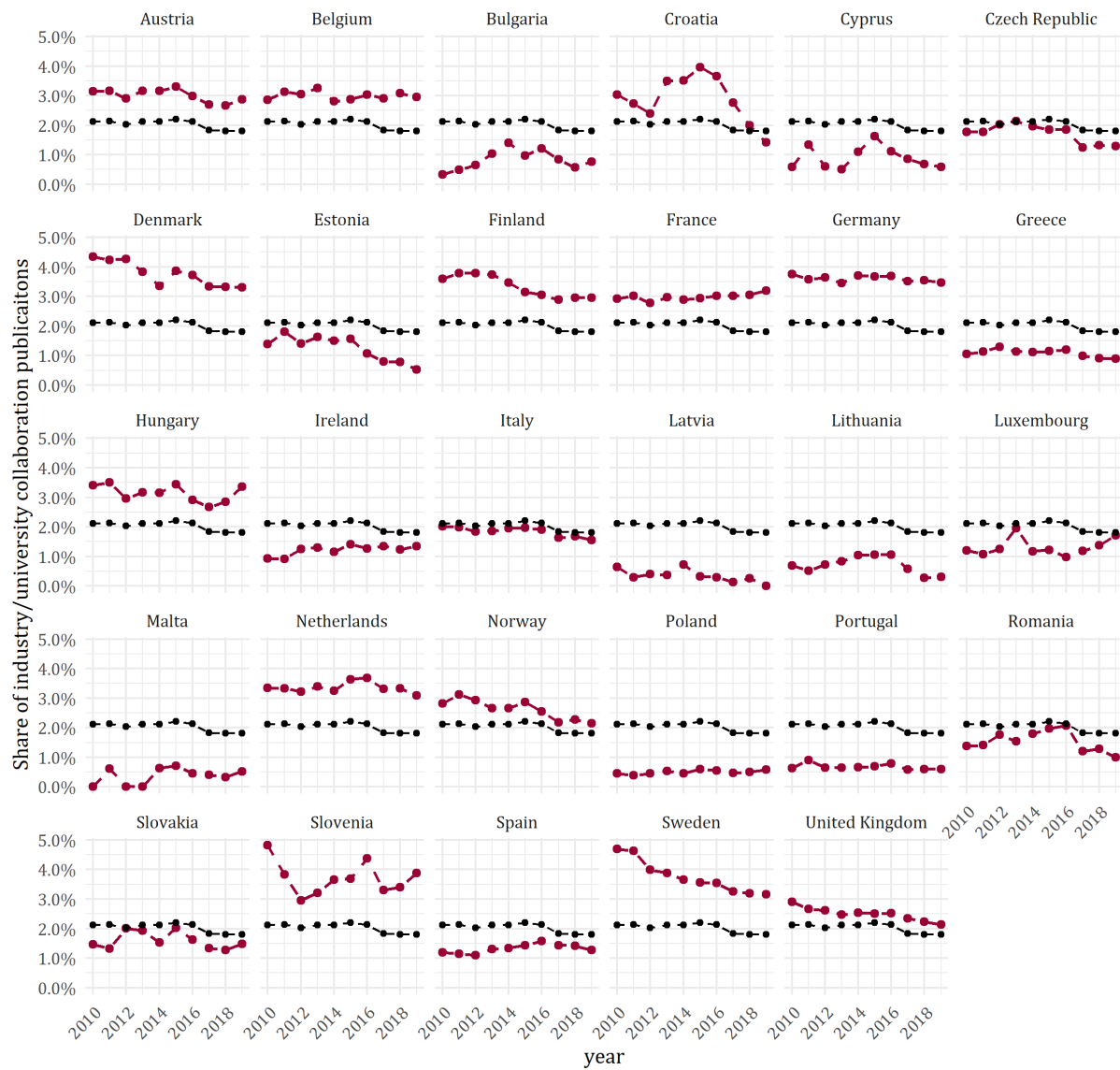


Figure 21 Percentage of publications classified as industry co-publications



2.2.3 Monitoring RRI using Eurobarometer data

2.2.3.1 Interest in scientific discoveries

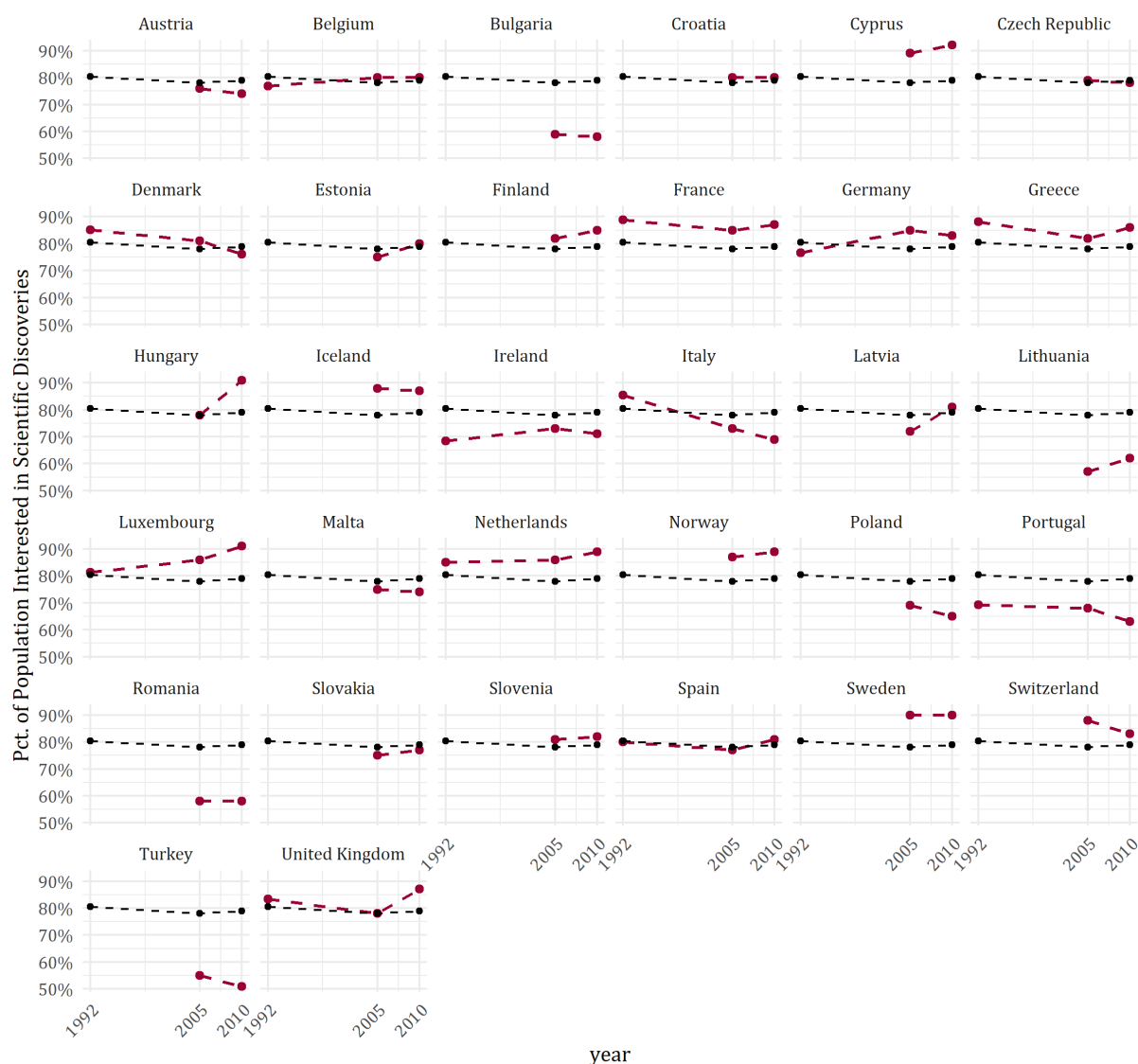
Table 23 Interest in scientific discoveries

Metric/indicator	Percentage of the EU-public interested in scientific discoveries
Source	Eurobarometer Surveys: EB 38.1, EB 224, & EB 340
Source website and metadata	https://library.carleton.ca/sites/default/files/find/data/surveys/pdf_files/eurob381-92-gid.pdf http://ec.europa.eu/commfrontoffice/publicopinion/archives/ebs/ebs_224_report_en.pdf http://ec.europa.eu/commfrontoffice/publicopinion/archives/ebs/ebs_340_en.pdf
Source methodology	Item formulation: “For each issue (New scientific discoveries) I read out, please tell me if you are ...” (1992, 2005). “In everyday life, we have to deal with many different problems and situations, where we feel more or less interested and confident. I am going to read you a number of statements (New scientific discoveries and technological developments). For each of them, please tell me whether you are ...” (2010). Response options : “Very interested”, “Moderately interested”, “Not at all interested” & “Don’t know” (1992, 2005, 2010).
Coverage	1992: EU12 2005 & 2010: EU28 + CH, IS, NO & TR
Data Missing	No data missing
Flagged observations	No flagged
Data comments	
Description	The accumulated yearly proportion of respondents replying that they are either “ <i>Very interested</i> ” or “ <i>Moderately interested</i> ”.
Extraction date	08-09-2020
Unit	Percentage of population.
Name in MoRRI	Not included in MoRRI
Important definitions	



Figure 22 shows the share of citizens that are very or moderately interested in *scientific discoveries* for the EU28 plus CH, IS, NO, and TR for the years 1992, 2005 and 2010.

Looking at the European average, the share of citizens interested in scientific discoveries is rather stable. The average percentage of citizens interested was 80% for the EU12 member states in 1992, and for 2005 and 2010 the average percentage of interested citizens in the EU28 member states was 78% and 79% respectively.



Coverage: EU12 (1992),
EU28 + CH, IS, NO & TR (2005 & 2010).
Black dashed line: Weighted EU Average

Figure 22 Percentage of the EU-public interested in scientific discoveries



2.2.3.2 Feeling of science efficacy

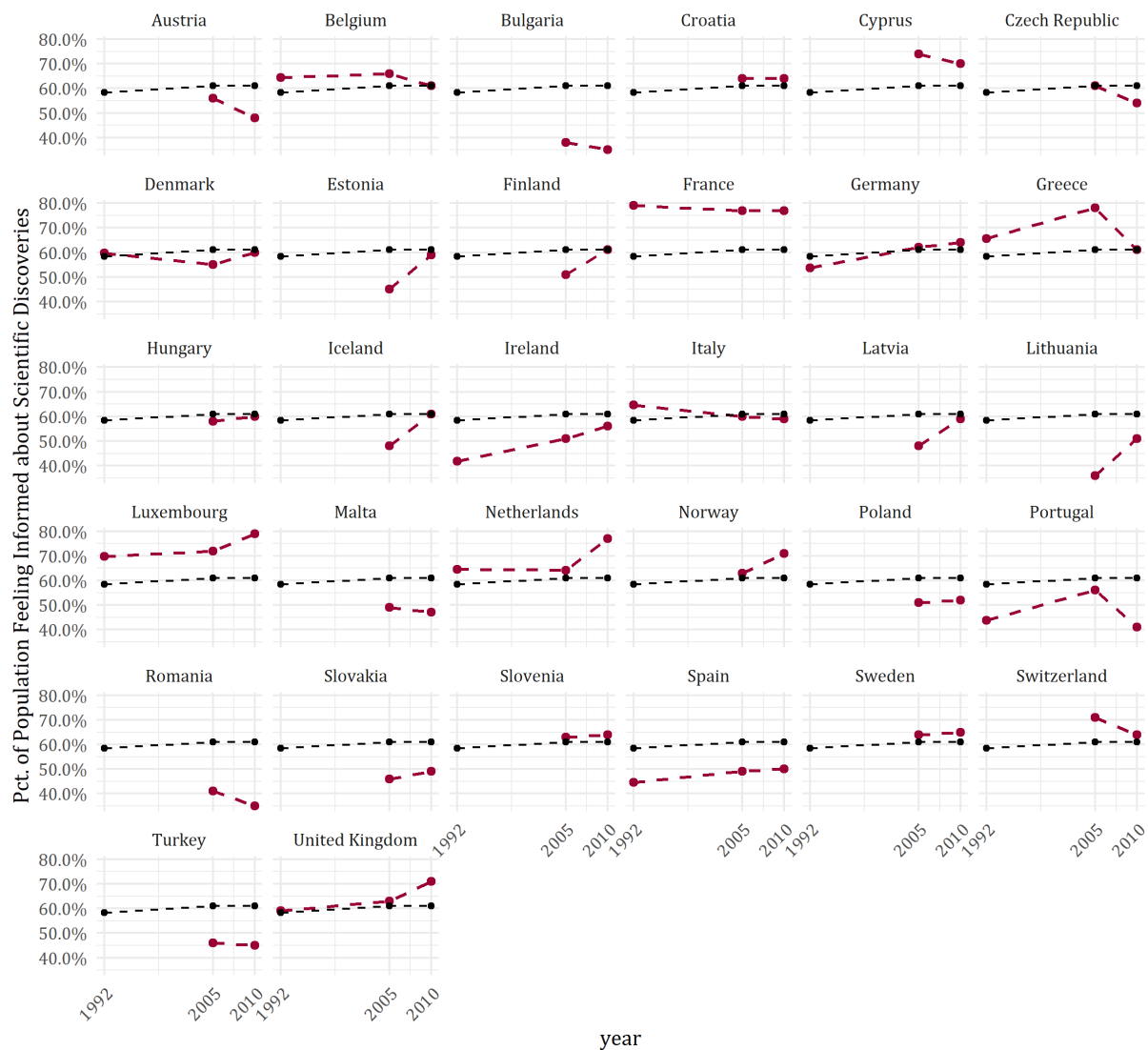
Table 24 Feeling of science efficacy

Metric/indicator	Percentage of the EU-public that feels informed about science
Source	Eurobarometer Surveys: EB 38.1, EB 224 & EB 340
Source website and metadata	https://library.carleton.ca/sites/default/files/find/data/surveys/pdf_files/eurob381-92-gid.pdf http://ec.europa.eu/commfrontoffice/publicopinion/archives/ebs/ebs_224_report_en.pdf http://ec.europa.eu/commfrontoffice/publicopinion/archives/ebs/ebs_340_en.pdf
Source methodology	<p>Item formulation:</p> <p>"I would like you to tell me for each of the following issues (New scientific discoveries) in the news if you are ..." (1992).</p> <p>"For each of the following issues (New scientific discoveries) in the news do you feel ... about it?" (2005).</p> <p>"Would you say that you are ... in scientific research" (2007).</p> <p>"I would like you to tell me for each of the following issues in the news if you feel ..." (2010).</p> <p>Response options :</p> <p>"Very well", "Moderately well", "Poorly" & "Don't know" (1992).</p> <p>"Very well informed", "Moderately well informed", "Poorly informed" & "Don't know" (2005, 2010).</p>
Coverage	<p>1992: EU12</p> <p>2005 & 2010: EU28 + CH, IS, NO & TR</p>
Data Missing	No data missing
Flagged observations	No flagged
Data comments	
Description	The accumulated yearly proportion of respondents that answer either "Very well" or "Moderately well", "Very well informed" or "Moderately well informed", "Very well informed" or "Fairly well informed".
Extraction date	08-09-2020
Unit	Percentage of population.
Name in MoRRI	Not included in MoRRI
Important definitions	



Figure 23 depicts the development in the percentage of citizens that feel very or moderately well informed about developments in science for the EU28 plus CH, IS, NO, and TR for the years 1992, 2005 and 2010.

Similarly to the level of interest in scientific discoveries, the average percentage of citizens that feel reasonably well-informed about science is stable. In 1992, this included 58% of citizens in the EU12 member states, while in both 2005 and 2010 the average percentage of citizens feeling informed about science in the EU28 member states was 61%.



Coverage: EU12 (1992),
EU28 + CH, IS, NO & TR (2005 & 2010),
EU28 (2013).
Black dashed line: Weighted EU Average

Figure 23 Percentage of the EU-public that feels informed about science



2.2.3.3 Scientific literacy

Table 25 Scientific literacy

Metric/indicator	Percentage of correct science-quiz answers within the EU-public
Source	Eurobarometer Surveys: EB 38.1, EB 55.2 & EB 224
Source website and metadata	https://library.carleton.ca/sites/default/files/find/data/surveys/pdf_files/eurob381-92-gid.pdf http://ec.europa.eu/research/press/2001/pr0612en-report.pdf http://ec.europa.eu/commfrontoffice/publicopinion/archives/ebs/ebs_224_report_en.pdf
Source methodology	<p>Quiz questions:</p> <ol style="list-style-type: none"> 1. "The oxygen we breathe comes from plants" (1992, 2001, 2005). 2. "The continents, on which we live have been moving for millions of years and will continue to move in the future" (2001, 2005). <p>"The continents on which we live have been moving their location for millions of years and will continue to move in the future" (1992).</p> <ol style="list-style-type: none"> 3. "Antibiotics kill viruses as well as bacteria" (1992, 2001, 2005). 4. "Lasers work by focusing sound waves" (1992, 2001, 2005). 5. "All radioactivity is man-made" (1992, 2001, 2005). <p>Response options :</p> <p>"True", "False" & "Don't know" (1992, 2001, 2005).</p>
Coverage	<p>1992: EU12</p> <p>2001: EU15</p> <p>2005: EU28 + CH, IS, NO & TR</p>
Data Missing	No data missing
Flagged observations	No flagged
Data comments	
Description	The yearly proportion of correct quiz answers, measured as an average for each respondent.
Extraction date	08-09-2020
Unit	Percentage of correct answers.
Name in MoRRI	Not included in MoRRI
Important definitions	



Figure 24 depicts the development in the average percentage of correct science quiz answers among citizens in the EU28 plus CH, IS, NO, and TR for the years 1992, 2001 and 2005.

The figures provide a very partial impression of the citizens' level of 'text book' knowledge of science. The overall average percentage of correct science quiz answers increased from 56% in 1992 to 66% in 2005. No country saw decreasing levels of science literacy.

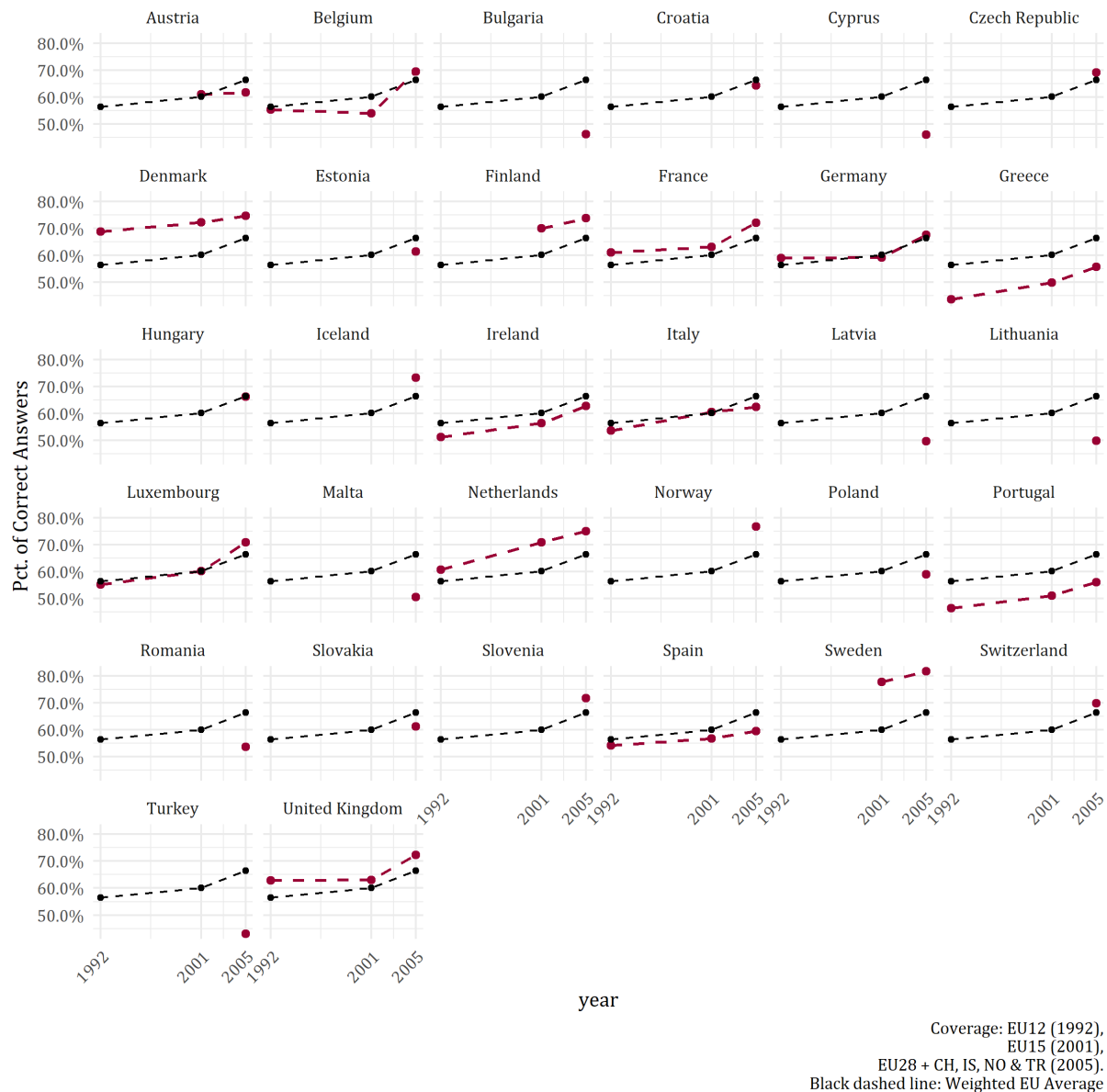


Figure 24 Percentage of correct science quiz answers



2.2.3.4 Trust in scientists

Table 26 Trust in scientists

Metric/indicator	Percentage of the EU-public that believes that scientists are among the best qualified to explain the impact of scientific and technological developments
Source	Eurobarometer Surveys: EB 224, EB 340 & EB 401
Source website and metadata	http://ec.europa.eu/commfrontoffice/publicopinion/archives/ebs/ebs_224_report_en.pdf http://ec.europa.eu/commfrontoffice/publicopinion/archives/ebs/ebs_340_en.pdf http://ec.europa.eu/commfrontoffice/publicopinion/archives/ebs/ebs_401_en.pdf
Source methodology	<p>Item formulation:</p> <p>“Among the following categories of people and organisations, which three are best qualified to explain to you the impacts of scientific and technological developments on society?” (2005).</p> <p>“Among the following categories of people and organisations working in (OUR COUNTRY), which are the best qualified to explain the impact of scientific and technological developments on society?” (2010, 2013).</p> <p>Response options :</p> <ol style="list-style-type: none"> 1. "Scientists working at a university or government laboratories" (2005, 2010, 2013). 2. "Scientists working in industrial laboratory" (2005, 2010). "Scientists working in private company laboratories" (2013). 3. "Newspaper journalists" (2005, 2010, 2013). 4. "Television journalists" (2005, 2010, 2013). 5. "Politicians" (2005, 2010, 2013). 6. "Consumer organizations" (2005, 2010, 2013). 7. "Environmental protection associations" (2005, 2010, 2013). 8. "Industry" (2010, 2013). "The industry" (2005). 9. "The military" (2005, 2010, 2013). 10. "Religious leaders or representatives" (2005). "Representatives of different religions" (2010, 2013). 11. "The Government" (2005) "Government representatives" (2010, 2013). 12. "Medical doctors" (2005, 2010, 2013). 13. "Writers and intellectuals" (2005, 2010, 2013). 14. "Other (SPONTANEOUS)" (2005, 2010). 15. "None (SPONTANEOUS)" (2005, 2010, 2013). 16. "Don't know" (2013). (2005, 2010, 2013).
Coverage	<p>2005 & 2010: EU28 + CH, IS, NO & TR</p> <p>2013: EU28</p>
Data Missing	No data missing



Metric/indicator	Percentage of the EU-public that believes that scientists are among the best qualified to explain the impact of scientific and technological developments
Flagged observations	No flagged
Data comments	
Description	<p>The yearly proportion of respondents choosing scientists, either publicly or privately employed, as part of their answer.</p> <p>Respondents could choose either one, two or three of the response options as their answer.</p>
Extraction date	08-09-2020
Unit	Percentage of respondents choosing scientists, divided between publicly and privately employed scientists.
Name in MoRRI	Not included in MoRRI
Important definitions	

Figure 25 shows the development in the percentage of citizens that believes that scientists are among the best qualified to explain the impact of scientific and technological developments for the EU28 plus CH, IS, NO, and TR for 2005, 2010 and 2013.

The figures tap into levels of trust in scientists. The average percentage of citizens of the EU that believes that scientists are among the best qualified increased for both privately and publicly employed scientist in the time period.

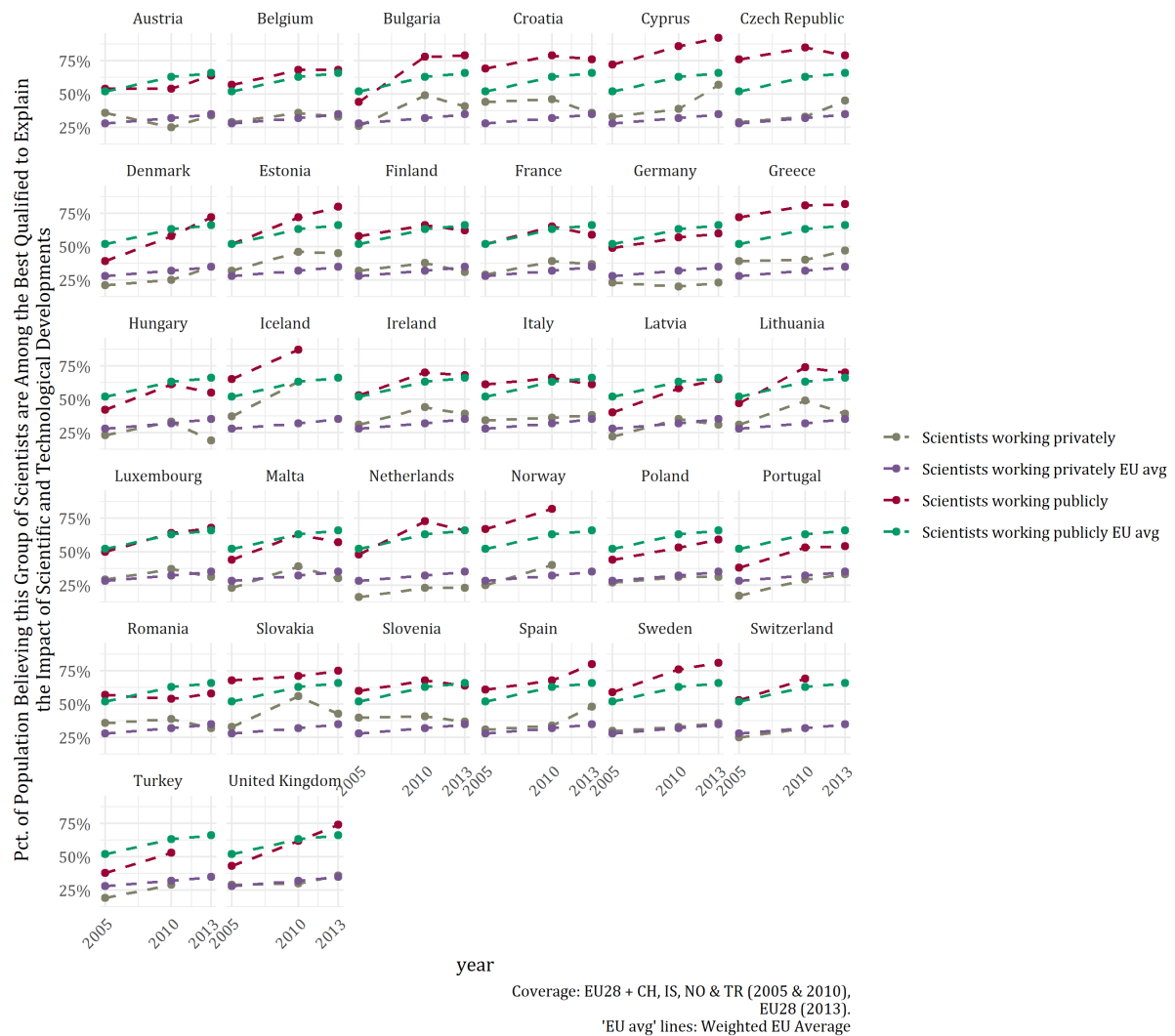


Figure 25 Percentage of the EU-public that believes that scientists are among the best qualified to explain the Impact of Scientific and Technological Developments



2.2.3.5 Engagement and co-creation (meetings and debates)

Table 27 Engagement and co-creation (meetings and debates)

Metric/indicator	Percentage of the EU-public that attends public meetings or debates about science and technology
Source	Eurobarometer Surveys: EB 224 & EB 340
Source website and metadata	http://ec.europa.eu/commfrontoffice/publicopinion/archives/ebs/ebs_224_report_en.pdf http://ec.europa.eu/commfrontoffice/publicopinion/archives/ebs/ebs_340_en.pdf
Source methodology	Item formulation: “How often do you attend public meetings or debates about science and technology?” (2005). “And now, there will be a few questions on how you engage with science and technology. Do you attend public meetings or debates about science and technology?” (2013). Response options : “Regularly”, “Occasionally”, “Hardly ever”, “Never” & “Don’t know” (2005). “Yes, regularly”, “Yes, occasionally”, “No, hardly ever”, “No, never” & “Don’t know” (2013).
Coverage	2005 & 2010: EU28 + CH, IS, NO & TR
Data Missing	No data missing
Flagged observations	No flagged
Data comments	
Description	The accumulated yearly proportion of respondents that answer either “Regularly” or “Occasionally”, “Yes, regularly” or “Yes, occasionally”.
Extraction date	08-09-2020
Unit	Percentage of respondents.
Name in MoRRI	Not included in MoRRI
Important definitions	

Figure 26 illustrates the percentage of citizens that attends public meetings or debates about science and technology for the EU28 plus CH, IS, NO, and TR in 2005 and 2010.

Looking across countries, the share of people who engage with science by attending public meetings or debates about science and technology is fairly low at 10% in 2005 and 9% in 2010.



Figure 26 Percentage of the EU-public that attends public meetings or debates about science and technology



2.2.3.6 Engagement and co-creation (petitions and demonstrations)

Table 1

Table 28 Engagement and co-creation (petitions and demonstrations)

Metric/indicator	Percentage of the EU-public that sign petitions or join street demonstrations on science and technology matters
Source	Eurobarometer Surveys: EB 224 & EB 340
Source website and metadata	http://ec.europa.eu/commfrontoffice/publicopinion/archives/ebs/ebs_224_report_en.pdf http://ec.europa.eu/commfrontoffice/publicopinion/archives/ebs/ebs_340_en.pdf
Source methodology	Item formulation: “How often do you sign petitions or join street demonstrations about nuclear power, biotechnology or the environment?” (2005). “And now, there will be a few questions on how you engage with science and technology. Do you sign petitions or join street demonstrations on matters of nuclear power, biotechnology or the environment?” (2013). Response options : “Regularly”, “Occasionally”, “Hardly ever”, “Never” & “Don’t know” (2005). “Yes, regularly”, “Yes, occasionally”, “No, hardly ever”, “No, never” & “Don’t know” (2013).
Coverage	2005 & 2010: EU28 + CH, IS, NO & TR
Data Missing	No data missing
Flagged observations	No flagged
Data comments	
Description	The accumulated yearly proportion of respondents that answer either “Regularly” or “Occasionally”, “Yes, regularly” or “Yes, occasionally”.
Extraction date	08-09-2020
Unit	Percentage of respondents.
Name in MoRRI	Not included in MoRRI
Important definitions	

Figure 27 finally depicts the development in the percentage of citizens that sign petitions or join street demonstrations on matters of science and technology matters for the EU28 plus CH, IS, NO, and TR in 2005 and 2010.



The share of people who engage with science by signing petitions or joining street demonstrations on science and technology matters was 12% in 2005 and 13% in 2010, with some variation across countries.



Figure 27 Percentage of the EU-public that sign petitions or join street demonstrations on science and technology matters



3 CONCLUSION

The SUPER MoRRI project is concerned with promoting responsibility in research and innovation through the provision of a monitoring framework that can support learning and organisational change. The framework will draw on existing resources and data and will also involve primary data collection through the SUPER MoRRI empirical research programme. Three consecutive RRI monitoring reports will provide basic data and descriptive analyses as outlined in the project's implementation plan (Mejlgaard et al. 2020).

In this 1st RRI Monitoring Report only secondary data is included, and all indicators / metrics are presented at the country level, covering EU28 and Norway. The 26 indicators / metrics provided are drawn from Eurostat, She Figures, Web of Science and Unpaywall, and Eurobarometers. The majority of these were also included in the MoRRI basket of indicators, covering particularly the key RRI areas of gender equality and open access.

In the forthcoming reports, scheduled for April 2022 and August 2023, primary data from the project's main collection vehicles will be presented. These are expected to allow for the development of modified versions of some of the original MoRRI indicators, as specified in the Strategic Plan (Woolley et al. 2020). The inclusion of any potential indicators in the final SUPER MoRRI monitoring framework is conditional on relevance to end-users. The credibility, feasibility, and relevance of indicators, including those presented in the report at hand, will be assessed in collaboration with stakeholders.



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SUPER MoRRI

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