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Comparative Background Report

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General Information on EFFORTI

EFFORTI (Evaluation Framework for Promoting Gender Equality in R&I) seeks to analyse and model the influence of measures to promote gender equality on research and innovation outputs and on establishing more responsible and responsive RTDI (research, technology, development, innovation) systems. For this purpose, EFFORTI will

- develop an evaluation framework which enables evaluators, science managers, policy-makers and programme owners to conduct a sound analysis of the research and innovation outputs, outcomes and impacts of gender equality measures across Europe, with a focus on the national level;
- design a differentiated concept to analyse a variety of policy measures and assess their performance, taking into account the diversity in national policies as well as organisational contexts;
- derive general lessons for evidence-based and thus "good" policy-making in the field of gender equality within RTDI systems. This means that not only has progress towards more gender equality in RTDI been achieved, but also that RTDI has been able to benefit from this progress through enhanced scientific and innovation outputs and productivity, as well as through a higher responsiveness to societal needs and challenges.

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Content

0 Introduction 7

1 Innovation System 9

1.1 Governance 9

1.2 Input 12

1.2.1 Development of R&D inputs in sectors 12

1.3 Employment 15

1.3.1 Development of number of researchers between 2009 and 2015 in the whole R&D sector and its subsectors 15

1.3.2 Proportion of scientists and engineers in total labour force 18

1.4 Output 19

1.4.1 Share of tertiary educated population among the group of 25 to 34 years of age 19

1.4.2 Number of scientific papers in relation to the population size 20

2 Gender Equality Policies 22

2.1 Gender equality policies 22

2.1.1 Comparison of Structures for Gender Equality 22

2.1.2 Equal opportunity/anti-discrimination legislation and measures 23

2.1.3 Fiscal policies 26

2.1.4 Parental leave policies 27

2.2 Empirical Evidence for Gender Regime 29

2.2.1 Labour market participation 29

2.2.2 Usage of parental leave 34

2.2.3 Reproductive work 37

2.2.4 Comparison of the assessments 43

3 Gender Equality in RTDI 45

3.1 Gender Equality Policies in RTDI 45

3.1.1 Strategic gender equality policies in RTDI in place 45

3.1.2 Structures for Gender Equality in RTDI 47

3.1.3 Activities addressing Gender Equality 47

3.2 Empirical Evidence for the Gender Regime in RTDI 48

3.2.1 Gender Equality in RTDI on organisational level 48

3.2.2 Participation of women in tertiary education 50

3.2.3 Labour market participation of women and men in RTDI 51

3.2.4 Horizontal Segregation 55
3.2.5 Vertical Segregation 61
3.2.6 Employment conditions 67
3.2.7 Gender Gap in Scientific Output 74
3.2.8 Inclusion of gender in research and teaching 77
3.3 Comparison of the assessments of Gender Equality Policies in RTDI 79
4 Evaluation Culture and Policy 82
4.1 Description of Evaluation Culture 82
4.2 Framework conditions and evaluation standards 84
4.3 Responsibilities, function and transparency of RTDI evaluation 85
4.3.1 Actors and strategy processes 86
4.3.2 Features of RTDI Evaluations 87
4.4 Gender equality in RTDI evaluations 88
4.5 Evaluation utilisation and policy learning 89
4.6 Recent trends/developments with regard to RTDI policy evaluation 90
5 Conclusions 92
5.1 Comparison between gender equality in the labour market and in RTDI 92
5.2 Main characteristics of the innovation system and their impact on gender equality in RTDI 94
5.3 Main issues of evaluation culture and policy in RTDI 95
5.3.1 Evaluation culture 95
5.3.2 Types of evaluations 95
5.3.3 Evaluation of gender equality (measures) 96
6 Bibliography 97

List of figures

Figure 1: GERD by sector of performance in percentage of GDP, 2014 13
Figure 2: Development of GERD as a percentage of GDP between 2005 and 2014 14
Figure 3: Development of GERD in % of GDP by sector of performance, 2005-14, in percent 15
Figure 4: Development of total researchers 2005-13, Index 2005=100 16
Figure 5: Development of researchers by sector of performance 2005-13, in percent 17
Figure 6: Researchers by sector of performance 2013, in percent of total R&D personnel 17
Figure 7: Proportion of scientists and engineers in the active population between 15 and 74 years of age, by year* 18
Figure 8: Share of tertiary educated population among the group of 25 to 34 years of age* 20
Figure 9: Number of scientific papers in relation to the population size 21
Figure 10: Employment rates in the total population aged 20–64, by sex 29
Figure 11: Gender gap in employment rates in the total population, aged 20–64 30
Figure 12: Employment Rate of Persons Aged 25-49 by Age of Youngest Child, Sex and Country in 2012 31
Figure 13: Employment impact of parenthood (age 20-49) 32
Figure 14: Full-time equivalent (FTE) employment rates among women and men aged 20-64 (%), 2010-2014 33
Figure 15: Gender gap in full-time equivalent (FTE) employment among women and men aged 20-64 (%) (in percentage points), 2010-2014 34
Figure 16: Take-up of parental leave by fathers in 23 Member States in percentages of the available leave 35
Figure 17: Proportion (%) of employed mothers with a child under age 1 on maternity or parental leave 36
Figure 18: Time spent in paid work, by sex (in minutes per day) 38
Figure 19: Time spent in unpaid work, by sex (in minutes per day) 39
Figure 20: Enrolment rate of children under the age of 3 years in childcare facilities, by country and year 40
Figure 21: Main reasons for women (aged 15 -64 and with children up to mandatory school age) not working or working part-time by perceived shortcomings of childcare 42
Figure 22: Reasons for part-time work for persons aged 20-64, 2015 43
Figure 23: Proportion of RPOs that have adopted gender equality plans, 2013 49
Figure 24: Share of tertiary educated population among the group of 25 to 34-year-olds by sex* 50
Figure 25: Percentage of female graduates in tertiary levels of education, 2014 51
Figure 26: Proportion of scientists and engineers in the active population between 15 and 74 years, by sex and year 52
Figure 27: Growth rates of the number of researchers in all R&D sectors between 2005 and 2013, respectively 2006 and 2013 (AT, HU, FR) in full-time equivalents by sex 53
Figure 28: Share of women in R&D by countries 54
Figure 29: Share of women researchers by RTDI sectors and country in 2013 55
Figure 30: Gender segregation by occupation 56
Figure 31: Gender segregation by economic sectors 56
Figure 32: Proportion of women ISCED 6 graduates differentiated by field of study in 2010 57
Figure 33: Proportion of female researchers in the business enterprise sector, by economic activity (NACE Rev. 2) 2012 59

Figure 34: Distribution of researchers in the Higher Education Sector (HES), across fields of science, 2012 60
Figure 35: Share of male and female members of boards 62
Figure 36: Proportion of women on boards, members and leaders, 2014 63
Figure 37: Proportion of women academic staff by grade, 2013 64
Figure 38: Proportion of female heads of institution in the higher education sector 65
Figure 39: Share of gender-balanced research evaluation panels in funders, 2013 66
Figure 40: Actual weekly working hours of full-time workers by country, 2005 - 2015 68
Figure 41: Actual weekly working hours of full-time employed professionals by country, 2005 - 2015 68
Figure 42: Actual weekly working hours of full-time workers by gender and country, 2005 - 2015 70
Figure 43: Actual weekly working hours of full-time employed professionals by gender and country, 2005 - 2015 71
Figure 44: "Precarious" working contracts of researchers in the higher education sector out of total researcher population, by sex, 2012 72
Figure 45: Gender pay gap (%) in the economic activity "Scientific research & development" and in the total economy, 2010 74
Figure 47: Women to men ratio of authorships (when acting as corresponding author) in all fields of science (2011-2013) 75
Figure 48: Women to men ratio of scientific authorship (when acting as corresponding author), by field of science, 2011-2013 76
Figure 48: Proportion of women in patents by country and year 77
Figure 50: Inclusion of the gender dimension in research contents (%RPO) 78

0 Introduction

The EFFORTI project seeks to analyse and model the influence of measures to promote gender equality on research and innovation outputs and on establishing more responsible and responsive RTDI (research, technology, development, innovation) systems. The final outcome of the project is an evaluation framework which should enable stakeholders and evaluators to consider effects of gender equality measures on the RTDI system when planning and/or evaluating such measures.

The EFFORTI project develops this model and evaluation framework on the basis of gender equality measures in seven countries: Austria, Denmark, France, Germany, Hungary, Spain and Sweden. These countries vary considerably with respect to their innovation systems and performance, the status quo of gender equality in the whole society as well as in RTDI but also with regard to their evaluation culture. But also the gender equality policies and measures in RTDI are located at the interface of different policy environments as they are related to the innovation system and gender equality but also to broader welfare policies.

One main assumption of the EFFORTI project is that considering the context is important when evaluating the effects of gender equality measures on research and innovation. Different contexts might require different policies and measures to promote gender equality but might also influence the effects of these measures.

Based on the objectives of the EFFORTI project we have considered the following contextual framework conditions as relevant:

- the structure and performance of the research and innovation system,
- gender equality policies in the labour market and welfare policies related to reproductive work and childcare,
- the governance and existing policies of gender equality in RTDI and
- the evaluation culture and policy especially in the field of gender equality in RTDI.

To get a better overview of the differences and similarities between these contexts and the different countries, country notes for each EFFORTI country were prepared. The country notes are not comparative but attempt to describe and explain the characteristics of each context in the respective country. Therefore, relevant longitudinal data to describe the contextual environments for gender equality measures in RTDI between the different countries have been defined and collected. International data sources like Eurostat or OECD data have been used to enable comparativeness. Additionally, international comparative reports as well as national sources of information have been utilized to prepare the country notes. Especially the national sources of information were helpful for providing explanations for specific characteristics or developments as such fine grained analyses are often missing in international comparative reports. Furthermore, interviews with national experts have been conducted to explore topics which were not covered by other sources of information or data. The main findings of each country report were presented in a workshop with national stakeholders and experts to collect feedback and verify interpretations. The seven country notes are published on the EFFORTI homepage.

The following report compares the results of the country reports and tries to identify similarities but also differences within the contextual environments for gender equality in RTDI. As the national reports were following the same structure and used the same data to describe the contextual

environment in each country, they provided a solid basis for an international comparison. In cases where data or information was not available in some country notes, the authors of these reports were asked to provide this information for the comparative report. If additional sources were used that were not mentioned in the country reports, these sources were referenced in the footnotes. To enhance the readability of the comparative report, we have not referenced all sources of information which were used in the different country reports. Therefore, the country notes should be consulted to identify sources of information and data.

The comparative report starts with a comparison of the different innovation systems as these form the background of all measures to promote gender equality in RTDI. The chapter describes the key structural features, inputs and outputs of the innovation systems in the EFFORTI countries in respect of their potential linkages to and effects on gender equality in RTDI. In the following chapter, the second general context for gender equality in RTDI is discussed: the equal opportunity and anti-discrimination legislation but also taxation policies and parental leave regulations are compared. Furthermore, the different gender and welfare regimes prevalent in the EFFORTI countries are assessed based on selected data on the participation of women in the labour market, the usage of parental leave and the gendered division of paid and unpaid work. The third chapter of this report focuses on the core topic of the EFFORTI project: gender equality in RTDI. The first part of this chapter discusses the gender equality policies and strategies in RTDI whereas the second part assesses the status quo of gender equality in RTDI and compares this to data for the whole labour market. The evaluation culture is considered in the fourth chapter which provides an overview of the recent developments and the status quo of policies and practices of evaluation in the EFFORTI countries. The concluding chapter discusses differences and similarities between gender equality in the whole labour market and in the RDTI sector, how the structure of the innovation system affects gender equality in RTDI and what can be learned from the comparison of policies and practices of evaluation in RTDI.

Through this exercise, a deeper understanding of the contextual environments and their interrelations and interdependency with gender equality in RTDI should be developed. This will be used to identify those contextual factors which should be considered for developing an evaluation framework for gender equality measures in RTDI within the EFFORTI project.

1 Innovation System

Below, a comparative overview of key structural features, inputs and outputs of the seven countries analysed in this study will be provided. Aspects of interest for comparison are chosen with regard to their potential to be linked to the participation of women in the R&D and innovation research. These aspects are:

- Governance and funding mechanisms of the public sector for R&D and innovation
- Level and development of R&D inputs
- Structure and development of R&D employment
- Output of tertiary education
- Scientific output

1.1 Governance

Comparing governance structures is a difficult task, since they do not apply to mono-causal derivation of best practices and performance comparisons, but are highly dependent on historic developments and path dependencies. In the following, structural characteristics are compared, comprising the role of national authorities (political bodies, administration and advisory boards), the federal distribution of tasks as well as the competitive funding scheme for R&D and innovation.

In Austria, Denmark, Sweden and France, the national government respectively the national ministries are the main authorities in planning and budgeting national research, development, technology and innovation policy (RTDI). In all four countries, reforms and restructurings of national policy planning for RTDI have been carried out in the past decades. Even though the composition of intergovernmental responsibilities differs between countries and is also varying over time, common features do exist.

Activities by national authorities in these countries typically comprise steering and funding of the higher education sector, national strategy formulation and the commission and funding of respective RDTI programmes; they are mostly implemented by public intermediaries such as agencies, councils and public funds. In Austria, currently two ministries are mainly responsible for RTDI topics: the Federal Ministry for Transport, Innovation and Technology (BMVIT) and the Federal Ministry for Science, Education and Research (BMWFW). The first one is in charge of innovation and technology policy and funding, the second of the higher education and public sector. The Federal Ministry for Finance (BMF) is responsible for the so-called “R&D premium”, a tax allowance scheme applied to private sector R&D expenditures.

Similar to Austria, governance responsibilities in Sweden are distributed among several ministries, with the Ministry of Enterprise and Innovation and the Ministry of Education and Research as the main actors, both in terms of their portfolio of duties as well as regarding their share of budget for RTDI. Vice versa, Denmark is characterised by a high degree of centralism, with the Ministry of Higher Education and Science combining the main responsibility for the higher education sector, research and innovation policies.

In France, the general budget of the interministerial Mission on Research and Higher Education (MIRES) is an intergovernmental allocation mechanism for research and innovation budgets of the Ministry for Education, Higher Education and Research (MENESR), the Ministry for the Economy, Industry and

Digital Affairs as well as – to a smaller degree though – funds for several other ministries (Defence, Culture and Communication, Ecology, Sustainable Development and Energy, and Agriculture, Agrifood and Forestry). The MENESR is the leading ministry within the MIRES responsible for the implementation of the agreed budget plan. Innovation policies are shared between the MENESR and the Ministry for the Economy, Industry, and Digital Affairs. In addition, the MENESR has responsibility for controlling the eligibility of the expenditures exposed by companies in the framework of the R&D tax credit (CIR).

In Austria, Sweden and Denmark, public intermediaries play an important role for the implementation of public funding programmes, typically with a differentiation between actors funding basic science and those responsible for applied research, technology development and innovation. In Austria, for example, this duality is represented by the Austrian Science Fund (FWF) and the Austrian Research Promotion Agency (FFG). In Denmark, the Danish National Research Foundation (DNRF) and the Danish Council for Independent Research (DFF) - both funding basic research – as well as the Innovation Fund Denmark have to be mentioned as the most important ones, but with a lot of other public funds and initiatives of smaller scale in place. Furthermore, both in Denmark and Sweden, the private sector, private philanthropic funds and large companies, are an important factor in funding R&D, with emphasis on specific topics or areas not necessarily aligned with national priorities (Polt et al. 2015).

Compared to other countries, a lot of responsibility is delegated to various agencies in Sweden, with VINNOVA, the Swedish Research Council, the Swedish Research Council for Environment, Agricultural Sciences and Spatial Planning (Formas) and the Swedish Research Council for Health, Working Life and Welfare (Forte) as the most important ones. These agencies have a lot of autonomy with only little space for interventions by the government relating to the way agencies exercise their authority. Therefore, the activities and results of the agencies are followed up and evaluated every year when they submit an annual report to the government.

Compared to the aforementioned countries, the provision of competitive public funds for research and innovation via public intermediaries is a relatively new instrument in France, with the National Research Agency (ANR) being established in 2005, unlike those in other countries mostly dating back to the 1960s. The ANR covers basic research, applied research, innovation and technology transfer and funds research projects on a competitive basis and through public-public and public-private partnerships.

A distinguishing characteristic of both Germany and Spain compared to the other countries in the sample is the higher degree of decentralisation in the responsibility for RTDI policies, especially regarding the higher education sector. Main public authorities responsible for the allocation of funds, policy-planning and performance-monitoring of the higher education institutions are the 16 Länder in Germany and the 17 autonomous communities in Spain. In Germany, the provision of basic funds by the Federal Government is restricted to financing the construction of research infrastructure and cooperative Länder-Federal Government funded programmes, for policy priorities of national interest. These policy programmes currently are:

- the Pact for Research and Innovation (‘Pakt für Forschung und Innovation’), which provides additional funding for non-university research according to certain success criteria such as the increase of publications and patents;

- the Higher Education Pact ('Hochschulpakt'), which provides more financial resources for institutions to cope with the growing number of students;
- the Initiative for Excellence ('Exzellenzinitiative', now called 'Exzellenzstrategie'), which is a competitive programme supporting successful universities with significant resources for cutting-edge research in tailored graduate schools and clusters.

Furthermore the federal government contributes to the basic funding of the four large research performing organisations, namely Helmholtz Association, Fraunhofer Society, Max-Planck-Society and Leibniz Association, but at varying degrees.

At the institutional level, the Joint Science Conference (GWK) is the main body that coordinates research policies between the Federal Government and Länder governments. The overarching national strategy framework is the 'Hightech-Strategy', launched in 2006. In its third edition launched in 2014, the overarching aims of the strategy are to intensify the cooperation between science and industry, to further improve the framework conditions for innovation and to tackle the "grand challenges of our time" through specific R&D programmes. The Federal Ministry of Education and Research (BMBF) accounts for the biggest share of the budget for RTDI according to the 'Hightech Strategy'; however, innovation is on the agenda of all federal ministries. All R&D programmes by Federal Ministries and most of the programmes set up by the Länder are administered and managed by a range of implementation agencies. These agencies can either work on direct command of the ministry or administer their programmes on a fairly independent basis. The most important body for the provision of completive funds for basic research is the German Research Foundation (DFG).

In Spain, regional budgets for R&D, comprising university general funds, account for about two thirds of total national GBOARD. Hence, the effective coordination of national and regional R&D and innovation policies and priorities is a persistent challenge. On a national level, the Ministry of Economics and Competitiveness (MINECO) is the main body responsible for RTDI policy design and operational management. The Council of Science, Technology and Innovation (CPCTI) and the Advisory Committee of Science, Technology and Innovation (CACTI) act as intermediaries for the coordination of RTDI policies with diverse stakeholders at different governance levels (regional and local authorities, industry, parliament and citizens) as well as the private sector. The main funding bodies involved in the implementation of R&I policies are the Spanish Research Agency (AEI) and the Centre for Industrial Technological Development (CDTI), again reflecting the duality between basic and applied research in public sector funding streams.

Hungary vice versa is characterised by a high degree of centralism regarding RTDI policy planning and implementation, with the office of the prime minister and the parliament, specifically the Education, Science, and Research Committee, as central nodes. The National Development Cabinet (NFK), established in 2012 and chaired by the prime minister, is the main governmental body responsible for RTDI in Hungary. Apart from the prime minister, the ministers of the Prime Minister's Office, the Ministry of National Economy and Ministry of National Development participate in this high-level decision-making body. At operational level, the National Research, Development, and Innovation Office (NRDI Office) has been the main governmental body responsible for funding RTDI since 2015, as successor of the Hungarian Scientific Research Fund (OTKA) and the Research and Technological Innovation Fund (KTIA). This combination of funding duties for basic and applied research and innovation is unique compared to the other countries in this project. The official justification behind the concentration of all RTDI-funding programmes under the NRDI Office is to be able to manage all

RDI-related national calls in line with the official RDI policy and in a standardised and transparent way in order to achieve the highest possible impact and excellence. The NRDI Office is also directly subordinated to the Prime Minister's office and the president of the NRDI Office reports directly to the Parliament.

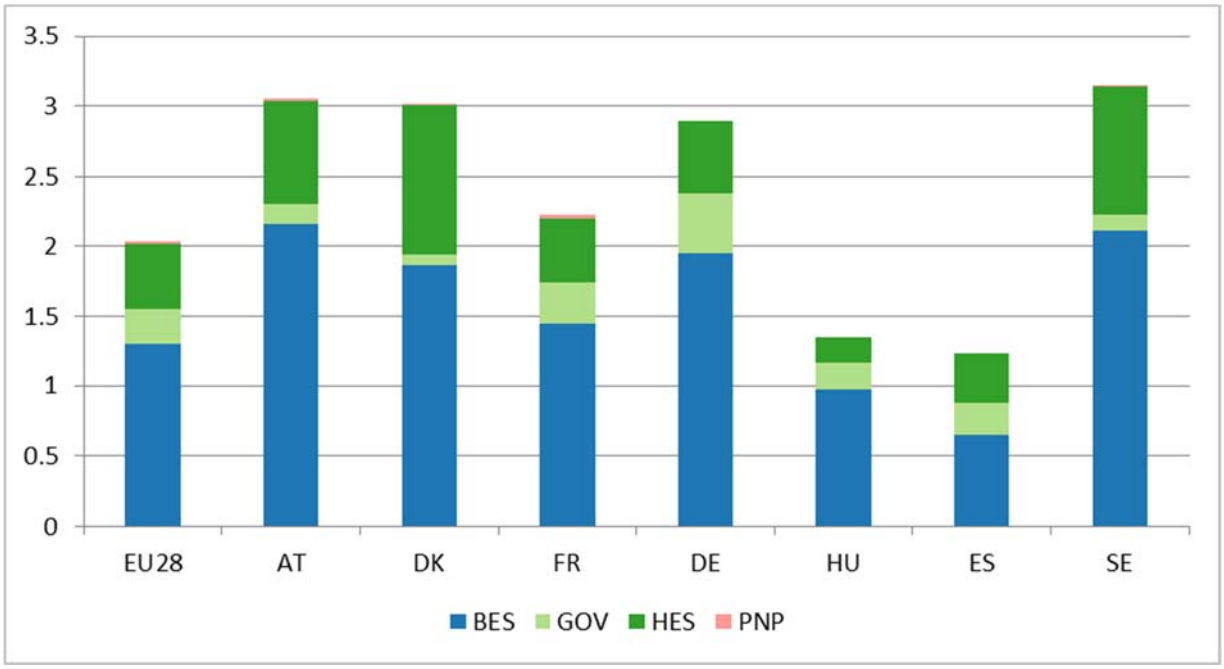
1.2 Input

1.2.1 Development of R&D inputs in sectors

Austria, Denmark and Sweden are the countries of comparison with the highest R&D-intensity in 2014, measured in the share of gross domestic R&D expenditures relative to GDP (see Figure 1). With 3.15 % in Sweden, 3.02 % in Denmark and 3.06 % in Austria they also fit the EU 2020 target of 3 % of GDP that should be spent for R&D on a national level. Germany ranges close behind with an R&D intensity of 2.89 %, but still far above the EU-28 average of 2.04 %. On the other hand, R&D intensities in Hungary and Spain are below the EU average with 1.36 % and 1.24 %. With 2.24 %, France ranges only slightly above the EU-28 average.

In all of the EFFORTI countries, the business enterprise sector (BES) is by far the most important R&D-performer in 2014, followed, though with distinction, by the higher education sector (HES). With 1.07 % and respectively 0.91 % of GDP, the relative importance of R&D in the higher education sector is the largest in Denmark and Sweden, accounting for about one third of total R&D expenditures. Though smaller in size with 0.35 % of GDP, the Spanish higher education sector is responsible for about 28 % of total R&D expenditures. In Austria, 0.74 % of GDP is spent by the higher education sector, which is 25 % of total R&D expenditures. In France (21 % of total R&D), Germany (18 % of total R&D) and Hungary (13 % of total R&D), the higher education sector is much less important as R&D performer compared to the business sector, with its share in total expenditures even ranging below the EU-28 average of 23 %. The role of government sector research (GOV) is of different importance, i.e. public research organisations as research performers beside higher education institutions. Whereas in Austria, Denmark and Sweden their role is traditionally small compared to the higher education sector, the opposite is the case in France, Germany, Hungary and Spain. In Germany and Hungary, research performed within the government sector is even as important as within the higher education sector. This reflects the prominent role of the research organisations Max Planck Society, Fraunhofer Society, Helmholtz Association and Leibniz Association. Their institutes cover a broad spectrum from basic to applied research with different disciplinary backgrounds and foci and act as providers of research services. The private non-profit sector (PNP) is of no importance in all countries compared.

Figure 1: GERD by sector of performance in percentage of GDP, 2014



Source: Eurostat 2017; [rd_e_gertot]

Except for Sweden, all countries have faced at least moderate increases in their total national R&D intensity since 2005 (see Figure 2), though not changing anything in their relative positions. The largest increase took place in Hungary with 48 % compared to 2005 (+0.44 percentage points). This is due to a sharp increase of the R&D expenditures in the business enterprise (in % of GDP) sector by 143 % (Figure 3), compared to decreases of the R&D performance of the higher education and government sector. The business sector R&D in Hungary has been encouraged by the introduction of a tax deduction scheme for enterprises in 2004, favouring R&D expenditures; that serves to increase the spending of R&D activity in the business sector.[1] Due to this measure, the innovation activity of the enterprise sector has been boosted up since 2004. Pharmaceutical companies have the most intensive research-development activities (19 % of BERD, 2013) followed by ICT, machinery and transport sectors. Though less pronounced than in Hungary, increased R&D expenditures of the business enterprise sector by 30 % have been an important driver for the increase of the Austrian R&D intensity by 29 % (+0.61 percentage points). One reason for this development is the comprehensive public funding system for applied and business R&D, including a tax allowance scheme for R&D expenditures. Also, the higher education sector was able to increase R&D spending by 25 % over the whole period, following steady increases of public university budgets.

With 0.26 % (+0.63 percentage points), the Danish R&D intensity faced the second largest growth of all countries in the sample. This is mainly due to increased expenditures by the higher education sectors, as a consequence of drastically enlarged budgets following the university reform in 2006. The reduction in R&D spending of the government sector reflects the merger of public research institutions with universities (Polt et al. 2015). In spite of the positive development, the Danish government that came into office in 2015 has declared that it will reduce the public research (HES and GOV) spending to 1 % of GDP (Danish case study).

[1] Deloitte (2015): Taxation and Investment in Hungary 2015 – Reach, relevance and reliability.

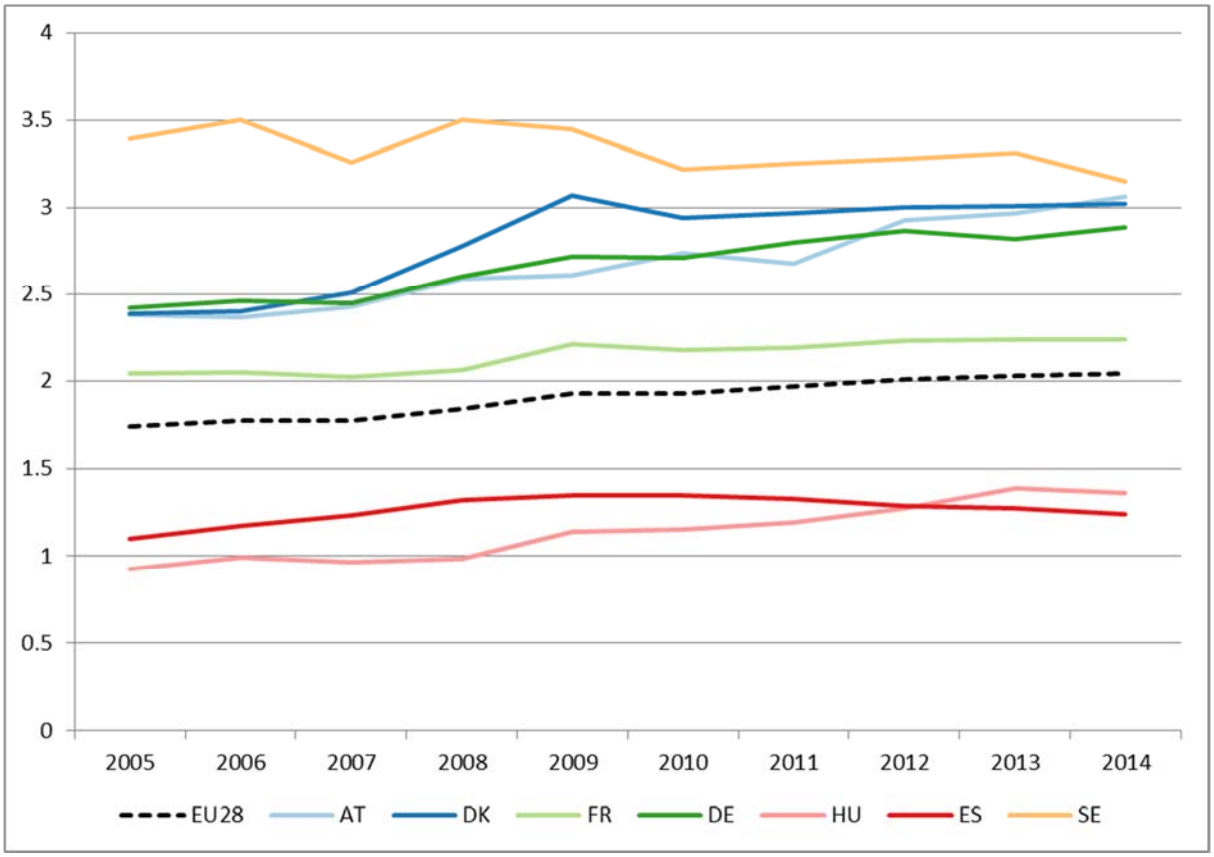
A similar development took place in France, where a number of higher education institutions and public research organisations merged to form so-called PRES (*Pôle de recherche et d'enseignement supérieur*) since 2007, in exchange for increased public funds and greater autonomy (Unger et al. 2017).

In Germany, the higher education as well as the government sector were the main drivers for the overall increase of 19 % of the R&D intensity (+0.47 percentage points), compared to a less pronounced increase in the business enterprise sector. The strongest increases took place in the higher education and government sector as a consequence of two major government initiatives, the 'excellence initiative' and the 'pact for research and innovation', to stimulate public sector R&D and innovation.

R&D expenditures in Spain were negatively affected by the crisis, though over the whole period between 2005 and 2014 the performance has been positive within all sectors. But between 2009 and 2014, the total R&D intensity dropped from 1.35 % to 1.24 % of GDP, as a consequence of declines in all sectors of performance.

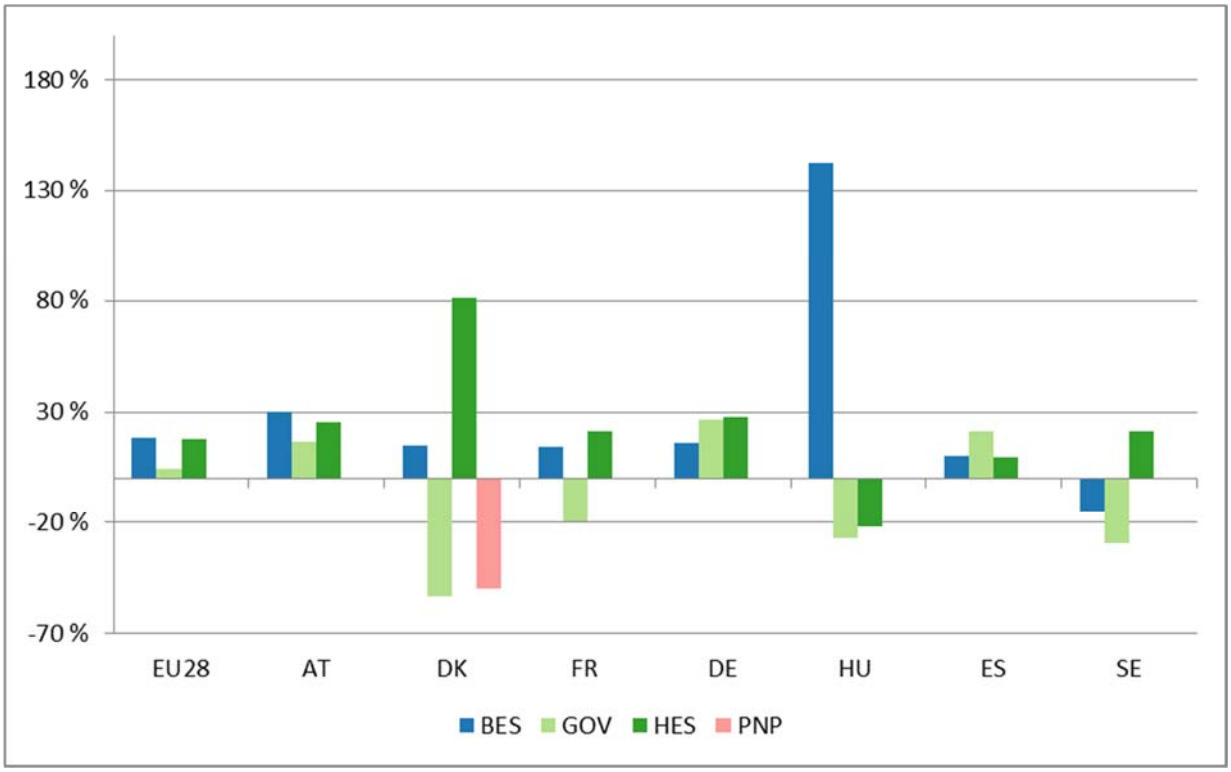
Sweden is still the leading country regarding overall R&D intensity, though facing a minor decline in R&D intensity since 2008. This is on the one hand due to the economic crisis, causing a decrease of business sector R&D expenditures (BERD) in % of GDP by 0.34 percentage points between 2009 and 2010. On the other hand, companies like Astra Zeneca, Ericsson and Sony have phased out some of their Swedish activities and thus decreased their research activities. Nevertheless, Austria and Sweden are still countries with the by far highest share of business sector R&D activities.

Figure 2: Development of GERD as a percentage of GDP between 2005 and 2014



Source: Eurostat 2017; [rd_e_gertot]

Figure 3: Development of GERD in % of GDP by sector of performance, 2005-14, in percent



Source: Eurostat 2017; [rd_e_gertot]

1.3 Employment

1.3.1 Development of number of researchers between 2009 and 2015 in the whole R&D sector and its subsectors

The development of researchers[2] across sectors basically reflects the structure and trends of funding flows as discussed above. Except for Sweden and Spain, all countries experienced a constant positive development of R&D (see Figure 2 and Figure 4), with sectoral behaviour being very similar to expenditure developments. The strong upswing of researchers in the private non-profit sector in Austria needs no further explanation, as this is still a very small sector with 261 researchers in 2013 compared to 14,413 in the public sector.

In Spain, the number of researchers dropped – despite the overall increase since 2005 – with the crises from 2009 onwards especially in the public sector (HES and GOV) with a reduction of researchers by about 10 % until 2013. In comparison to that, the number of researchers in the business sector declined only by 3 %. Another important structural feature in Spain is the importance of the public sector as employer for researchers. Whereas in all countries compared, the business enterprise sector accounts for about two thirds of all researchers – with different relevance of the higher education and government sector though – in Spain there is the exact opposite observable, with only 36 % of

[2] An R&D researcher can be employed in the public or the private sector – including academia – to create new knowledge, products, processes and methods, as well as to manage the projects concerned; Eurostat (2017).

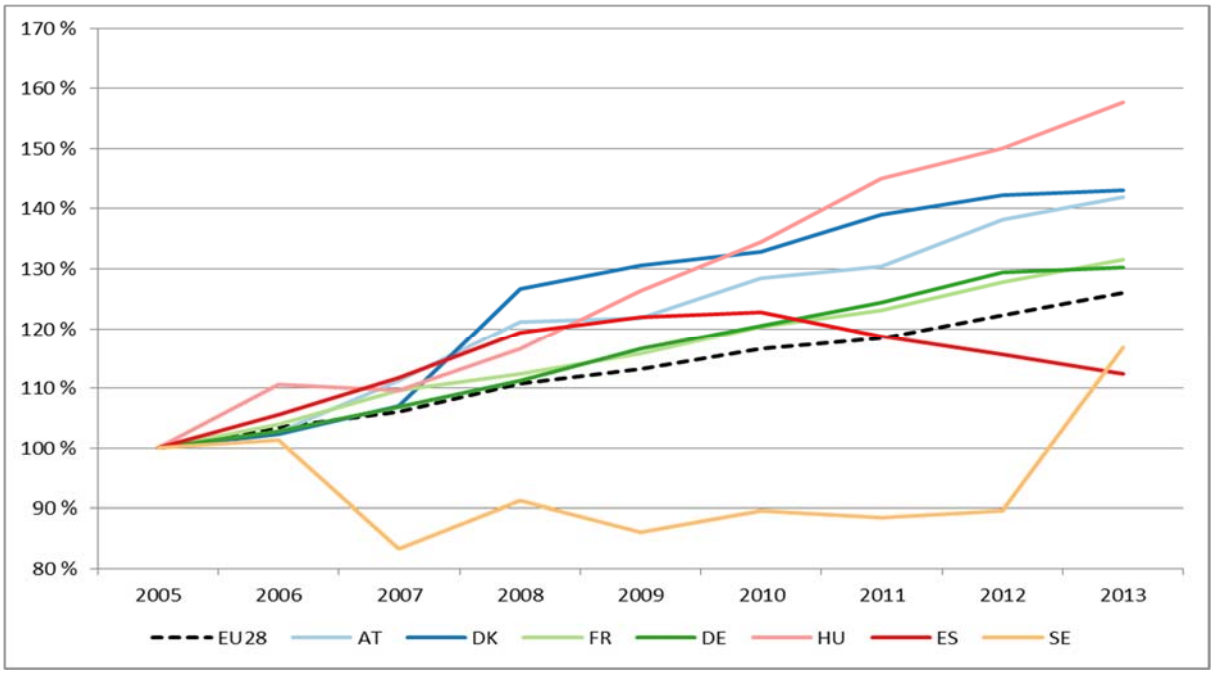
researchers being employed in the private sector in 2013, compared to 47 % in the higher education and 17 % in the government sector (see Figure 6).

The decline of researchers in the business enterprise sector in Sweden in 2007 and the following stagnation until 2012 is mainly due to the aforementioned structural shifts in the Swedish business sector, though the recovery after the crisis between 2012 and 2013 led to a small overall increase in the whole period. The same but smaller u-shaped development could be observed in the government sector, though the upswing in the number of researchers since 2011 was not sufficient for an increase of researchers compared to the level of 2005.

In Denmark, the largest increase of researchers took place in the higher education sector, following the Government Globalisation Strategy of 2006 (*Progress, Innovation, and Cohesion Strategy for Denmark in the Global Economy*) aiming to maintain Denmark's position as one of the wealthiest countries in the world by promoting research and innovation. The increase of the scientific labour force was a major cornerstone of this strategy.

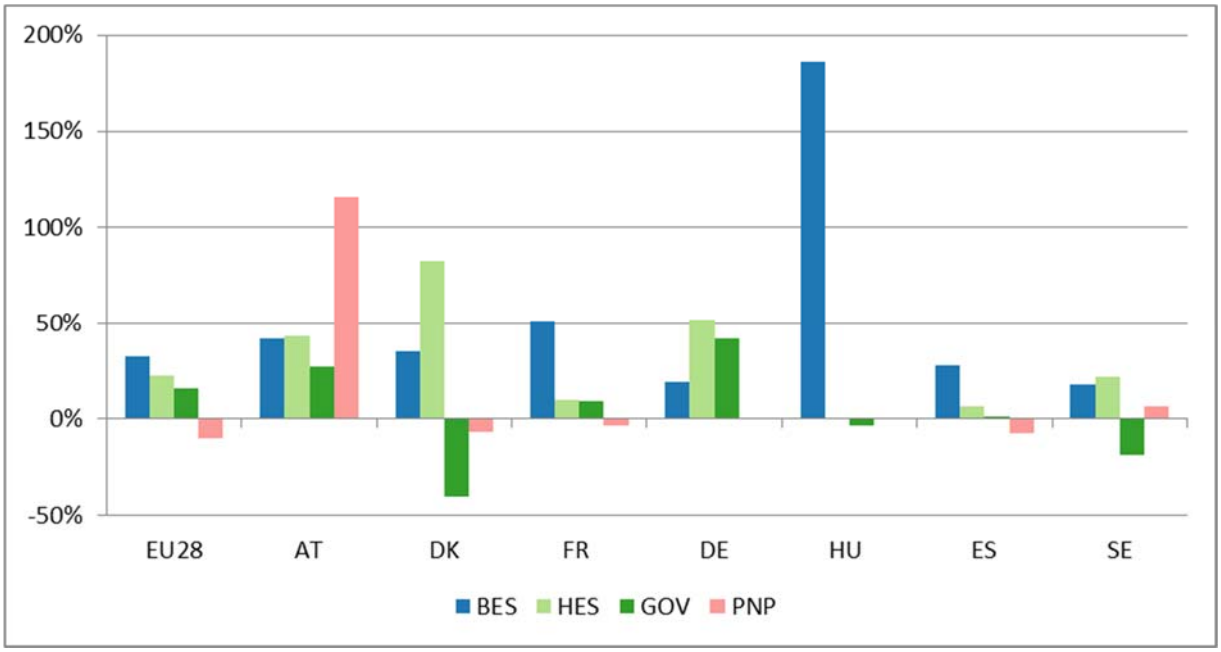
In Austria and Germany, debates are going on that the substantial increases of HEI researchers took place in connection with an expansion of the amount of temporary contracts, especially for junior researchers at the prae-doc and post-doc levels. In Germany, reforms of the law for temporary employment in science ('Wissenschaftszeitvertragsgesetz') already took place in 2015, tying the duration of the employment contract directly to the desired level of qualification, e.g. a PhD project, or external funding ('Drittmittel'). Furthermore, the Federal Government is in the process of negotiating a broader initiative for predictable careers in science with States' governments.

Figure 4: Development of total researchers 2005-13, Index 2005=100



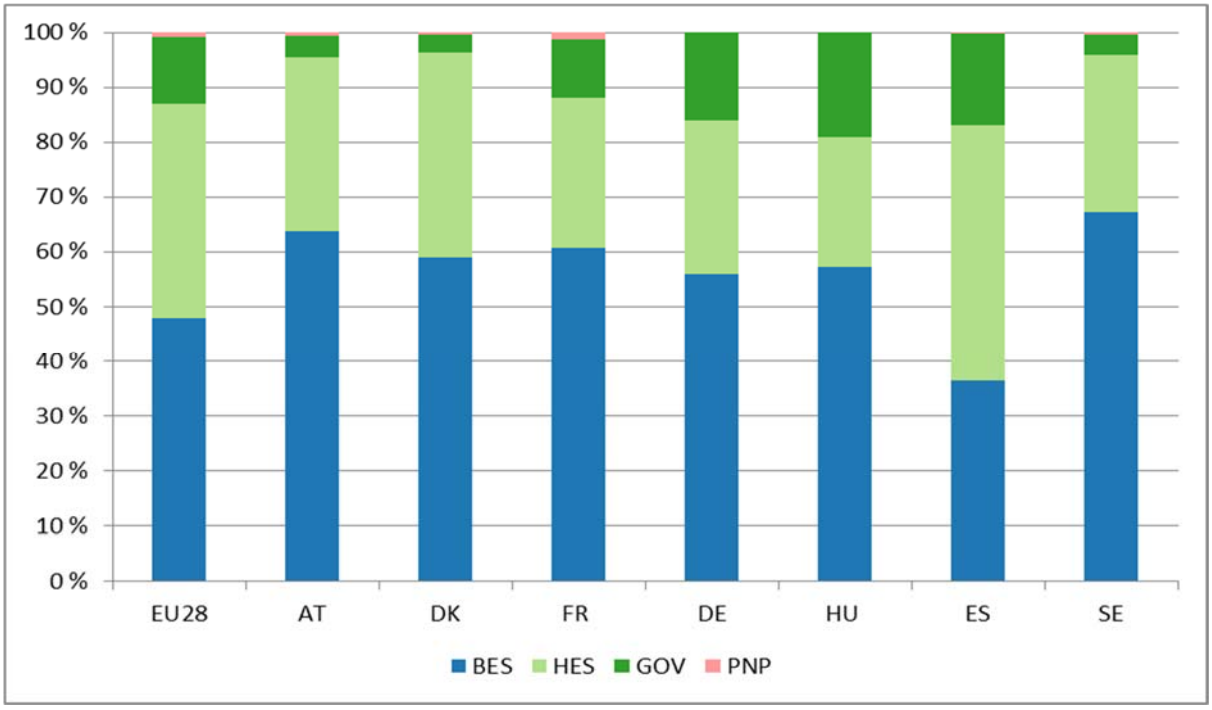
Source: Eurostat 2016 [rd_p_persocc]

Figure 5: Development of researchers by sector of performance 2005-13, in percent



Source: Eurostat 2016 [rd_p_persocc]

Figure 6: Researchers by sector of performance 2013, in percent of total R&D personnel



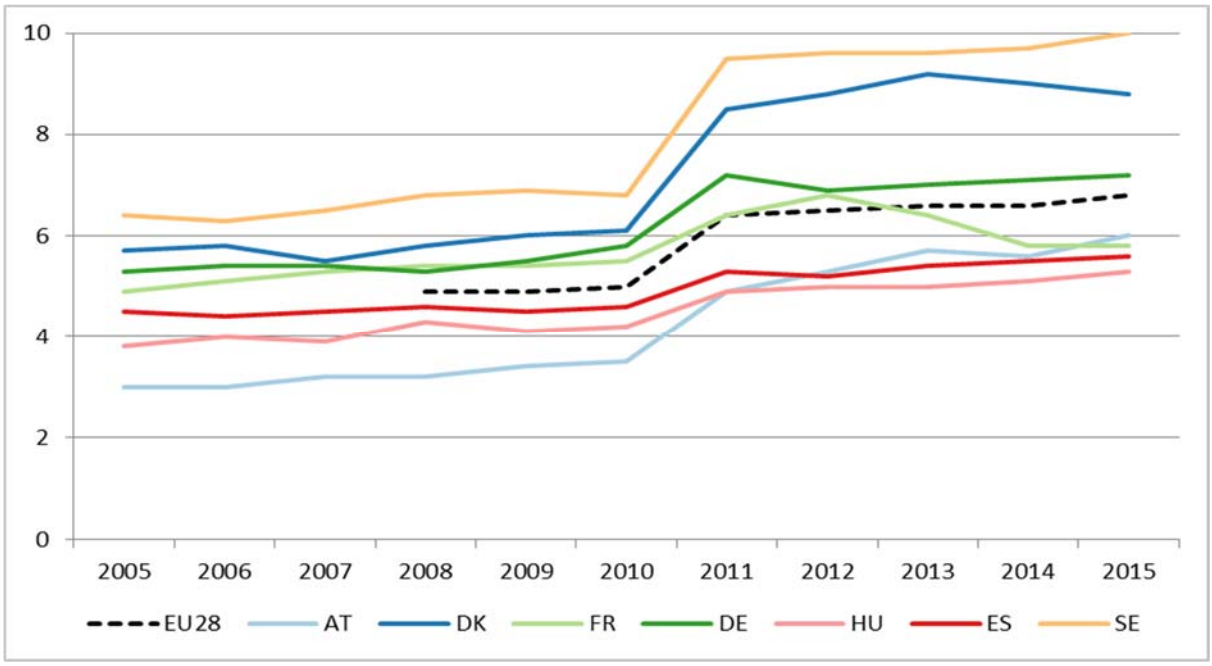
Source: Eurostat 2016 [rd_p_persocc]

1.3.2 Proportion of scientists and engineers in total labour force

Figure 7 reports the share of scientists and engineers in the active population between 15 and 74 years of age, which is a common measure to compare the knowledge intensity of the labour force. Unfortunately, a statistical break in the time series between 2010 and 2011 does not allow for a

comparison along the whole period between 2005 and 2015; but it is nevertheless possible to draw at least some conclusions.

Figure 7: Proportion of scientists and engineers in the active population between 15 and 74 years of age, by year*



*Break in time series 2011.
Source: Eurostat 2016, HRST by category, sex and age [hrst_st_ncat]

Sweden has the highest share of scientists and engineers with 10 %, followed by Denmark (8.8 %) and Germany (7.2 %) in 2015. Austria, though performing at equal levels with these countries regarding overall R&D intensity, even ranges with 6 % below the EU-28 average of 6.8 %. On the other hand, it has to be highlighted that Austria has faced the most pronounced growth of the share of scientists and engineers compared to all other countries since 2011 (the last comparable data point) of 1.1 percentage points until 2011. Vice versa, France is the only country that has faced a noticeable reduction of the share of scientists and engineers since 2011 by 0.6 percentage points to a level below the EU average of 5.8 % in 2015, which is maybe due to a delayed response of the French R&D system to the outbreak of the crisis in 2008/09.

Both the German and the Austrian R&I systems have traditionally benefitted from a labour force in which innovation is not exclusively the task of university trained scientists and engineers but is based on a specific combination of highly qualified university graduates and highly skilled workers from the dual vocational education system. This dual system has been subject of concern in the recent past, especially raised by companies that observe an increasing lack of supply of vocational trained experts (‘Fachkräfte’) in key areas such as IT or engineering, in contrast to an academic up-drift of the labour force. While in the mid-1960s in Germany for example, 92 % of school leavers entered into vocational training and only 8 % enrolled in university education; in 2011, the share of newly enrolled university students (50.1 %) and the share of newly enrolled participants in dual training (49.9 %) were almost equal. Among professions for which apprenticeship supply does not meet demand are several with relevance for R&I in Germany: technicians (-10 %), electrical technicians (-10 %) and IT (-11 %). Today,

also fewer dual educated workers advance to an engineering level through further education and training.

1.4 Output

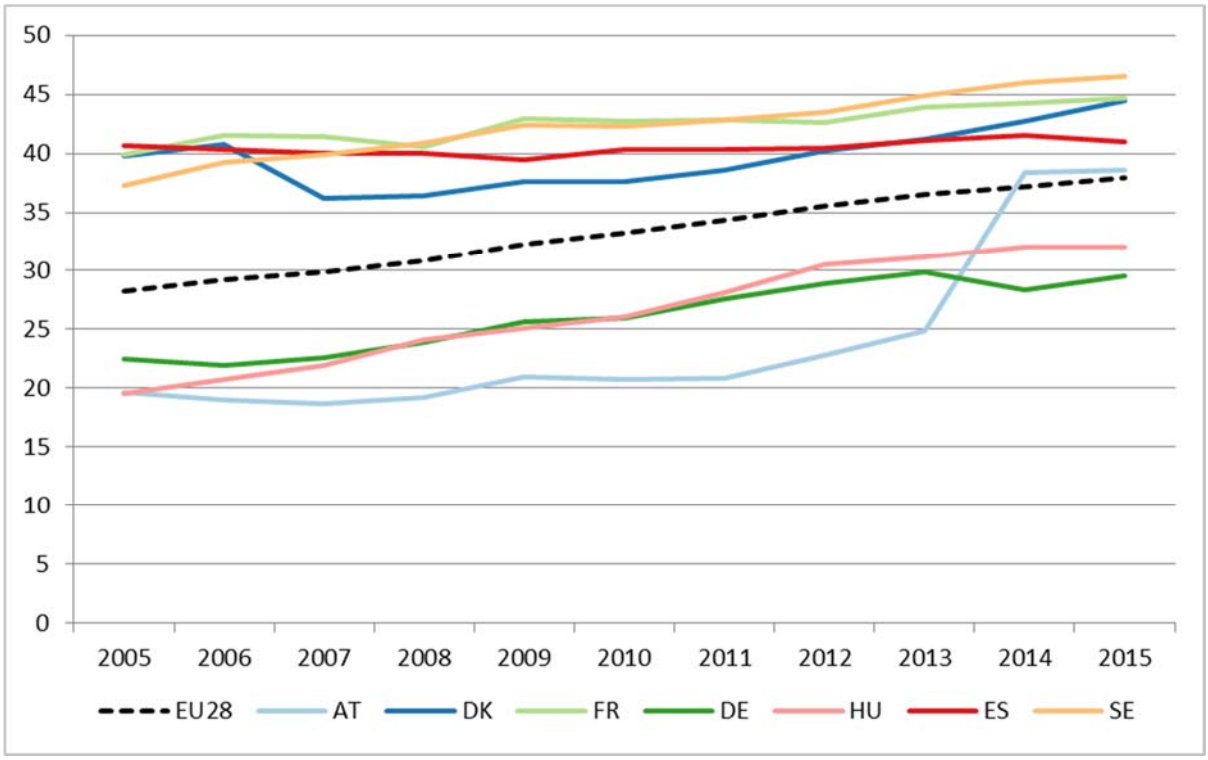
1.4.1 Share of tertiary educated population among the group of 25 to 34 years of age

Tertiary graduation rates illustrate a country's capacity to provide future workers with advanced and specialised knowledge and skills. Incentives to earn a tertiary degree, including higher salaries and better employment prospects, remain strong across OECD countries. Figure 8 reports the share of tertiary educated people in the age group of 25 to 34 years of age, which reflects the degree of academisation of the young work force. In a broad view, two groups of countries could be observed: One group, comprising Denmark, Spain, France and Sweden, constantly performing above the EU-28 average (37.9 %) of the degree of academisation, and a second group, consisting of Germany and Hungary, constantly performing 6 to 9 % below the EU-28 average. All countries, except France, faced a positive trend in their share of tertiary educated people in the respective age group. The strong upswing of Austria between 2013 and 2014 is due to a statistical reclassification of the upper-secondary vocational education (ISCED 4) that could be now reported as part of the tertiary educated labour force. This is due to the fact that in many countries, such as Denmark and Sweden, vocational educations like nursing or kindergarten education are provided at academic levels that led to problems in the comparability of figures in the past. The adjustment brought on an equal level with the EU average and closer to the group of academic top performers. Other hindering factors for comparability, beside the aforementioned statistical issues, are differences such as the ease of access or labour market demand for higher skills. Furthermore, the share of studies undertaken abroad is increasing.

Nevertheless, the future supply of skilled human capital is high on the political agenda of most countries compared. Danish politicians, for example, declared the ambition to get the youth faster through the educational system. As a policy initiative, the parliament adopted a law in 2016 that aims to reduce the delays in study time (by 4.3 months) in order to be in better accordance with the scheduled study time. Beside the duration of studying, the high share of drop-outs is also seen as a major challenge, especially in Austria and Germany. Germany is additionally confronted with the major challenge of large regional disparities in the provision of academic graduates, mainly due to the federal structure of the tertiary education system, with the German Länder being the main responsible authority for this subject. For instance, variations range from a proportion of 25-34 year-olds with tertiary education from 20 % in Sachsen-Anhalt to 38 % in Berlin (2014 figures; German Country Note).

For Hungary, bridging the gap between secondary and tertiary attainment remains the main challenge. 94 % of young people are expected to graduate from upper secondary education during their lifetime, but only 23 % complete academic tertiary education (tertiary-type A), compared with an average of 39 % for OECD -countries (OECD – Country Note Hungary 2014, p1, in OECD, 2014).

Figure 8: Share of tertiary educated population among the group of 25 to 34 years of age*



* Introduction of the ISCED 2011 classification: data up to 2013 are based on ISCED 1997, as from 2014 ISCED 2011 is applied. Online tables present data for three aggregates, and at this level of aggregation data are directly comparable for all available countries **except Austria**. The level shift break in Austria is due to the reclassification of a programme spanning levels: the qualification acquired upon successful completion of higher technical and vocational colleges is allocated in ISCED 2011 to ISCED level 5; under ISCED 1997 the same qualification was reported on ISCED level 4, but earmarked as equivalent to tertiary education.

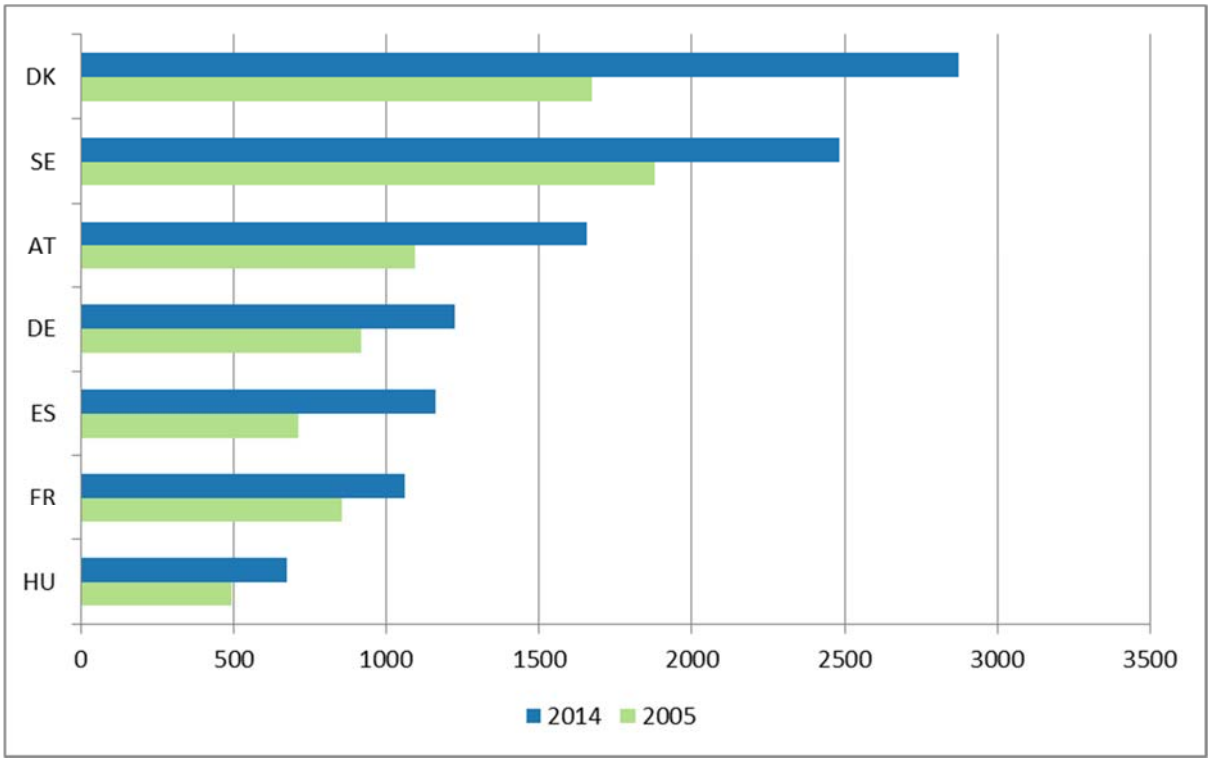
Source: Eurostat 2016, Population by educational attainment level, sex and age (%)[edat_lfse_03]

1.4.2 Number of scientific papers in relation to the population size

Figure 9 presents scientific productivity in terms of the number of scientific papers in relation to the population size and its development between 2005 and 2014, with Denmark and Sweden as the by far leading countries, followed by Austria. Hungary is at the end of the countries compared. In all countries, positive developments could be observed.

Interestingly, the ranking regarding the performance in scientific production corresponds with the relative importance of the academic sectors regarding R&D expenditures as percentage of GDP. Though no direct causality should be drawn by applying a simple input-output relationship, the combined views on both variables nevertheless allow for a sound assessment about the relative importance and capacity of the academic sector in each country.

Figure 9: Number of scientific papers in relation to the population size



Source: Innovationsindikator 2015

2 Gender Equality Policies

The first part of this chapter compares the gender equality policies of the EFFORTI countries. Firstly, the different structures for the implementation of gender equality policies, then the equal opportunity and anti-discrimination legislations are observed. Considering the effect of tax policy and parental leave regulations on the presence of women in the labour market, both topics are covered in separate sections.

In the second part of the chapter we analyse the effects of gender equality policies on the labour market, the use of parental leave, and gender-based division of labour in terms of paid and unpaid work.

2.1 Gender equality policies

2.1.1 Comparison of Structures for Gender Equality

Overall, the structures for gender equality consist of policy makers (ministries), implementing units at national and regional level (agencies), coordinating bodies, monitoring units, research institutions, and networks. Thus, different functions are covered and the gender mainstreaming approach is met too. But not every compared country exhibits all sorts of actors.

Most of the countries (except Hungary and Spain) have a ministry that is responsible for women affairs respectively gender equality, among other topics like health or social affairs. Hungary and Spain had a Ministry for Equal Opportunity / Ministry of Equality too, but they were both dissolved in 2010, in Hungary for political reasons, in Spain with the pretext of the economic crisis. In Hungary there is now a Department of Women Politics in the State Secretariat of Social and Family Affairs of the Ministry of Human Capacities and in Spain there is a State Secretariat for Social Services and Equality within the Ministry of Health.

Most of the countries implemented gender equality aspects in all policies and activities by installing units or coordinators/officials who are responsible for implementing gender mainstreaming in their policy areas. In an inter-ministerial working group for gender mainstreaming, representatives of the ministries come together to coordinate the implementation of gender mainstreaming. In Denmark, the respective ministers are responsible for equality/gender mainstreaming within their own areas, including gender mainstreaming assessment of policies and activities. Only for Hungary this cannot be reported. In 1999, a council for gender equality was established in Hungary that had a consultative role and consisted of administration officials from parliamentary committees, NGO representatives and experts, but this council stopped working in 2010.

On a regional level, in Austria, France, Germany and Spain, departments or delegates are installed to implement national gender equality policies and coordinate regional and local actors. In Sweden, the County Administrative Boards Advance Gender Equality Program improved and clarified the county's administrative boards' gender equality mandate. Furthermore, the Sustainable Gender Equality Program supports regions, county councils and municipalities in their work of developing gender-equal services by providing relevant knowledge and developing appropriate methods (Gender Equality Inquiry 2015, 7). In Denmark, the Ministry for Gender Equality has initiated a network consisting of seven municipalities with the purpose of examining how to expand good gender equality practices to

other municipalities (Institut for Menneskerettigheder 2016, 32). In Hungary, there is no regional structure to implement gender equality.

Moreover, all countries have an equal treatment commission or ombudsman[3], that implements equal treatment laws, conducts proceedings, if the principle of equal treatment might have been violated and enhances equal treatment and the social and political participation of women. In the case of Germany, they even do research on gender equality.

Independent research institutes that frequently observe and evaluate the situation of men and women and promote gender equality are mentioned in Denmark, Germany[4], Spain and Sweden. There is also a council in Germany and Sweden, which also includes NGOs, parties, trade unions, etc. that discusses gender equality policy and exchanges information and ideas. In Hungary, the National Office of Statistics is obliged to evaluate the situation of women and men.

All in all it can be said that the structures for gender equality in most of the countries are very elaborated and influenced by the politics of the European Union to implement gender equality as a cross-cutting issue. In Hungary, the structures for gender equality appear to be the weakest – here a backslash can be recorded: In the 2000s promising structures for gender equality had been built up; in the 2010s, however, the policy turned away from gender equality and focused entirely on family policy. The government considered this closer to Hungarian reality than the idea of gender equality.

2.1.2 Equal opportunity/anti-discrimination legislation and measures

2.1.2.1 Legislation

The principle of equality between men and women is anchored in the constitutions of the EFFORTI countries[5]. Moreover, each country has an act on equal treatment / anti-discrimination that prohibits discrimination on the grounds of sex, ethnicity, age, disability and other diversity dimensions. Legislation in this respect also focusses on gender equality in the labour market. Especially in Denmark and France, the legislation is very explicit: companies with more than 50 employees frequently have to provide a review on the current status of gender equality containing gender composition of employees and have to inform about gender equality measures. In Denmark, this rule applies only to state-owned companies and institutions.

In all countries also protective measures regarding pregnancy and the right to parental leave are regulated by law. Pregnant women and parents on leave are protected against dismissal. In Austria, France, Spain (during the first year after child birth) and Sweden, parents have the right to return to their former occupation, if possible. The situation is similar in Germany, only that there is no legal right to the same job, but for an equivalent job regarding pay and working hours. This also applies to France in the case that the parent returns from an unpaid leave lasting longer than a year. In Hungary, the working contract likewise remains in force during leave, but it is not explicitly stated that employers have to employ the returning parent in the original job, which leaves room for manoeuvres on the part of the employer. Changes to the working contract require mutual consent in Hungary as well as in

[3] For France see: http://www.familles-enfance-droitsdesfemmes.gouv.fr/
[4] For Germany see http://www.gesis.org/cews/cews-home/
[5] For Denmark see http://www.genderindex.org/country/denmark#_ftn1
For Sweden see https://www.constituteproject.org/constitution/Sweden_2012.pdf?lang=en

Austria. Furthermore, Denmark and Germany attach a high priority to the provision of childcare by guaranteeing access to childcare facilities for all parents returning from leave (in Germany for children between 1–3 years of age). The only other country that mentions childcare places in the law is Hungary.

In Hungary and Sweden, employed parents have the right to change working hours up to a certain age of their children. In France, this right is also applicable to annualised part-time in form of a leave of absence for one or more weeks. Spain also entitles parents to a change in working hours, but this adjustment is dependent on either collective bargaining or it being allowed by the employer. The situation in Austria and Germany is similar; parents are only entitled to reduce working hours if they are employed in organisations with more than 15 respectively 20 persons, otherwise the employer makes the final decision. Denmark is the only country where no such law exists due to the rather flexible legislation regarding parental leave and reduced working time.

To raise the share of women in decision-making positions is an issue in legislation in five countries: In France, Germany and Spain, the law mentions quotas (in Spain only as a recommendation except in the political sphere where sanctions are applied). In Germany, these quotas refer only to a certain group of private and state-owned companies, in France quotas are binding for companies with more than 500 employees and for boards, selection committees, juries etc. in the public sector. In Denmark, the legislation does not define a quota for the underrepresented sex, but in the public sector committees, boards etc. shall be gender-balanced, state-owned companies need to have a policy for women in leadership and state companies with more than 50 employees must define gender equality targets and initiate measures for gender equality in management and provide annual reports. In comparison, the Austrian antidiscrimination legislation concerning women in leadership positions is weaker: it only provides for compulsory women's promotion plans in the public sector and non-binding and largely unspecified rules for diversity measures in the Act for Incorporated Stock Companies. In Sweden, the question of quotas is continuously debated, but even without specific legislation 50 % of board members of state-owned companies are female (Numhauser-Henning 2015b, 15). In 2014, when the share of women on boards of private companies was around 25 %, the government 'foreshadowed' a proposal for legislation specifically concerning gender quotas. The legislative proposal was to be announced after shareholders' general meetings in 2016, if the share of women on company boards remains below 40 % (Numhauser-Henning 2015a, 12). In Hungary, there is no legislation addressing women in leadership.

Prohibition of gender discrimination concerning wages is a part of legislation in all analysed countries. In Denmark, France, Spain and Sweden, equal pay is also part of collective agreements / workers' statutes. Austria, Denmark and France have recorded income reports in the law where companies have to provide gender-based statistics on wages. In Germany, a law for wage-transparency has just passed the parliament[6]. In companies with 200 employees and more, employees now have the right to get an insight into the wages of their colleagues in comparable positions. Companies with more than 500 employees have to publish a regular report on wage equality. In Denmark and Sweden, a review of initiatives for equal pay is also frequently prepared by a public authority.

In Austria, Denmark, France, Germany, Spain, and Sweden, the implementation of gender equality as a cross-cutting issue in public administration is stated in the law. In Austria, France and Sweden each ministry has to set gender equality targets and has to report on the achievement of the objectives. In

[6] See http://www.bund-verlag.de/blog/betriebsrat/bundestag-verabschiedet-lohntransparenz-gesetz/

Germany and France every member of the public administration has to consider gender equality in its work. And in Spain, the gender perspective must be included in every norm, budget and action. Austria is the only country that explicitly focusses on gender budgeting by anchoring it in the constitution. With the implementation of effective budget management, every ministry is obliged to link its use of resources to measurable outcome targets. One of these targets has to be a gender equality target. The implementation of gender budgeting in the public administration is also supported by a guideline. But the Swedish government focusses on the implementation of gender budgeting too. Since 2017, gender budgeting and gender analysis has been mandatory to identify explanations for gender inequalities. In Denmark, the Ministry of Employment has decided that every bill must be accompanied by a 'gender mainstreaming memorandum'. They have to take gender consequences of the bill in question into account, i.e. considerations about the bill's consequences for women's and men's behaviours and opportunities on the labour market. In Germany, gender budgeting was introduced in a number of municipalities as well as in some states (Berlin, Bremen), but not nationwide[7].

All in all, a comparison of the countries concerning legislation shows that Spain has the most comprehensive equal opportunity / anti-discrimination legislation. In Sweden, the legislation is also very extensive, only legal quotas for women in management positions have not been introduced since 50 % of board members of state-owned companies are female, even without legal pressure. In Austria, regulations for women in leading positions are weak. In Denmark, France and Germany, there is no nationwide legal obligation on gender budgeting so far. And in Hungary, the legislative framework is comparatively weak and rather focussing on family policy than on gender equality.

2.1.2.2 Measures

In addition to anti-discrimination legislation, measures are being taken to push gender equality:

Measures to support the equal participation in the labour market: In addition to equal treatment legislation focusing on labour market issues, all countries, but especially Austria, Germany, Hungary and Spain, set measures to promote equal labour market participation of men and women. Most common are measures to support women's re-entry into the labour market after parental leave (Austria, Germany, Hungary and Spain), followed by extension of childcare facilities for 0–3 year-olds (Austria, Germany, Hungary) and activities for a better reconciliation of family and work (Austria, Hungary and Spain). In Hungary, these efforts can be seen partially critically as they encourage atypical forms of employment, like part-time work, teleworking, self-employment, freelance, and job-sharing, that often do not guarantee a living income to enable women work-life-balance. In Denmark, these kinds of measures focus on organisations and companies and provide tips and guidance for gender assessment. In Germany, an office was established to analyse discrimination in companies and propose measures to prevent discrimination. Overall, additional measures to support the equal participation in the labour market in Denmark and Sweden are not as necessary as in other countries, as their female employment rate is one of the highest in international comparison.

[7] For Germany see http://www.gender.de/cms-gender/wp-content/uploads/20140516_genderbuero_GB_D.pdf
https://www.bundestag.de/blob/421424/e7d8cf98f8b76850882bc9c094fbddd4/wd4-030-16-pdf-data.pdf

Measures to support gender equality in decision making: Austria, Spain and Sweden report non-binding quotas for management boards (Austria only for state-owned companies). In France, the media agreed to voluntarily increase the share of women among experts. Denmark and Germany set measures to support companies in raising the percentage of women in boards – in Denmark, these measures also focus on evaluating the impact of guidelines etc. Hungary does not report any measures supporting gender equality in decision making.

Measures to support equal pay: In Denmark, the comparatively comprehensive legislation on equal pay is also supported by providing companies with a guideline for promoting equal pay and annual gender-based statistics on wages. In Sweden, the trade unions and social partners annually conduct pay surveys. Austria, Germany and Hungary try to reduce the gender pay gap by combatting horizontal segregation. They promote initiatives in the area of gender-sensitive occupational orientation.

Measures concerning gender equality in public administration: In Austria, Denmark and Germany, annual reports about gender differences and inequalities are generated. In Denmark and Germany, even the impact of gender equality policy is evaluated frequently. In France and Sweden, regions have to develop regional gender equality strategic plans for gender mainstreaming in regional policies. Also monitoring structures for implementation, evaluation procedures and involvement of delegates are specified.

2.1.3 Fiscal policies

Most EFFORTI countries (Austria, Denmark, Hungary, Sweden, and Spain) have introduced individual taxation and have turned away from joint taxation which favours the traditional division of labour between a male primary earner and a female homeworker or secondary earner. However, elements of jointness are still present in the tax systems of France and particularly of Germany. In addition, it appears that the tax and transfer/benefits systems of most countries include rules and practices that create biased incentive structures. In Austria, for example, taxation rules clearly discourage families with double income. In addition, childcare costs could be interpreted as an implicit tax on the secondary earner which is not fully recognised in most EU member states. Therefore, individual and joint taxation considered alone do not explain existing differences between the EFFORTI countries but have to be viewed jointly with other features of taxation and transfer systems.

According to the Average Effective Tax Rate (AETR)[8], the EFFORTI countries seem to have more balanced taxation systems than the EU average. All of them score better than the unweighted average across the EU (1.4). Sweden and Hungary score 1.0 and thus have a balanced taxation for primary and secondary earners. In both countries, re-entering the labour market has a financial rationale for secondary earners. Austria and France also appear to have a quite balanced taxation system with a score of 1.1 even though taxation rules in Austria and the fiscal regime in France are both described as having a negative impact on the participation of women in the labour market.

[8] The AETR shows the amount of additional taxes and lost benefits relative to gross earnings for a person who has just entered or re-entered work. The higher the AETR the lower the incentive to participate in paid work (see also Bettio and Verashchagina 2013, 180). When comparing the AETR of a secondary earner in a household with two children and the net average tax rate accruing to a single person with the same level of income the ratio should be 1 if they are treated equally (Plantenga 2014, 13f).

Denmark, Germany, and Spain have a score of 1.3, which is worse than the scores of the other EFFORTI countries and only slightly below the unweighted EU average. In Spain, secondary earners face substantial disincentives to increase work intensity. However, they also benefit from one of the lowest Marginal Effective Tax Rates (METR) in the EU-27. In Denmark, the tax-credit favours top tax payers, who are the most well-paid employees and mostly men. The number of women paying top taxes has never been as low as it is today and this widens the overall pay gap between men and women.

Germany can be described as an example where several fiscal policies provide disincentives for women to participate in the labour market. Those are namely the joint taxation system of married couples and non-contributory co-insurance in the statutory health insurance. Furthermore, parental allowances, lack of affordable childcare and benefits for not working full-time (in two federal states) may also contribute to keep women from the labour market. It is suggested that the AETR even underestimates the gender bias of taxation in Germany, because only parts of the effect of joint taxation are taken into account.

2.1.4 Parental leave policies

The duration of maternity leave among the EFFORTI countries varies between 14 and 24 weeks. In Germany and Sweden, maternity leave is the shortest, matching the current EU legislation with 14 weeks. In Austria, France and Spain it is 16 weeks, and Denmark (18 weeks) and Hungary (24 weeks) grant a longer maternity leave. Not all EFFORTI countries offer paternity leave exclusively for fathers; in Germany, fathers have the possibility to take parental leave, paternity leave does not exist. In Austria, only federal public servants or federal contractual employees can apply for a four-week unpaid paternity leave. In the other EFFORTI countries, paid paternity leave is possible, varying from 5 days in Hungary, 10 days in Sweden, 11 days in France, 14 days in Denmark to 15 days in Spain.

The duration of parental leave is very different in the individual EFFORTI countries: in Austria, parents are entitled to take leave until the day before the 2nd birthday of the child, shared among the parents (but they can receive parental leave allowance for 3 years); in Hungary, France and Spain, it is possible until the child is 3 years old. In Sweden, the paid leave amounts to 480 full days per child (maternity leave and paternity leave included); in Germany it is 14 months while in Denmark it is comparatively short with 32 weeks which have to be shared among the parents.

In most EFFORTI countries, both parents have the right to take parental leave independently; in France and Spain, it is taken by both parents individually; in Austria and Sweden, it can be shared among the parents. In Denmark, all employees have to pay a yearly fee to an obligatory parental equalisation agreement/scheme to receive paid parental leave in return. In Germany, all official parents, adoptive parents, foster parents and the parents' partners who live with the child are entitled to parental leave; also grandparents can take unpaid parental leave, if the parent is underage or has not completed their professional education. In Hungary, both parents can take leave, but only one receives social security benefits and only mothers are protected against dismissal.

Most EFFORTI countries leave room for flexibility regarding parental leave. The parental leave in Sweden can be taken full or part-time, in a continuous period or split into different time blocks, all in coordination with the employer. France and Germany also offer full-time, as well as part-time parental leave options. The situation is similar in Denmark, where parents can take leave in a relatively flexible way with the possibility to save 8 to 13 weeks of parental leave for later use. This option also exists in

Austria for up to 3 months of parental leave, but in Austria parental leave is full-time leave, as it is in Spain. The Spanish breastfeeding permission is more flexible and can be applied in a number of ways, as one hour daily or added up and taken in complete days. Hungarian parents taking childcare payment can work unlimited hours once the child becomes six months old, and receive full benefit. In all EFFORTI countries, parents can be on leave simultaneously, at least for a certain period of time.

When it comes to increasing the proportion of fathers taking parental leave, two approaches are dominating among the EFFORTI countries: increasing the length of the leave by dedicating a certain amount of months exclusively to fathers and additional financial support. The former can be seen in Austria, Denmark, France, Germany and Sweden. Additionally, in Austria and Sweden a bonus system was implemented; Swedish parents receive tax-free extra daily payments, if they share the leave equally, while Austrian parents receive a one-time bonus under the same condition. Additionally, in Austria there is the option to receive a bonus, if permanently employed fathers take leave.

Austria, France, Denmark, Germany, and Spain belong to the 13 EU member states which cover 100 % of previous incomes during maternity leave. Some of these countries have limitations to these full payments, e.g. in France and Spain there is a certain ceiling. Sweden provides a compensation rate for wages for maternity leave to a little less than 80 % of the earnings, up to an earnings ceiling of around EUR 35,000 per year. Hungary's compensation rate is the lowest; 70 % of average daily earnings without an upper limit. As employers pay part of the benefits in most countries, specific rules for freelance workers, self-employed, marginally employed, and unemployed mothers apply. Only in Germany, self-employed mothers do not receive any benefits.

The majority of EFFORTI countries have at least one income-related option for parental leave. Hungary's allowance makes 70 % of the previous income without a ceiling for the first six months. After six months, the parental leave allowance is capped at EUR 494 per month. In Germany, it is 65 % of the previous net income, but parents with low income receive a higher rate and bonuses are paid for larger families. France has a similar system; the compensation rate is also income-related, but for parents with more than two children a flat-rate option is available. The systems in Austria and Sweden are alike; they both provide income-related allowances (80 % of net income, with a ceiling in Sweden of 4,000 EUR/m) and flat-rate options. However, in Austria the parents can choose between these options freely, while in Sweden conditions are attached e.g. employment, duration of the leave. Denmark pays a flat-rate of 4,180 DKK per week (pre-tax), while Spain does not provide any parental leave allowance.

A comparison of the seven EFFORTI countries regarding their parental leave policies shows that the Swedish system fosters the participation of fathers in childcare from birth the most and at the same time accelerates the return of women to the labour market through a shorter period of parental leave. The Danish system is nearly the same but does not offer a bonus for equally sharing parental leave. The Austrian parental leave system has adopted many regulations from the Swedish system in recent reforms, but a paid paternity leave after birth is still missing, as it is in Germany. In contrast to Germany, Denmark and Sweden, parental leave policies in Austria, France and Hungary still allow comparatively long parental leave periods that hinder an early reintegration of women into the labour market. In Spain, the situation is totally different in this respect because parental leave can be taken up to three years but it is not remunerated. Spain and Hungary are the only countries who do not have incentives for fathers taking parental leave and their parental leave regulations are comparatively less flexible.

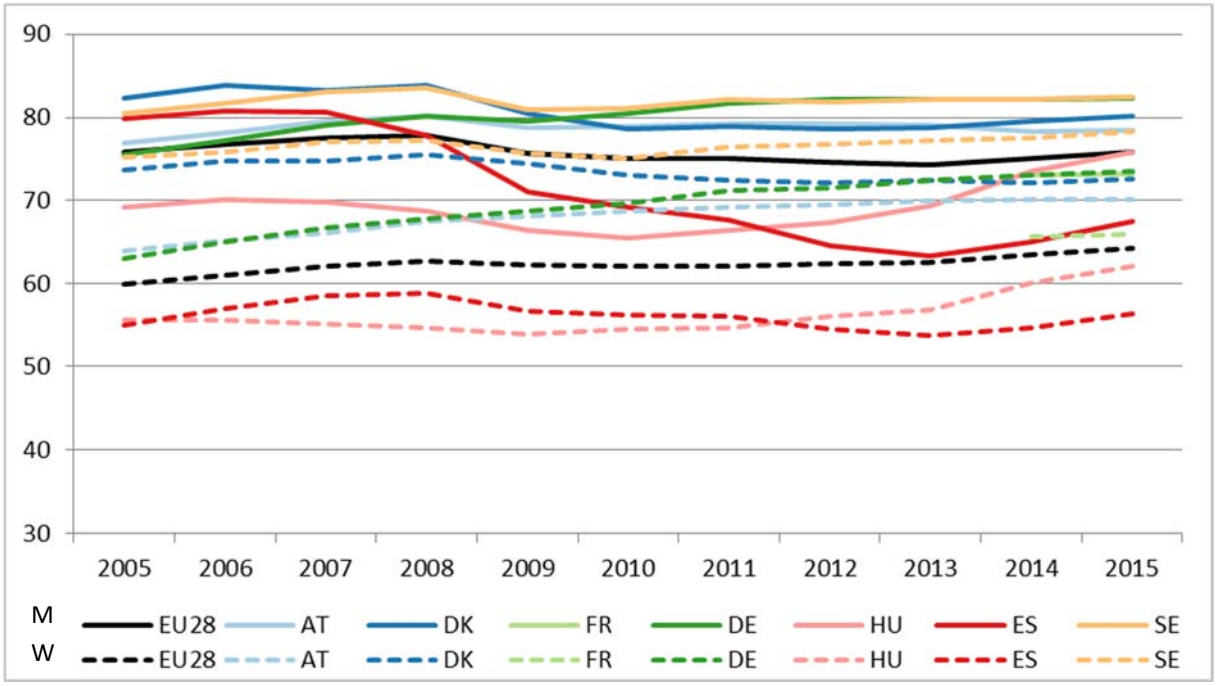
2.2 Empirical Evidence for Gender Regime

2.2.1 Labour market participation

2.2.1.1 Employment rate by sex

Figure 10 shows the proportion of employed people among men and women between 20 and 64 years of age in the EU and the EFFORTI countries between 2005 and 2015. The overall picture is rather optimistic, showing that while employment both for women and men is increasing, the gender gap is declining (see Figure 11). However, the employment rates for women remain well below the employment rates of men.

Figure 10: Employment rates in the total population aged 20–64, by sex



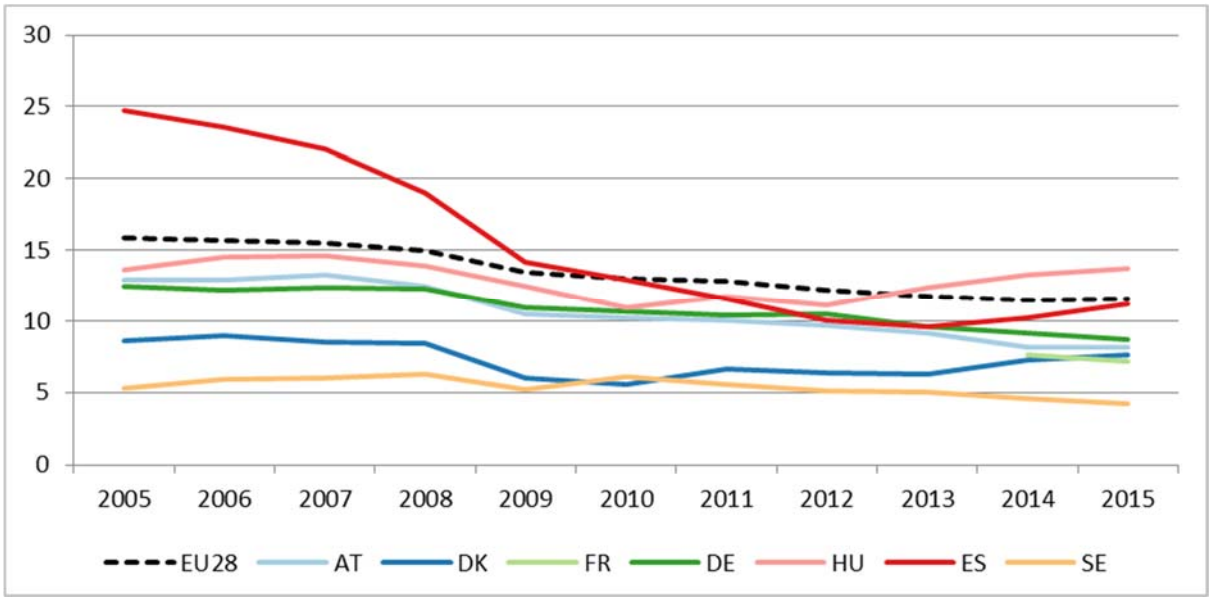
Source: Eurostat, LFS

The countries showing higher employment rates for men as for women than the EU average are Austria, Germany, Sweden and Denmark, even though Denmark is displaying a slight decline of employment. Hungary and France correspond to the EU-28 average, whereas Spain's employment rates both for men and women are lower; declining in the years of the economic crisis for men by 17 % from 2007/8 (81 %) to 2013 (64 %), but going up slightly for women. In all the other countries, the development of the employment rates is pulling in the same direction for both men and women but to a varying extent. In the period from 2005 to 2015, the biggest changes can be noticed in Germany (m: +7 %, f: +11 %), Hungary (m: +7 %, f: +7 %), Spain (m: -12 %, f: +1 %), and Austria (m: +2 %, f: +6 %).

The gender gap of 12 % in the EU-28 (2015) can be described as rather high in comparison with the EFFORT -countries which reveal gender gaps in or under the EU average; making Hungary the only exception with 14 %. The lowest gender gaps can be found in Sweden (4 %) and France (7 %). While the gender gap was reduced in the EU-28 by 4 % from 2005–2015, higher reductions were made in Austria (-5 %) and Spain (-14 %). The last most exceptional reduction could be explained by the job losses due to the crisis mentioned earlier, which concerned especially male employment and is not a

consequence of an improvement of the employment situation of women. This similarly applies to the development in Denmark, where the gender gap decreased in the period 2006–2010, especially at the time of the financial crisis in 2008, but has increased afterwards. It should also be noted that the gender gap does not represent full-time employment and therefore does not take into consideration the fact that there is often a high rate of part-time employment for women, e.g. in Germany (See also 2.2.1.3).

Figure 11: Gender gap in employment rates in the total population, aged 20–64

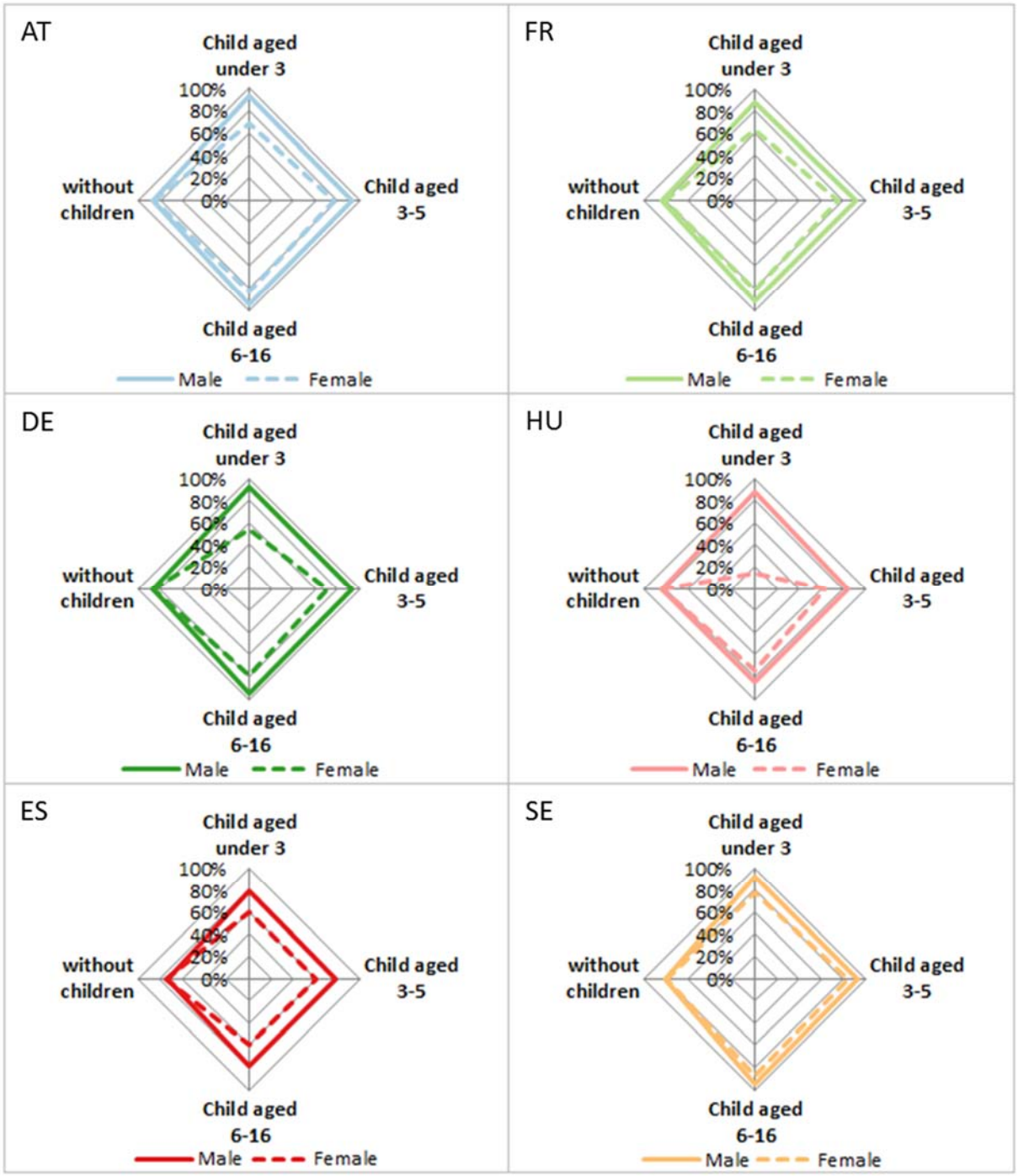


Source: Eurostat, LFS

2.2.1.2 Employment rate by age of children and sex

Different patterns of labour market behaviour of men and women are still present in the EU-28 and the EFFORTI countries, manifesting primarily in the overall lower employment of women. An important reason for this can be seen in the different impact of parenthood; whereas men with children tend to work more than men without children, the opposite is true for women: women without children have higher employment rates than women with children. In general, the employment rate of women with children remains well below the employment rate of men with children in all countries. This observation can be interpreted as an indicator of a traditional labour distribution of couples in which men have the primary responsibility to earn and women to care. Furthermore, the data makes evident that in all EFFORTI countries, employment rates of women rise with the age of their children; meaning women with younger children tend to work less likely than women with older children.

Figure 12: Employment Rate of Persons Aged 25-49 by Age of Youngest Child, Sex and Country in 2012[9]



Source: UNECE Statistical Database

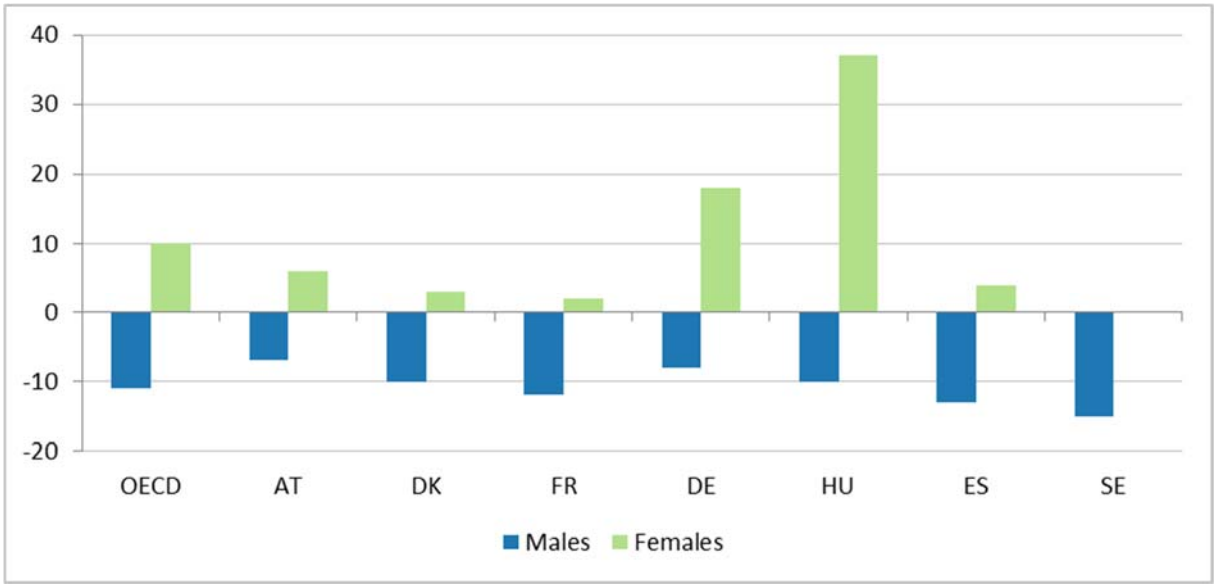
In Germany, this labour division is an expression of the re-traditionalisation of the work distribution among couples after the birth of the first child: while mothers tend to spend more time with the child, fathers work longer to make up for the lost income and the higher expenses. Thus, the father will advance faster on the labour market, which increases the opportunity costs of a changing work distribution in the future. In Hungary, there is a strong social agreement that mothers should stay at

[9] There is no data available for Denmark.

home with their children up to the maximum period of the parental leave that is 3 years. The socially and financially supported long maternity leave in Hungary alienates mothers from the labour market and women face serious difficulties in returning to their work. Besides the devaluation of knowledge, the loss of social capital and the discrimination of young mothers in the labour market also contribute to it: women with small children have to face scarce opportunities for part-time work and for sufficient childcare services.

The impact of parenthood on employment is also described in Figure 13. It appears that all countries indicate the same pattern; the impact of parenthood is positive for men (translating into a negative score) but negative for women (translating in a positive score)[10]. On average across OECD countries, the employment rate for fathers is 11 % higher than the employment rate of childless men and the employment rate of mothers is 10 % lower than the employment rate of childless women.

Figure 13: Employment impact of parenthood (age 20-49)



Source: Eurostat 2014; Plantenga 2014, p40

Regarding the impact of parenthood on women, Austria, Denmark, France and Spain rank better than average; in Sweden, no impact was determined at all. The greatest negative impacts can be observed in Hungary (37 %) and Germany (18 %). Concerning men, impacts below average can be found in Austria (7 %), Denmark (10 %), Germany (8 %) and Hungary (10 %), higher impacts in France (12 %), Spain (13 %) and Sweden (15 %).

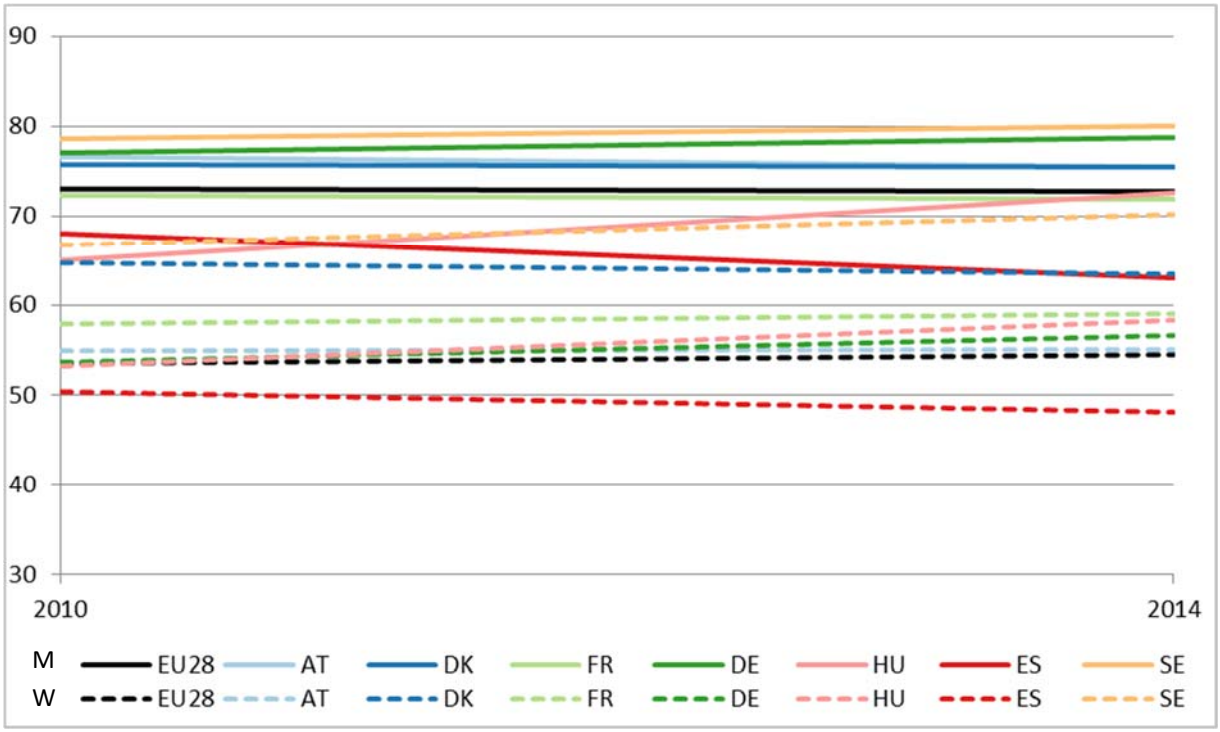
2.2.1.3 Employment by full-time and part-time status and sex

Figure 14 illustrates the labour market participation of men and women measured in full-time equivalents (FTEs). Consequently, part-time employment appears in the statistics as a share of FTEs. In the EU-28 in 2014, 55 % of women and 73 % of men worked full-time. The women's share of FTE is above EU average in all EFFORTI countries except Spain, with the best results in Sweden (70 %),

[10] The employment impact of parenthood is calculated by subtracting the employment rates of fathers and mothers of young children (0-6 years old) from childless men and women (Plantenga 2014, 7).

Denmark (64 %) and France (59 %). Interestingly, France (72 %) and Spain (63 %) are the only two countries that show a lower share of FTE employment for men than the EU-28 average. This is linked with an FTE employment rate of men in Spain which dropped from 68 % in 2010 to 63 % in 2014 due to the economic crisis. Female full-time equivalent also dropped – but not to the same extent (50 % to 48 %). Apart from Spain (m: -5 %; f: -2 %), Hungary showed the greatest shifts in this period, but in the opposite direction (m: +8 %, f: +5 %) as a result of the overall increase of FTE employment.

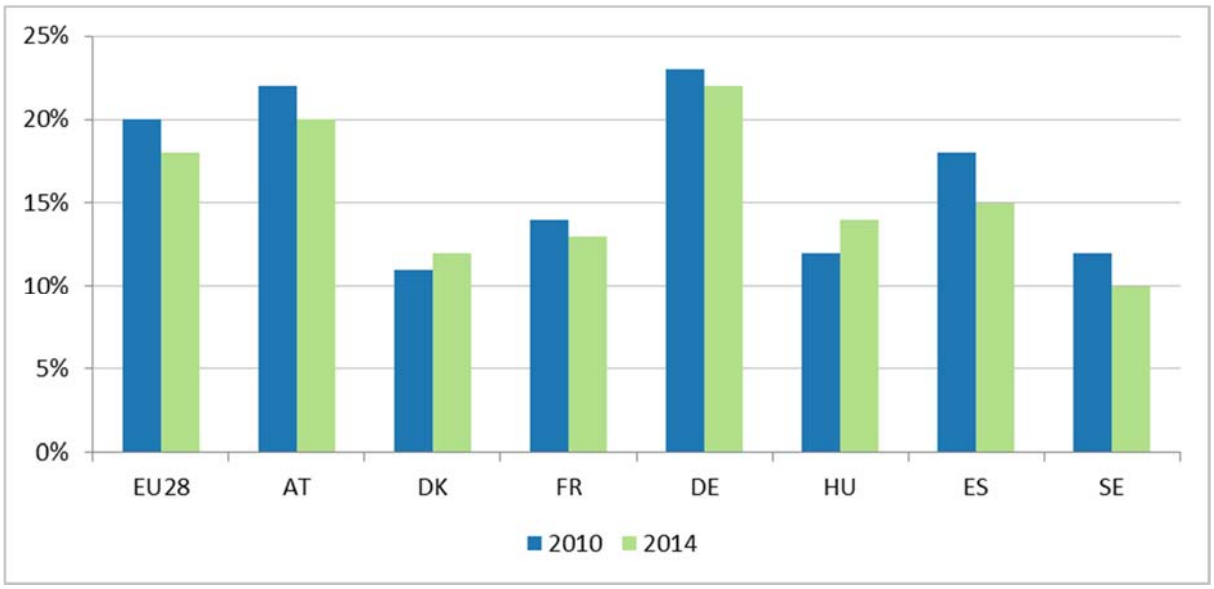
Figure 14: Full-time equivalent (FTE) employment rates among women and men aged 20-64 (%), 2010-2014



Source: EC 2016, Report on equality between women and men, p49

Among the EFFORTI countries, the gender gap for FTE employment rates is lowest in Sweden (10 %), Denmark (12 %) and France (13 %). Only two countries are above the EU-28 average gender gap of 18 % in 2014: Austria (20 %) and Germany (22 %). This indicates that part-time work is highly prevalent among women in these two countries. The high labour market participation of women in Austria and Germany is due to part-time work.

Figure 15: Gender gap in full-time equivalent (FTE) employment among women and men aged 20-64 (%) (in percentage points), 2010-2014



Source: EC 2016, Report on equality between women and men, p49

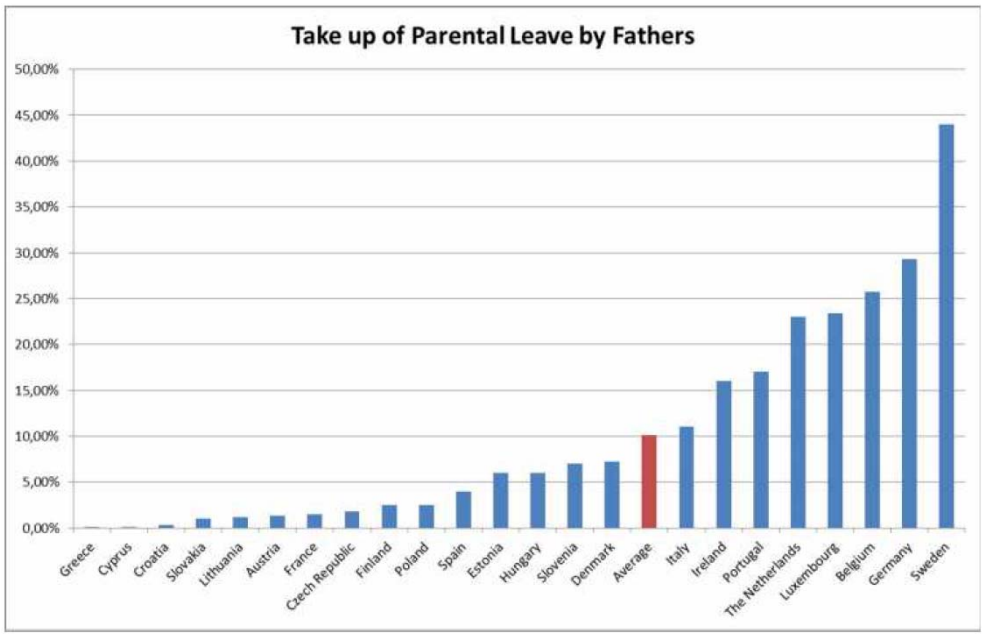
Even though Denmark and Sweden are part of the leaders in this regard, the issue of full and part-time orientation is recognised. In Denmark, the share of women working part-time has decreased over the past 30 years by around 13 percentage points; there has been an increase in the share of young women working part-time, but a decrease of women in other age groups working part-time. But there are still gender differences in regards to part-time work, which might partly be explained by horizontal segregation, where men and women are employed in different sectors where the working conditions might differ. Other explanatory factors are the gender roles, where women are still seen as primary care providers for children and since they often earn less than men, they also tend to reduce paid work and take on more reproductive work. In Sweden – even though "the Government's objective is that full-time work should be the norm, and part-time a possibility" – around 30 % of women work part-time. However, studies show that many part-time working women would prefer to work more than they do, and that the main reasons for part-time work are the unavailability of suitable full-time jobs or their childcare responsibilities (see also chapter 2.2.3.3).

2.2.2 Usage of parental leave

2.2.2.1 Usage by sex

It is difficult to compare the take-up rate of parental leave across countries because of different legislations in the EFFORTI countries and a lack of available and reliable comparative data. In Figure 16, it can be seen that it is not common for fathers in Austria, France, Spain, Hungary and Denmark to take parental leave, given they are positioned below the EU-23 average (10 %). Take-up of parental leave by fathers in Hungary is just slightly higher than 5 %; in Austria the rate is even lower. With nearly 45%, Sweden shows the highest share of fathers in parental leave among the EFFORTI countries.

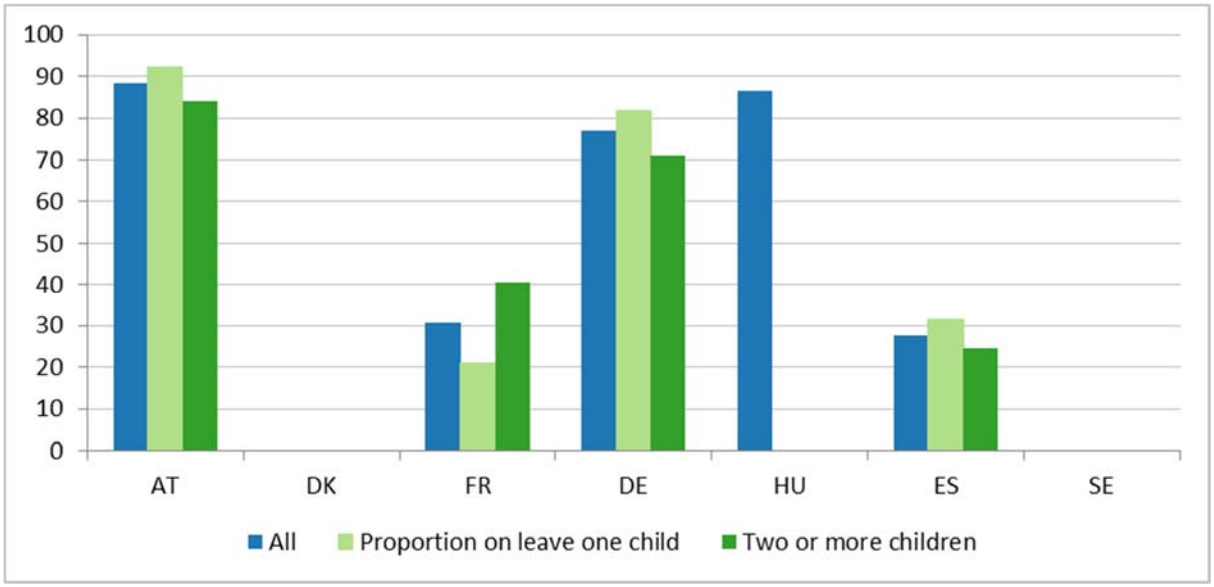
Figure 16: Take-up of parental leave by fathers in 23 Member States in percentages of the available leave



Source: FEMM Committee 2015, p73

Usage rates of parental leave by employed mothers are in comparison much higher to those of men, as indicated by Figure 17, especially in Austria, Germany and Hungary. For Denmark and Sweden there are no data available. In Spain, the percentage of mothers in maternity or parental leave is comparably low because parental leave is not remunerated. In France, the low proportion of mothers taking up leave can be attributed to legal regulations and the childcare situation (Govillot 2013, 1). In comparison to other OECD countries, France has a relatively high level of expenditure on childcare and shows a good availability of childcare also before mandatory school age in a European comparison (OECD 2011, 141; EC 2014, 15). Furthermore, the traditional role of motherhood is less prevalent in France than it is e.g. in Germany (BMFSFJ 2015a, 14p).

Figure 17: Proportion (%) of employed mothers with a child under age 1 on maternity or parental leave



Source: OECD Family Database 2016, PF2.2.A

According to studies, people maintain traditional values about gender roles in the family, which is the main reason behind this data. Nevertheless, some studies suggest that younger generations are opening up to the idea of involving fathers in childcare. Sweden (43 %) and Germany (29 %) are the two EFFORTI countries which reach the first places regarding take up of parental leave by fathers. However in Germany, there are strong differences between the federal states: In Saxony, 44 % of the fathers of children born in the first quarter of 2015 have made use of parental leave, but only 22 % did so in Saarland. Next to regular parental leave, there are also an increasing number of fathers who take short-time parental leave to care for a sick child in Germany. One of the biggest statutory health insurers noticed an increase in the participation of fathers between 2009 and 2014 from 10 percent to almost 20 percent in short-time parental leave days.

2.2.2.2 Average duration of parental leave periods by sex

Although the parental leave legislation is quite different in the EFFORTI countries and hardly any comparable data is available, it can be stated that fathers take up much shorter periods of parental leave than mothers. For instance in Germany, for children born in the first quarter of 2015, fathers used parental leave benefits for 3.1 months and mothers for 11.6 months on average. Also in Denmark and Sweden, leave periods of fathers are much shorter than those of mothers. This resonates with the already stated traditional gender roles and the gendered division of labour.

2.2.2.3 Barriers for increasing participation of men

When comparing the EFFORTI countries, three main barriers can be identified that keep fathers from taking parental/paternity leave. First and above all, it is based on cultural reasons; meaning traditional views on parenthood play a role in why fathers might hesitate to take leave. Even though social patterns are changing, this has an effect in all EFFORTI countries and can be undermined by national

studies; e.g. in Austria, only 32 % accept fathers who take parental leave, while 73 % still accept a father who focuses on career and does not participate in childcare. In Denmark, a study showed that men taking paternity leave often receive remarks from their male colleagues, such as 'have a nice holiday' (Warming 2016, 7-8), and in Sweden it is perceived that 'women are expected to go on parental leave immediately after the baby is born, while men are expected to do so later, and preferably when it suits the work at the department' (Salminen-Karlsson et al. 2014, 72).

Second, a reason that is frequently raised against paternity/parental leave of fathers is that families cannot afford it. In general it can be said that in most cases a gender pay gap represents a disincentive for men to take leave, as the higher income is often needed. For Austria, this economic argument is undermined by the income-based child benefit model. Also a German study showed a positive effect of a high household income on the fathers' parental leave (Institut für Demoskopie Allensbach according to BMFSFJ 2015b, 42). Even though the financial aspect is considered an important factor in most countries, a Swedish study relativises the impact of income by showing that it only plays a minor role in regards to the distribution of parental leave days in Sweden.

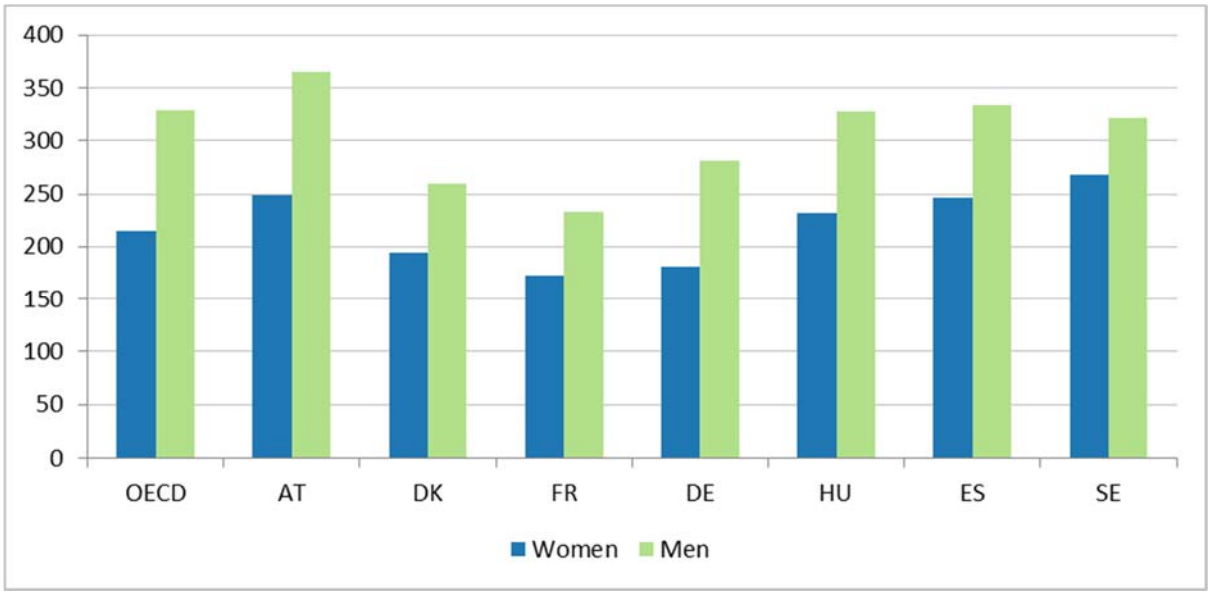
Lastly, fathers fear negative career effects if they stay home for a while, dedicating their time to childcare. In Austria, this holds especially true in male dominated economic sectors and in companies with a long-hours work culture. French men may even be afraid of losing their jobs or that the leave may constitute a negative signal for wage increases once returning to the job. In Germany, it is considered a key reason for fathers not to use parental leave, because firstly, leave of fathers is only partly accepted by employers, secondly, especially for men leave often goes with a leak of aspiration in their career and thirdly, the chances to be promoted to a higher position in a short run decrease. A comparable perception can be found in Denmark, where a recent survey showed that more than 50 % of the fathers who took less than three months leave in total (paternity and/or parental leave) stated that 'if my employer had clearly indicated that my job situation would not be negatively affected' and 'if my work place had a tradition for male employees taking leave' were factors influencing the period of leave they took (Bloksgaard and Rostgaard 2016).

2.2.3 Reproductive work

2.2.3.1 Time spent on unpaid work

As seen in Figure 18 and Figure 19, women spend more time working than men in total with 57h/week compared to 54h/week on OECD average. While men spend more time with paid work (38h/week) than with unpaid work (16h/week), women spend more time with unpaid work (32h/week) than with paid work (25h/week).

Figure 18: Time spent in paid work, by sex (in minutes per day)[11]



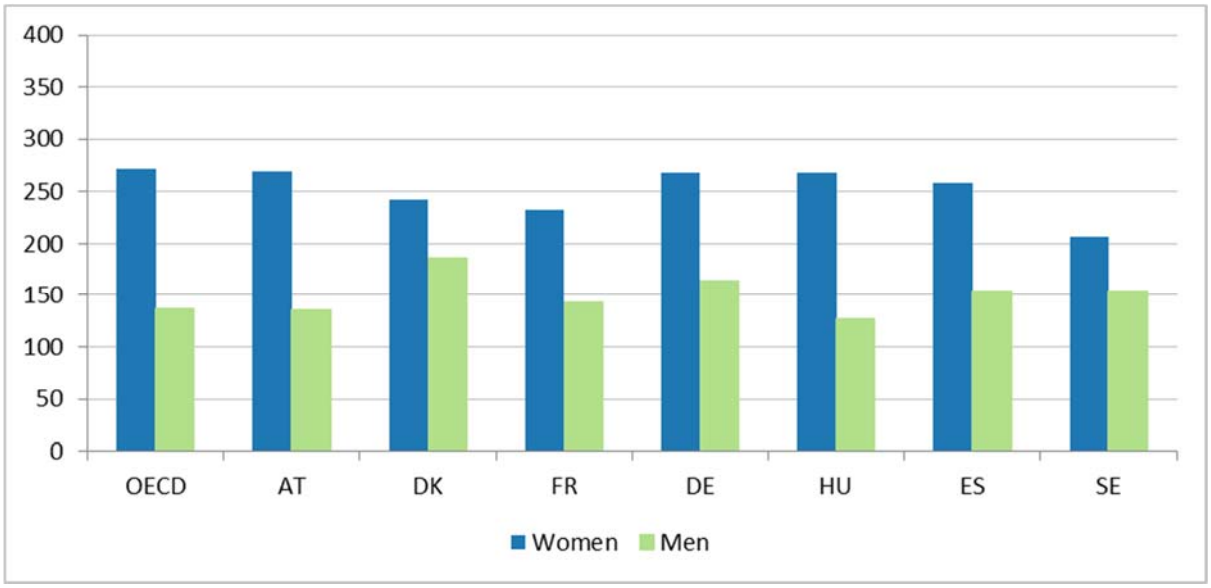
Source: OECD 2014

In Sweden (31h/week), Austria (29h/week), Spain (29h/week) and Hungary (27h/week), women invest more time in paid work than on OECD average, while in other EFFORTI countries, they work less time paid. Concerning men, only Austria (43h/week) and Spain (39h/week) are above OECD average. In comparison with the other countries, in France both women (20h/week) and men (27h/week) spend the least amount of time on paid work. The difference between men and women is the greatest in Austria (diff: 13h/week), thus corresponding with the OECD average (diff: 13h/week); whereas Sweden shows the smallest difference with 6h/week. These results reflect the higher part-time orientation of Austrian women. This makes the prevalent breadwinner model with women as providers of additional income evident.

In all of the EFFORTI countries, women do more unpaid work than men (see Figure 19); the most in Austria, Germany and Hungary (respectively 31h/week), the least in Sweden (24h/week). Austria and Hungary, both among the countries with the highest number of unpaid working hours for women, also show the greatest differences between men and women (diff: 16h/week). In Hungary, women spend even double the amount on unpaid work, this is based mostly on traditional role models; most of the people maintain traditional values related to roles in the family. In accordance with this, women are usually responsible for the housework and care of children and relatives.

[11] The data for this figure refers to different time horizons. The data for Austria depicts 2008-09, for Denmark 2001, for France 2009, for Germany 2001-02, for Hungary 1999-00, for Spain 2009-10 and for Sweden 2010.

Figure 19: Time spent in unpaid work, by sex (in minutes per day)[12]



Source: OECD 2014

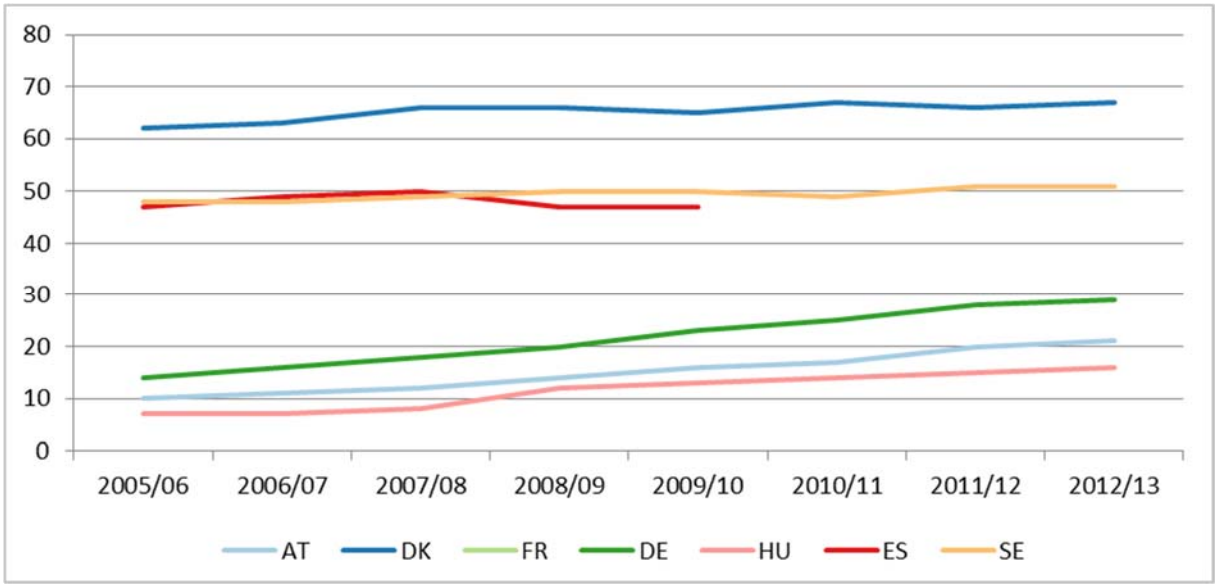
The gender gap for unpaid working hours is smallest in Sweden but women have changed their behaviour more than men. Changing these patterns might require a change in gendered norms and expectations of 'who does what', including more equality in terms of women's and men's prerequisites on the labour market. One explanatory factor might be that still more women than men work part-time, and therefore do more unpaid work. Another factor is the flexibility in parental leave policies, where families might strengthen traditional gendered patterns.

2.2.3.2 Enrolment rate of children under the age of 3 years in childcare facilities

The enrolment rate of children under the age of 3 years in childcare facilities differs greatly among the EFFORTI countries. The highest results are found in the Nordic countries: Sweden (51 %) and Denmark (67 %). Nordic countries including Denmark have a high share of parents taking part in the labour force, compared to other European countries, which makes childcare facilities necessary. While providing more childcare than Hungary (16 %), Austria (21 %) and Germany (29 %) rank in the lower part of the range too.

[12] The data for this figure refers to different time horizons. The data for Austria depicts 2008-09, for Denmark 2001, for France 2009, for Germany 2001-02, for Hungary 1999-00, for Spain 2009-10 and for Sweden 2010.

Figure 20: Enrolment rate of children under the age of 3 years in childcare facilities, by country and year[13]



Source: UNECE Statistical Database

Looking at the developments since 2005/6, the data reveals that all the countries were able to increase their shares of children enrolled in childcare facilities. The greatest changes were made in Austria (+11 %) and Germany (+15 %), where enrolment in childcare facilities has become gradually more common within the last decade. Sweden could raise its already high level of enrolment only slightly in this period with 3 %, because 'due to parental leave very few of the youngest children are in daycare' (Nordic Council of Ministers 2015, 11). This explanation also applies to Austria and Germany[14].

In Hungary, where the enrolment rate is lowest, the primary source of institutional childcare for children younger than three years is the nurseries operated by local governments. Children may be admitted to a nursery from the age of 20 weeks onwards, but in practice very few parents enrol their child before they are at least one year old, and in most cases not until after the child's second birthday. This is because paid parental childcare leave makes it possible for the majority of mothers to care for their child at home for two or three years before returning to employment. The majority of Hungarian families consider it to be much more desirable for the mother to stay at home than to enrol the child in a nursery. As a consequence, only around 16 % of children under the age of three were in nursery childcare in 2015. It is also a usual practice in Hungary that nurseries do not accept a child if the mother is staying at home with her younger child and is receiving childcare fees.

2.2.3.3 Main reasons for women not working or working part-time

In the EU, the main reason for women aged 15-64 years working part-time is the care of children or sick adults (27 %), followed by not being able to find a full-time job (25 %). In the EFFORTI countries,

[13] On this topic, no data is available in the UNECE Statistical Database for France; for Spain, it is only available from 2005/06 to 2009/10.

[14] See e.g. http://library.fes.de/pdf-files/akademie/bayern/12359.pdf

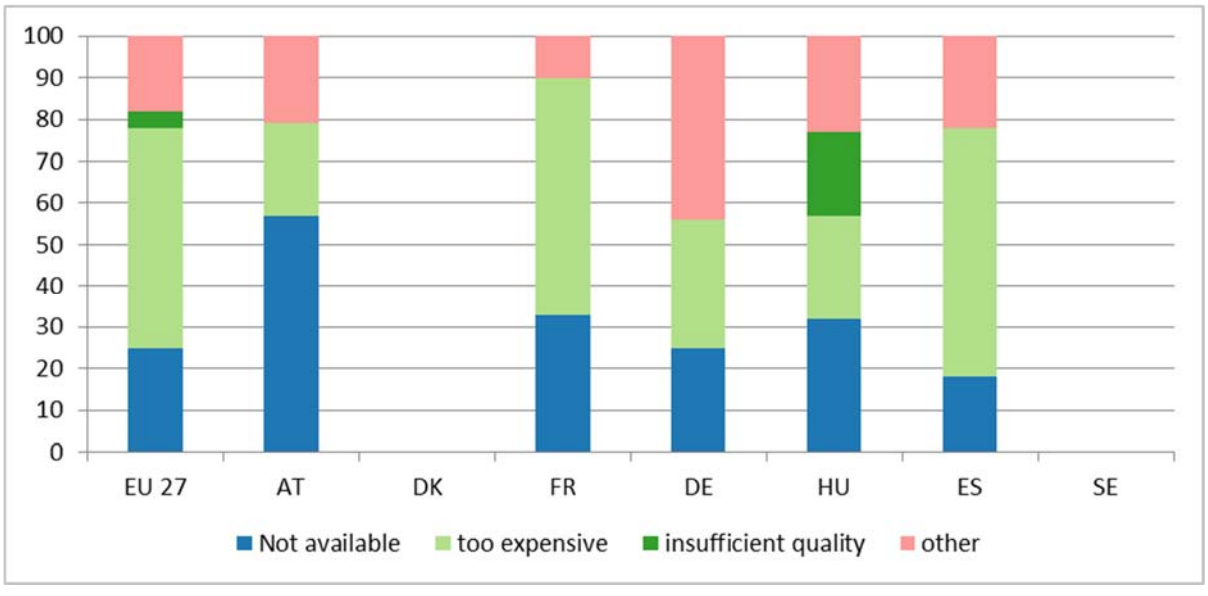
the relevance of these two reasons partly differs widely: In Spain (60 %) and France (42 %), a number of women higher than average work part-time because they cannot find a full-time job. In Denmark (15 %), Austria (11 %) and Germany (10 %), this applies to relatively few women. On the other hand, in Austria (39 %) and Germany (30 %), a comparably higher number of women work part-time to take care of children or sick adults. All other EFFORTI countries are below the EU average, above all Denmark with only 3 %[15].

On an EU-27 level, the main reason for women not working or working part-time because of childcare is seen more in the costs (53 %) than in the availability (25 %) or insufficient quality (4 %) of childcare facilities. This corresponds with the situation in France, Germany and Spain. However in Germany, only 31 % see costs as the main problem, while in France (57 %) and Spain (60 %), the share is higher than average.

In contrary, in Austria and Hungary availability rather than costs of external childcare is rated as the main reason for women not working or working part-time. In both countries, this share is higher than on average, but with 57 % exceptionally high in Austria. But as this survey data is from 2010 and the availability of childcare facilities has improved in Austria since, it can be assumed that these results have changed too. Only 22 % of mothers in Austria do not work or work part-time because childcare facilities are too expensive. In Austria, the funding of childcare facilities is a matter of federal states. The costs for a childcare place for a family therefore differ depending on the federal state.

In Hungary, the low availability of childcare services is the most important factor explaining the lower participation of women in the labour market. Availability is limited, particularly in rural areas. Addressing this problem, the Hungarian government launched a new program in 2017 to increase the number of childcare facilities. Furthermore, the low flexibility of the labour market is another main obstacle for part-time work as the present tax and social insurance system is not encouraging for employers to employ part-time workers.

Figure 21: Main reasons for women (aged 15 -64 and with children up to mandatory school age) not working or working part-time by perceived shortcomings of childcare



[15] See Eurostat Labour Force Survey [lfsa_epgar]

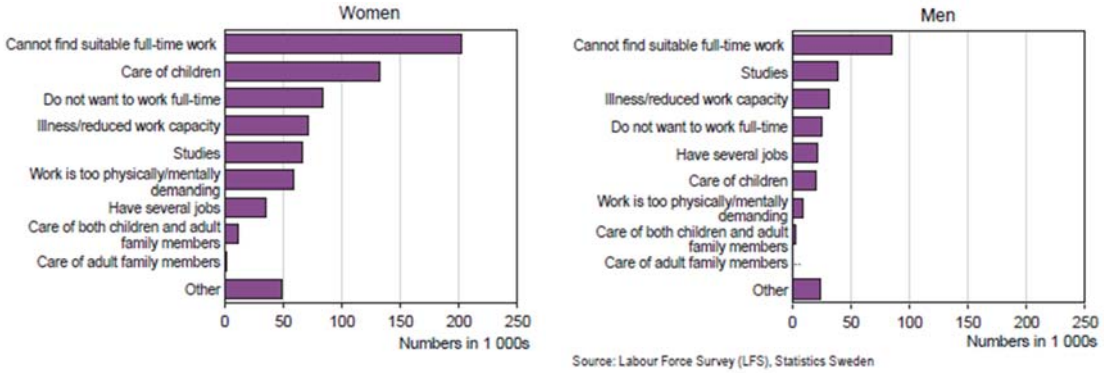
Source: EU-LFS data 2010 p35

The EU-LFS data source does not provide data on this topic for Sweden and Denmark, but for Denmark it can be said that compared to other Nordic countries, it has a relatively high share of men and women working part-time. More women than men are single parents and this might be one of the reasons why women in Denmark are not working or working part-time. Other explanations could be that women spend more time on domestic work than men, and also, men and women are often employed in different sectors where there might be different possibilities for employment in full-time or part-time positions (see also part 2.2.1 on general labour market participation and part 3.2.4 on general horizontal segregation).

For Sweden, an alternative data source is available on the topic; it is represented in Figure 22 and provides an overview of reasons for part-time employment (Statistics Sweden 2016, 53). For both women and men, the main reason for part-time employment among the age group 20-64 is that they cannot find a suitable full-time job. However, more women than men also state that they work part-time because they take care of children, whereas only relatively few men provide this explanation. Also, more women than men cannot work full-time due to illness and/or reduced work capacity. Further, a relatively large share of women also stated that they do not want to work full-time, and this is worth noticing when promoting initiatives for engaging more women in full-time employment.

Based on the Swedish case, it can be argued that while good public childcare services might increase women's labour market participation, flexible working contracts or flexible working time arrangements might keep women with children in employment, but they might also be more likely to work on reduced time. Parents with children aged 1-3 years who choose to stay at home with the child instead of sending the child(ren) to preschool are entitled to a child raising allowance cash payment provided by the Swedish municipalities. It is a possibility that this might encourage some parents, especially mothers, to stay at home and not engage in employment at all. Besides the parental leave/benefit scheme as such, e.g. the number of non-transferable days, there are no special measures to encourage men to make use of reduced working hours.

Figure 22: Reasons for part-time work for persons aged 20-64, 2015



2.2.4 Comparison of the assessments

Despite legislation and additional measures, the labour market in all analysed countries remains gender-segregated and the traditional division of labour persists and is nearly the same, as data shows

(see chapter 2.2.3, 3.2.4 and 3.2.5). In countries like Austria and Germany, this persistence is supported by contradictory policies that on the one hand strengthen traditional gender roles with fiscal policies and on the other try to combat it by supporting paternity leave. Another reason for lack of progress is that gender equality is rarely addressed in the educational system and gender stereotypes are not combated. This is mentioned for France, but certainly applies for other countries too. Countries like Denmark and Sweden have a more consistent gender equality policy than Austria or Germany, but nevertheless they cannot overcome gender segregation. Hungary on the other hand is clearly pursuing a policy of supporting the traditional division of labour between women and men. This also results in comparatively inflexible working conditions for reconciliation of work and life. And Spain has comprehensive structures and legislation on gender equality, which however cannot be effectively implemented due to massive budgetary cuts caused by the economic crisis. Moreover, the crisis led to labour market policy reforms that did not consider effects on gender equality and disadvantage women. This shows that gender equality policy is neglected in times of crisis in favour of other political interests.

Concerning childcare facilities, Austria, Germany and Hungary are currently fighting against a shortage especially for children under the age of 3, but yet not sufficiently. In Spain, extending childcare services for those of 0-3 years of age is a major challenge (León and Lombardo, 2014). In 2008, the government passed the Educ3 Plan which established the provision of pre-primary school care coverage – in 2012, this plan was cancelled. In 2013, childcare coverage for children aged 0-3 was still limited, dominated by the private sector and varied greatly according to Autonomous Communities (Lombardo 2016, 19). In Sweden[16], Denmark and France, the supply of childcare facilities is sufficient. These countries have a long tradition of handing children over to external care facilities at an early age.

Activities to reduce the gender pay gap vary across the countries. Denmark and Sweden address equal pay in the law and set many activities like Equal pay action plans and wage development monitoring. In Denmark, France, Spain and Sweden, equal pay is also part of collective agreements / workers' statutes, which is not the case in Austria. In Germany, it depends on the union whether equal pay is an issue in collective agreements or not. It appears to be neglected by unions quite often, but e.g. verdi has a campaign to level up social professions which are traditionally fulfilled by women. Wage transparency is generally missing in Spain, and in Austria the regulations in this respect are very limited because of confidentiality rules. In Hungary, wage transparency is actively prevented in many employment contracts that stipulate a penalty if the amount is revealed by the employee. And in Spain, Equal Pay is determined in the law but not supported by active policies. Interestingly, these very diverse policies seem to have low effects. Data shows (see capital 3.2.6.3) that the gender pay gap in Hungary, a country with almost no activities concerning equal pay, has a similar gender pay gap as Sweden, a country with very advanced equal pay activities. This may be due to different historical backgrounds.

The comparison of activities regarding Gender Equality in Decision Making show that quotas like in Germany or Austria (for state-owned companies) can be very effective in rising the share of women in boards. But the regulations in Austria, Denmark and Germany are limited to specific companies (e.g. state-owned, specific size) and are nowhere universally valid for the public and private sector. Non-binding regulations like in Austria, Germany and Sweden for the private sector and in Spain are not successful in raising the share of women in decision making. However, the political culture in Sweden

[16] See (Nordic Council of Ministers 2015c, 6) and (Swedish Social Insurance Agency 2015, 10)

appears to be clearly different from that in other countries. In Sweden, political decision making is voluntarily gender-balanced, quotas are not needed. On the contrary, in Hungary there are no activities that aim to improve the gender balance in decision making and consequently, the share of women in decision making is comparatively low (see chapter 3.2.5).

3 Gender Equality in RTDI

After the EFFORTI countries' innovation systems were described in Chapter 1, and the general equality policies were compared in Chapter 2, the third chapter focuses on gender equality in RTDI.

In the first part, gender equality policies and strategies in RTDI, structures and actors as well as relevant measures targeting the three ERA objectives are described. The second part of the chapter depicts the actual status quo of gender equality in RTDI and compares it with the entire labour market of the seven reference countries. Furthermore, the situation regarding gender equality at organisational and individual level as well as the integration of the gender dimension in research and teaching are examined. Due to comprehensive data, the individual situation of women in RTDI can be reflected best in terms of participation in tertiary education and labour market in RTDI, horizontal and vertical segregation, employment conditions and gender gap in scientific output.

3.1 Gender Equality Policies in RTDI

3.1.1 Strategic gender equality policies in RTDI in place

In general, there are various different strategies for implementing gender equality in RTDI: France, Germany and Hungary have explicit strategic documents addressing gender equality in RTDI, but in Hungary, no actions following the strategy have been taken yet. In Germany and Austria, gender equality in RTDI is addressed by overall political instruments like the coalition agreement in Germany and the outcome-oriented budgeting in Austria – both of them formulate gender equality targets that have to be met. Although regarding the coalition agreement in Germany, it has to be said that this is just an objective agreement with no sanctions. Austria and Spain have developed RTDI strategy documents that also include gender equality targets. In Denmark, Spain and Sweden, gender equality in RTDI is also subject of gender equality or equal opportunity strategies like the Act on Gender Equality and the Gender Equality Action Plan in Denmark, the action plan for Equal Opportunity in Spain or the strategy for the Work on Gender Mainstreaming in Government Offices in Sweden. Moreover, in Denmark and Sweden, a task force respectively a national expert group was installed to support gender equality in RTDI. For Denmark, a report by DFiR, the Danish Council for Research and Innovation Policy states that the adoption of gender mainstreaming strategies in research is not a prioritised strategy (Danmarks Forsknings- og Evalueringspolitiske Råd 2016, 16). However, the growing attention on gender issues and gender equality has for example resulted in several action plans at university and funding levels (Oxford Research 2015, Nielsen 2015, DFIR 2015).

Overall, there are countries which

- are developing their own strategy for gender equality in RTDI;
- outsource the topic to a working group;
- anchor the topic multiply in universal political instruments, RTDI strategies or Gender Equality / Equal Opportunity strategies.

Apart from Hungary, all the countries of comparison address ERA targets in their gender equality RTDI policies. To raise the share of women in RTDI, improve their career opportunities and generally foster gender equality in research organisations in Austria, France, Spain and Sweden, universities have to have gender equality / equal opportunity plans. Austrian, German and French universities also have to

have units working on gender equality/equal opportunities. Moreover in Austria, Germany[17] and France, the university performance agreements contain gender equality objectives, but missed targets do not lead to financial sanctions. Nonetheless, Austria, Germany and Sweden do provide financial incentives for gender equality in RTDI: They tied research grants to gender equality measures in institutions (in Austria occasionally) and integrated organisational gender criteria in research funding.

Regarding women in decision making, Austria, France and Spain implemented quotas for university committees. In Germany, in the North Rhine-Westphalian state law there is now the obligation for every university to set a quote, although the quote is under the discretion of every university. Furthermore, research organisations meanwhile set quotas according to the cascade principle (because of the Pact for Research and Innovation). In Denmark and Sweden, universities are obliged to work towards gender balance in management bodies and in Sweden hiring committees have to include men and women, but there are no explicit quotas implemented. In Sweden, half of the newly appointed professors will have to be female by 2030. Only in Denmark, the RFO committees have to be gender balanced, in Sweden they have to report on their gender equality activities. In Austria, the Austrian Science Fund implemented a quota of 40% of the underrepresented sex.

The ERA target to integrate the gender dimension in research and teaching is less frequently addressed by gender equality policies in the compared countries. In Austria, Denmark and Germany, gender relevance must be shown in research applications. In France, a commission defined a research agenda for gender research and training as an academic field; proposing to integrate the gender dimension in research funding, publications and specialised journals. In Spain, the Law for Science and Technology supports the integration of the gender dimension in research but concrete programmes are missing. Apart from that, the Action Plan for Equal Opportunities in the Information Society aims to increase the digital content of interest to women. In Sweden, the Swedish Secretariat for Gender Research is responsible for integrating gender analysis into science research and curricula. There is no comparable institution in the other EFFORTI countries.

In Austria, Denmark, Germany[18] and Sweden, the universities' progress regarding gender equality is monitored. In Germany and Spain, this monitoring does not only include universities but all RPOs. In France, disaggregated data about gender Equality in HEIs have to be provided.

In general, it can be said that gender equality strategies in RTDI are primarily aimed at universities, more rarely on RPOs and never on the BES sector. The BES sector is, if at all, addressed by the general gender equality policy that focusses more on women in management positions and not on women in RTDI (see 2.1.2). Gender equality strategies in RTDI mainly try to influence the gender equality policies of RPOs through GEPs, quotas and funding policies. The gender dimension in research and teaching is rarely addressed.

[17] For Germany see (p. 18) http://www.hamburg.de/contentblob/3929628/c5aa297a8f82a5627a824f306dbf6d94/data/zlv-2013-2014-uhh.pdf;jsessionid=C6A1A6F086F52220EE1DD56F64AB51E8.liveWorker2 (p. 9)

[18] See : http://www.gwk-bonn.de/themen/chancengerechtigkeit/

3.1.2 Structures for Gender Equality in RTDI

In all compared countries except for Hungary, ministries are involved in implementing gender equality in RTDI. In Hungary, there are no specific measures for women in RTDI at a national level, but the recently introduced policies supporting families and mothers returning to work also have an impact in RTDI. In Austria, Denmark, France and Germany, ministries responsible for research are dealing with the issue. In Spain and Austria, (also) ministries responsible for economy and innovation implement gender equality policy in RTDI. In Sweden, the government, the Ministry for Gender Equality and the interministerial working group on gender mainstreaming are involved in designing a gender equality policy in RTDI.

Austria, Denmark, France, Germany and Sweden also mention research funding organisations that support national policies on gender equality in RTDI, but to a different extent. In Austria, Germany and Sweden, the funding organisations seem to be more involved in supporting gender equality than in the other countries, as they provide financial incentives for organisations applying for research funds to promote gender equality. In Spain, a policy has been implemented since 2011 that requires applicants to specify whether they will consider sex or gender in their research design.

Austria, Denmark, France, Germany[19] and Sweden have councils for research (and innovation) policy; gender equality in RTDI is one of the issues they are dealing with. The Austrian Council for Research and Technology development has not been very active in this issue though.

Further, Austria, Denmark and Sweden name associations of universities (also rector's conference) that coordinate gender equality activities in universities and aim for increasing the share of women in leading positions. In this context, the Hungarian Academy of Science has to be mentioned, which is the only institution beside the nongovernmental Association of Hungarian Women in Science that addresses gender equality in RTDI in Hungary.

3.1.3 Activities addressing Gender Equality

3.1.3.1 In scientific careers and regarding gender balance in decision making

In addition to the policy strategies and laws already illustrated, we will briefly analyse further activities in the EFFORTI countries aiming to raise the share of women on all levels in RTDI. All of the compared countries implemented structural measures to support scientific careers of women, at least to some extent. In Austria, Germany, Hungary and Sweden, RPOs are supported regarding structural change. However, in Hungary the activities are non-exhaustive and do not focus specifically on gender but on equality in general. In France, Hungary and Spain, structural measures mainly focus on improving work-life balance by improving parental leave arrangements or funding regulations for parents in RTDI.

Moreover, Austria, Denmark, Germany, Hungary and Sweden support female careers on an individual level. They fund fellowships or leadership programmes for female researchers, provide services for female scientists, arouse the interest of girls for STEM or install female professorships.

In addition, Germany, Sweden as well as Denmark and France fund research regarding gender equality in RTDI and career paths of women in RTDI to some extent.

[19] For Germany see http://www.gwk-bonn.de/die-gwk/aufgaben

Denmark, Germany and Sweden also report on evaluation activities in RFOs; the Swedish Research Council and the Danish Council for Independent Research aim to ensure that men and women have the same success rates and get the same amount of funding. Moreover, the Swedish Research Council observes evaluation panels regarding gender bias in the evaluation process and trains those responsible. The Innovation Fund Denmark evaluates if their funding activities focus on leadership development for men and women PhDs and postdocs. The German Research Foundation has currently evaluated the impact of the research-oriented standards for gender equality.

Generally, it can be stated that nearly all activities regarding female scientific careers and gender balance in decision making focus on HES respectively on RPOs and RFOs. The BES sector in RTDI is hardly tackled, solely in Austria with one structural measure and in Germany with one research funding measure.

3.1.3.2 Activities addressing the integration of the gender dimension in research

In addition to the gender equality strategies in RTDI concerning integration of the gender dimension in research and teaching, the EFFORTI countries also report some activities supporting this issue: In Austria, France, Germany and Sweden, gender research is an issue in one or more funding programmes. In Denmark and Spain, support activities like trainings or checklists for evaluating the adequacy of integrating the gender dimension into research are mentioned. In France and Hungary, specific activities regarding the gender dimension in research and teaching are limited to examining the gender dimension in science and research in Hungary and analysis of the gender research landscape in France.

3.2 Empirical Evidence for the Gender Regime in RTDI

3.2.1 Gender Equality in RTDI on organisational level

3.2.1.1 Proportion of RPOs that have adopted gender equality plans

The ERA Facts and Figures (2014) report states that 36 % of RPOs in the EU28 have adopted gender equality plans. Among the EFFORTI countries, the share of RPOs varies significantly. Whereas Germany (81 %), Sweden (79 %) and Hungary (50 %) rank clearly above the EU28 average, Austria (38 %), France (40 %) and Spain (34 %) are grouped around the EU average, and Denmark (16 %) is significantly below. Countries with a higher density of RPOs with gender equality plans have a specific legislation making the adoption of gender equality plans obligatory. In Germany, it can be explained by the fact that research organisations are supposed to implement gender equality measures according to the General Equal Treatment Act; gender equality plans are a common way to fulfil this task (GWK 2016a, 138). In Sweden, the national gender equality legislation has included gender equality planning for all employers, including RPOs, for decades. In recent years, the legislation has explicitly specified the equality planning duties for universities and other educational organisations. Sweden has adopted legislative rules for universities, educational and research institutions to develop gender equality plans (GenPORT, p. 2).

In Hungary, the main motivation behind adopting an equality plan was a legal obligation for the public sector. The development of an equality plan has been obligatory for Hungarian governmental and

public institutions that employ more than 50 employees and those companies where the government or a municipality has more than 50 % ownership since 2004. But these equality plans are not dedicated gender equality plans as gender equality is one target among other equality dimensions. Also, the EU efforts to integrate gender equality in calls for proposals and grant agreements in H2020 have put RPOs recently under pressure to develop gender equality plans.

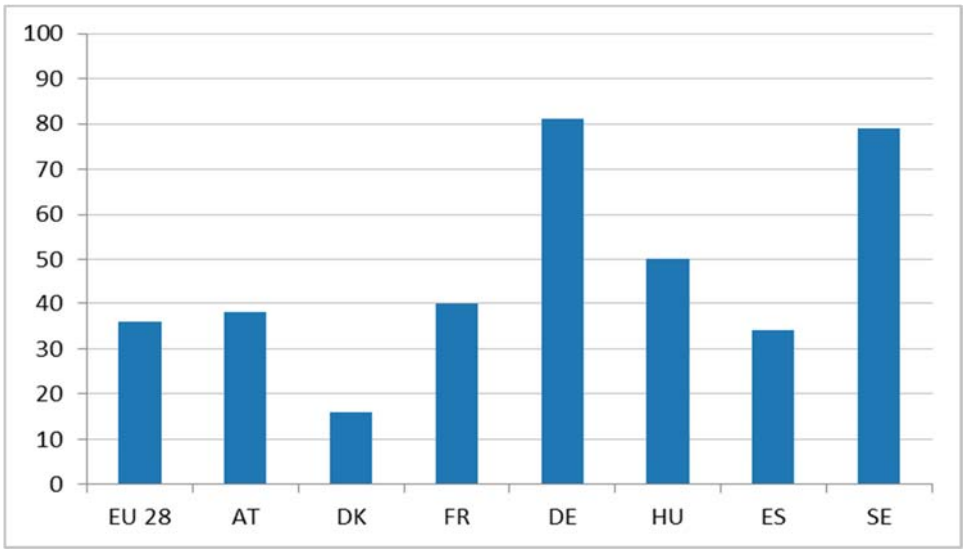
Austria seems to be an exception to this pattern as the university law from 2002 stipulates the adoption of women's promotion plans and since 2015 gender equality plans have become mandatory in universities following an amendment to the university law. Therefore, the ERA figure for Austria seems to be lower than to be expected when taking into account the legal situation. Furthermore, it is not clear which research organisations are subsumed under the term RPO in Austria.

National data for Spain for 2015 however suggests that compared to the ERA figures a higher share of universities (61 %) have a gender equality plan in place and another 24 % are developing one. Only 14 % of universities do not have any gender equality plan. But private universities are lagging behind in implementing gender equality plans compared to public universities in Spain.

Denmark's result might partly be due to the strong culture of self-management when setting up e.g. organisational goals. However, in 2015, four out of eight universities reported that they had gender equality plans and policies focusing on the upper levels of management. One fifth of the universities reported that they have almost achieved a 60/40 gender composition at all management levels, and one out of six universities reported that they were developing a gender equality policy for the management level.

The differences between the ERA data and national data in Spain and Denmark can be explained by the fact that national data refers to universities only, whereas the ERA data is based on the RPO definition. As research systems are quite heterogeneous in terms of research sectors and research organisations (as outlined in chapter 1), data about RPOs with adopted gender equality plans are in general difficult to interpret.

Figure 23: Proportion of RPOs that have adopted gender equality plans, 2013



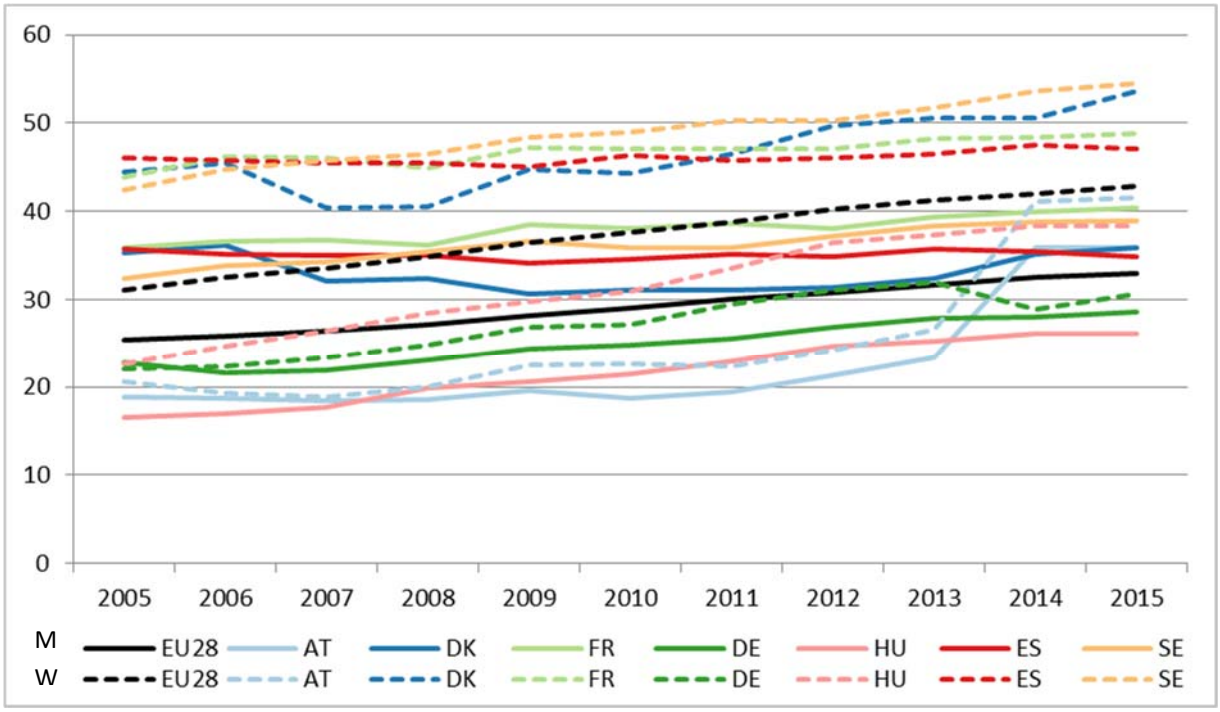
Source: SHE Figures 2015, p116 (data only for 2013) (based on ERA Survey 2014)

3.2.2 Participation of women in tertiary education

3.2.2.1 Share of tertiary educated population among the group of 25 to 34-year-olds by sex

Figure 24 below illustrates the development of the rate of tertiary education among the 25-34-year-olds differentiated by sex for the EU28 and the EFFORTI countries from 2005 to 2015. Between 2005 and 2015, the rate of tertiary educated in this age group has increased continuously for the EU28 average as well as for the EFFORTI countries. The rate has been increasing for both sexes. In 2005, 25 % of men and 31 % of women between 25 and 34 had a tertiary education; in 2015 33 % of men and 43 % of women did so. Thus, in absolute numbers, women's lead in educational attainment has even been increasing between 2005 and 2015. Consequently, in 2015 the share of women with tertiary education in this age group is significantly higher than the one for men in all EFFORTI countries except for Germany. But Germany has the lowest share of tertiary educated among the population between 25 and 34 years, which is related to the dual vocational training system. It offers a qualification without tertiary education and therefore Germany has a comparatively high proportion of middle-ranked qualified people. In Austria, the situation was similar until 2013. But due to a reclassification of ISCED, the qualification acquired upon successful completion of higher technical and vocational colleges is now allocated under ISCED level 5 – before it was classified as ISCED level 4. Another exception is Spain where the share of tertiary educated is stagnating between 2005 and 2015 among the 25-34-year-olds. Therefore, general trends of the higher education system are visible also in the EFFORTI countries: the expansion of tertiary education in the population of the EU28 member states and the feminisation of higher education. Both trends are interrelated and are promoted by public policies like the Bologna Reform Process but also public policies promoting gender equality in educational choices and opportunities.

Figure 24: Share of tertiary educated population among the group of 25 to 34-year-olds by sex*



* Introduction of the ISCED 2011 classification: data up to 2013 are based on ISCED 1997, as from 2014 ISCED 2011 is applied. Online tables present data for three aggregates, and at this level of aggregation data are directly comparable for all available countries **except Austria**. The level shift break in Austria is due to the reclassification of a programme spanning levels: the qualification acquired upon successful completion

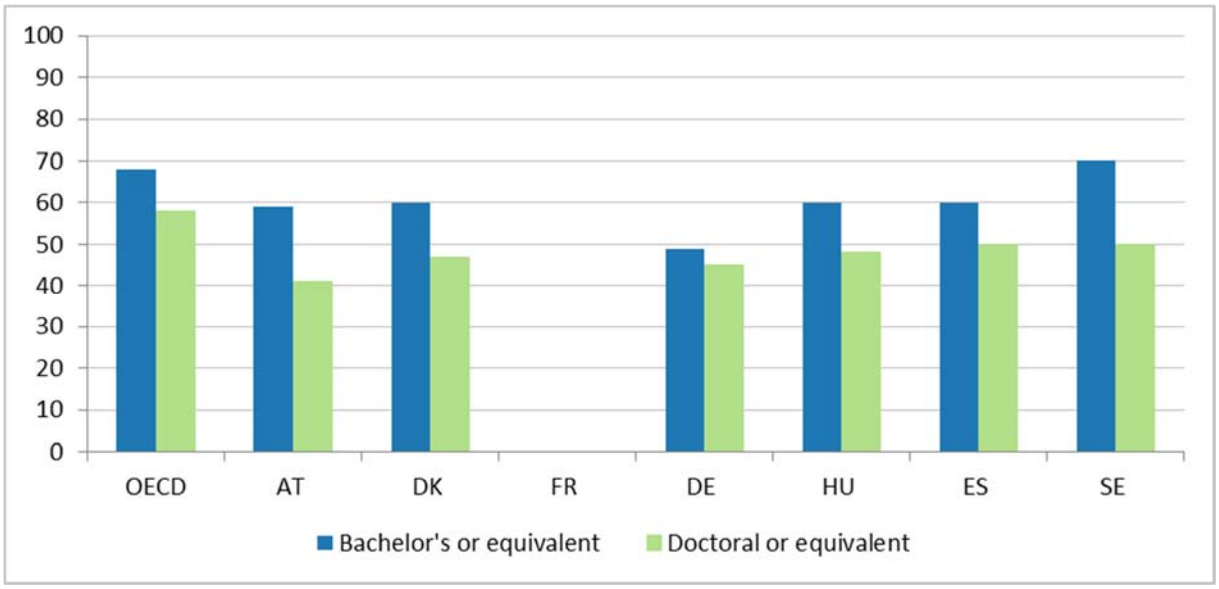
of higher technical and vocational colleges is allocated in ISCED 2011 to ISCED level 5; under ISCED 1997, the same qualification was reported on ISCED level 4, but earmarked as equivalent to tertiary education.

Source: Eurostat, Population by educational attainment level, sex and age (%)[edat_lfse_03]

The above-mentioned feminisation trend is also reflected in the tertiary graduation rates of women and men. In 2014, on average 57 % of bachelor graduates or equivalent were women in OECD countries. In addition, on OECD level 58 % of doctoral or equivalent graduates were female. The EFFORTI countries reveal relatively high rates of female graduates at the level of a Bachelors' or equivalent degree (SE: 70 %, HU: 60 %, ES: 60 %, DK: 60 %, AT: 59 %). But only 49 % of Bachelors' graduates are women in Germany. This is significantly lower than in the OECD and EU average, where most Bachelors' graduates are women.

However, the share of women among PhD graduates in the EFFORTI countries is significantly lower than in the OECD average but also compared to the share of women among bachelor graduates or equivalent in these countries (SE: 50 %, HU: 48 %, ES: 50 %, DK: 47 %, DE: 45 %, AT: 41 %). Although a feminisation process is observable, women are compared to men still less likely to continue their tertiary education until a PhD degree.

Figure 25: Percentage of female graduates in tertiary levels of education, 2014



Source: (OECD 2016, 64)

3.2.3 Labour market participation of women and men in RTDI

3.2.3.1 Proportion of scientists and engineers in total labour force by sex

The development of the proportion of scientists and engineers in the total labour force is hard to compare due to a data break between 2010 and 2011 which is related to a redefinition of the category of scientists and engineers in the HRST statistics.[20] This led to an increase of especially women

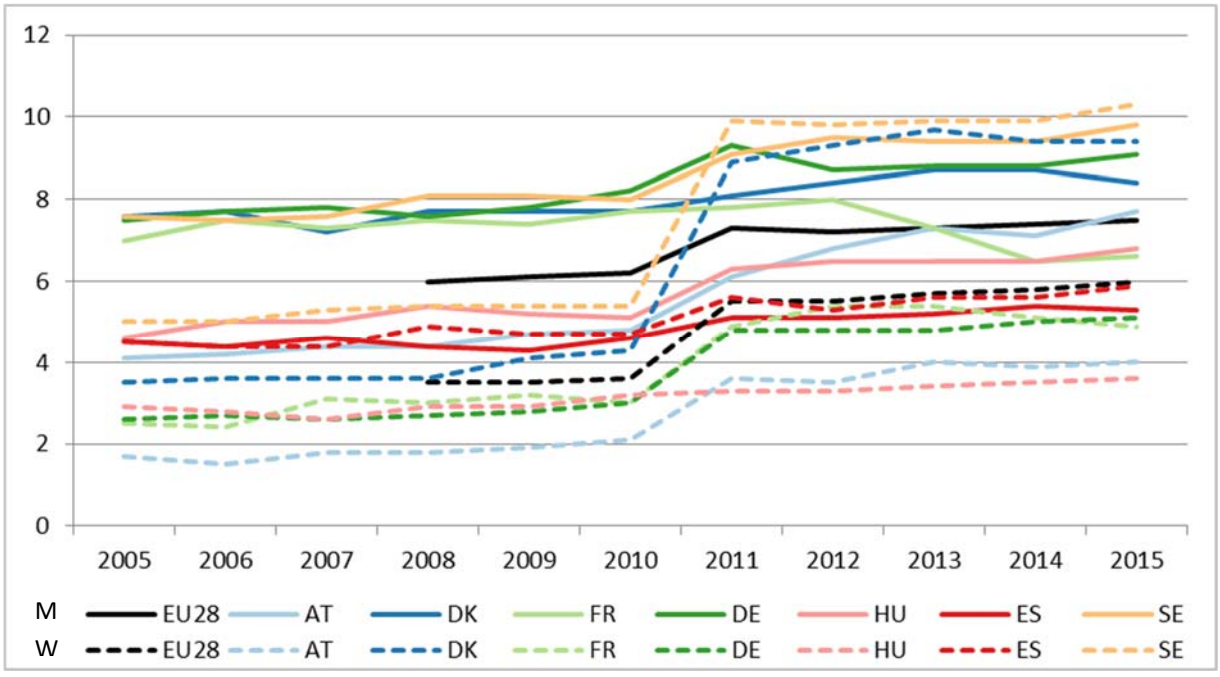
[20] Concerning the redefinition of scientists and engineers in the HRST, the major adjustment is the inclusion of information and communication technology professionals (Eurostat, n.d.). http://ec.europa.eu/eurostat/cache/metadata/Annexes/hrst_esms_an1.pdf

engineers and scientists in most of the EFFORTI countries. Therefore, the higher proportion of engineers and scientists among the active population in the EFFORTI countries is related to this reclassification. We are thus comparing the status quo for 2015 in the EFFORTI countries and not the development of this indicator.

In the year 2015, 7 % of the active population in the EU28 were scientists and engineers. Three EFFORTI countries display a proportion above the EU28 average: Denmark (9 %), Germany (7 %) and Sweden (10 %). Hungary shows the lowest proportion in the total labour force with only 5.3 % followed by Spain (5.6 %) and France (5.8 %). In Sweden, Denmark and Spain, the proportion of engineers and scientists among the total female labour force is higher than for men. In Hungary (3.8 %), Austria (4 %) and France (4.9 %), the share of women scientists and engineers is significantly lower than for the EU28 average.

The highest proportion of female scientists and engineers can be found in Denmark and Sweden. In the case of Denmark, this might be attributed to a high investment in PhD students, based on the Globalisation Strategy, initiated by the prime minister in 2006 and continuing throughout the period. Thus, female students and female PhD students have outnumbered the male PhD students in recent years. In Austria, persisting traditional gender segregated occupational choices and traditional role models are described in the country note as the main reasons for the low proportion of women scientists and engineers. As long as women are mainly responsible for childcare, they tend to choose occupations with a better work-life balance. Employment opportunities in science and engineering in Austria are often dominated by men with a male-oriented work culture and full-time orientation.

Figure 26: Proportion of scientists and engineers in the active population between 15 and 74 years, by sex and year



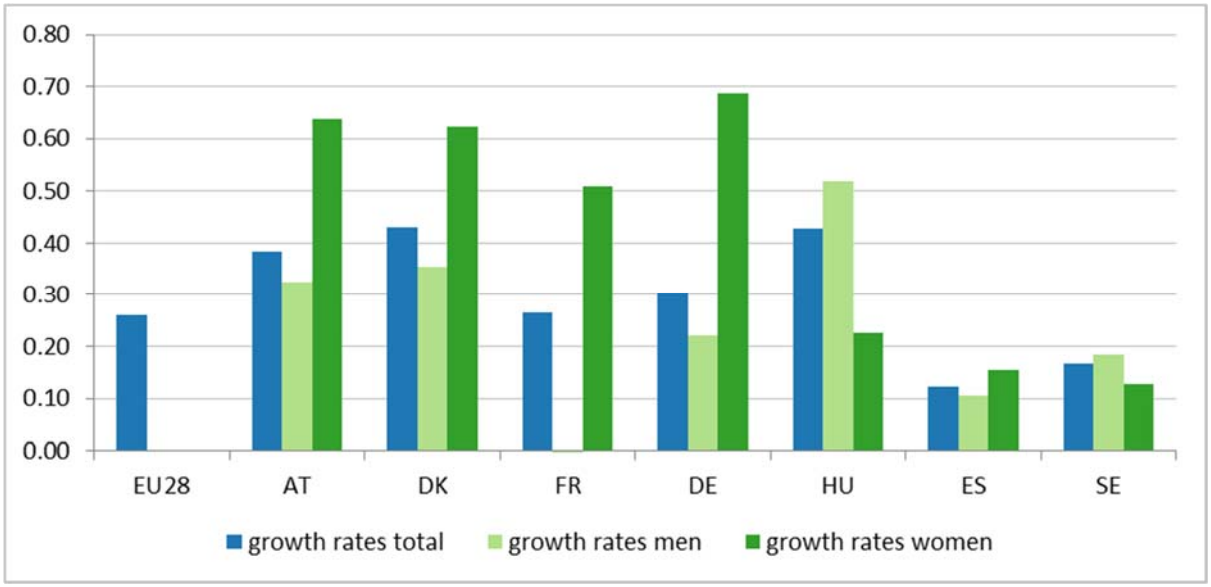
Source: Eurostat, HRST by category, sex and age [hrst_st_ncat]

3.2.3.2 Share of female researchers in all R&D sectors by sex

Figure 27 shows the growth rates of the number of researchers in all R&D sectors in total, as well as those of male and female researchers separately. The highest total growth rates can be found in Denmark (43 %), Hungary (43 %), Austria (38 %) and Germany (30 %); all above the EU average (26 %). France corresponds to the EU average, Spain (12 %) and Sweden (17 %) rate significantly below.

In most EFFORTI countries, the growth rate of female researchers exceeds the growth rate of male researchers, with the highest gender differences in France (m: 0 %, f: 51 %) and Germany (m: 22 %, f: 69 %). Only in Hungary and Sweden, the male researchers show a higher growth rate than the female researchers; in Hungary, the growth rate for men is more than twice as high as the one for female researchers.

Figure 27: Growth rates of the number of researchers in all R&D sectors between 2005 and 2013, respectively 2006 and 2013 (AT, HU, FR) in full-time equivalents[21] by sex

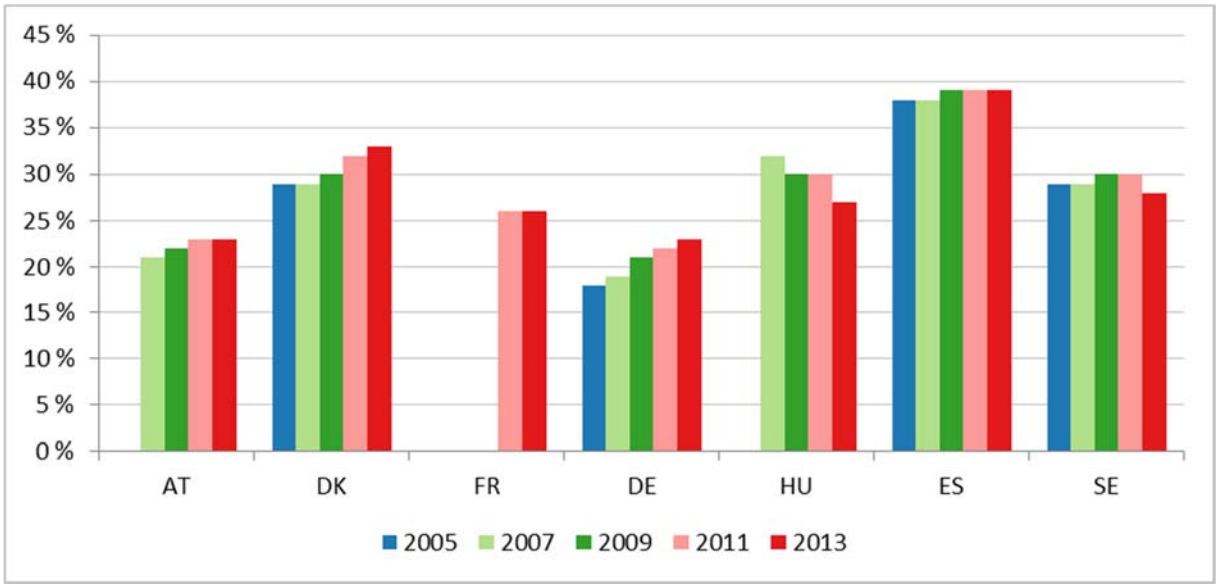


Source: Eurostat, Total R&D personnel by sectors of performance, occupation and sex [rd_p_persocc] (calculations JOANNEUM RESEARCH)

The highest share of women in R&D among the EFFORTI countries can be found in Spain (39 %), followed by Denmark (33 %) and Sweden (28 %). Austria and Germany (both 23 %) reveal the lowest shares in comparison with the other EFFORTI countries. Interestingly Germany is also the country which at the same time has increased the proportion of women researchers the most (+5 %). Denmark's share of women rose by 4 percentage points, while in Sweden (-1 % point) and Hungary (-5 % point), the share decreased. Although the absolute number of female researchers in Hungary is growing, their growth rate is lower than the one for male researchers. As a consequence, the share of women researchers is declining. This development is especially evident in the Hungarian BES which cannot be counterbalanced by the development in the public sector.

[21] On an EU level, there is no data available on the number of researchers differentiated by sex.

Figure 28: Share of women in R&D by countries



Source: Eurostat, rd_p_persocc (calculations JOANNEUM RESEARCH)

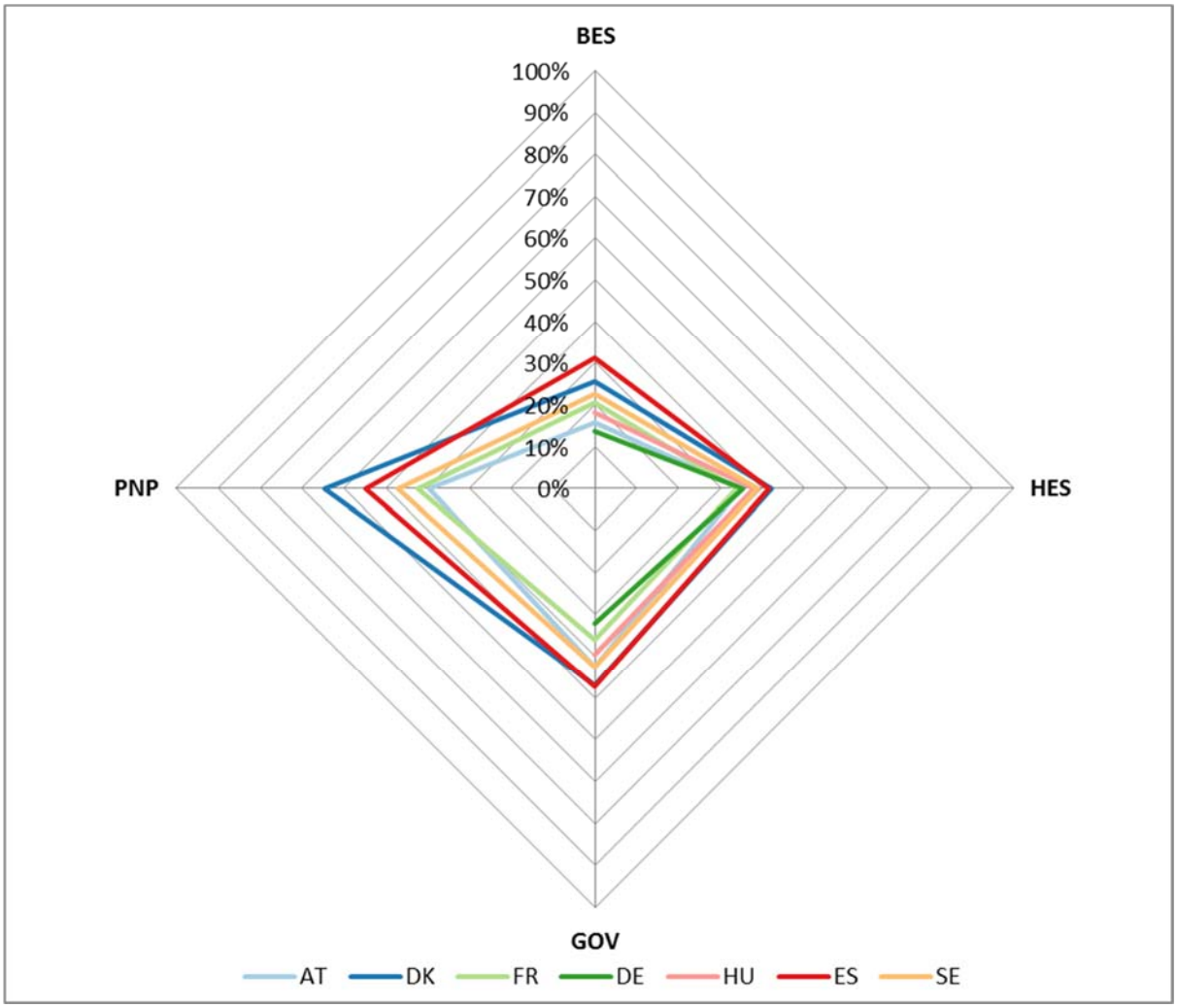
3.2.3.3 Proportion of female researchers differentiated by R&D sectors by sex

The share of women researchers varies significantly between the different R&D sectors. But the pattern concerning the participation level of women is similar among the EFFORTI countries: The share of women researchers is higher in the private non-profit (PNP) and in the government sector (GOV), whereas the higher education sector (HES) and above all the business enterprise sector (BES) exhibit lower shares of female researchers.

Regarding the share of women researchers in the Business Enterprise Sector in 2013, Spain (31 %) ranks first, followed by Denmark (26 %), Sweden (22 %), France (20 %), Hungary (18 %), Austria (16 %) and Germany (14 %). In Hungary, the share of women has decreased from 23% in 2006 to 18% in 2013 after a peak in 2007. This is due to a higher growth rate of the number of male researchers in this sector. According to a recent study of NIH (2013), the reasons behind these numbers in Hungary are that science and engineering and IT are not popular among girls when they start their educational path, and the R&D sector recruits the majority of their researchers from these fields; workloads and working conditions are hardly reconcilable with work-life balance in BES; the sector does not tolerate the absence related to child-rearing. In the other countries, the shares increased or stagnated between 2005 and 2013.

When assessing the share of women researchers in the HES, the EFFORTI countries are ranked relatively close, from 34 % in France to 42 % in Denmark and Spain. The share of women in the GOV sector ranges from 32 % in Germany, followed by France (36 %), Hungary (40 %), Austria (42 %), Sweden (43 %) to Denmark and Spain (both 47 %). High shares of women can also be observed in the PNP in Denmark (64 %) and Spain (55 %), with Sweden (47 %) and France (42 %) coming next. In this sector, Austria reveals the lowest share of women with 39 %. For Hungary and Germany no data is available for this R&D sector.

Figure 29: Share of women researchers by RTDI sectors and country in 2013



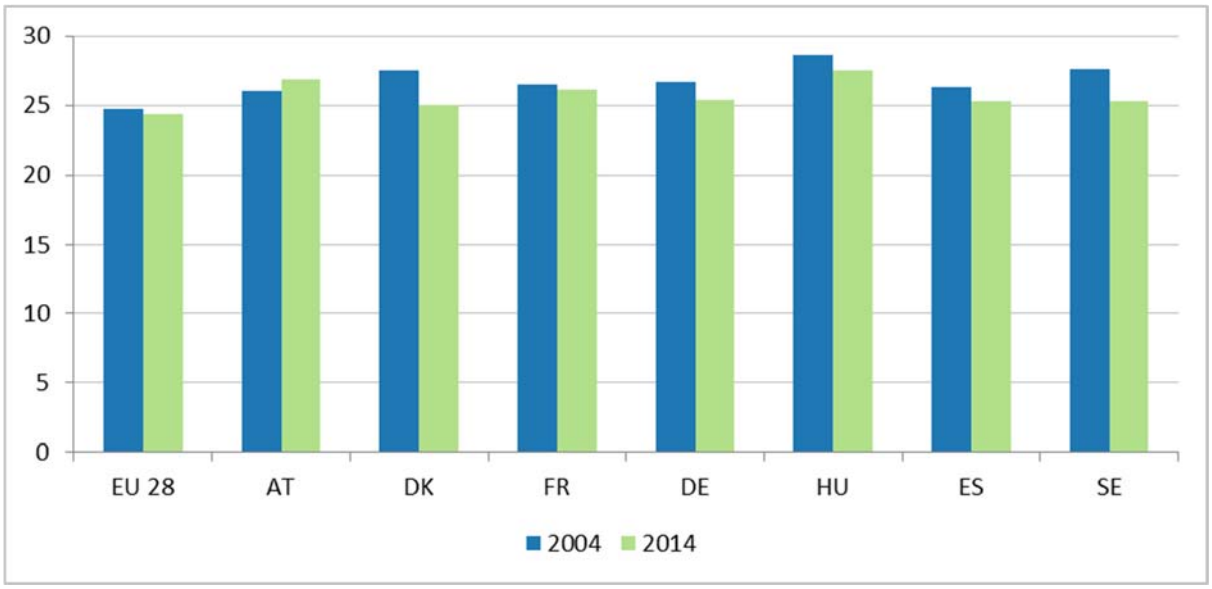
Source: Eurostat, Total R&D personnel by sectors of performance, occupation and sex [rd_p_persocc]

3.2.4 Horizontal Segregation

3.2.4.1 Gender segregation by occupation

The gender segregation index below reflects the proportion of the employed population that would need to change occupation or sector in order to bring about an even distribution of men and women across occupations or sectors. The index varies between 0 (no segregation) and 50 (complete segregation), meaning in the EU28 in 2014 24% of employees would have to change the occupation and 19% would have to change the sector to reach a non-segregated distribution. The segregation index of the economic classes is slightly lower than that for occupations despite the further differentiation of the sectors. This means that women and men tend to work more often in the same workplace than in the same professions.

Figure 30: Gender segregation by occupation

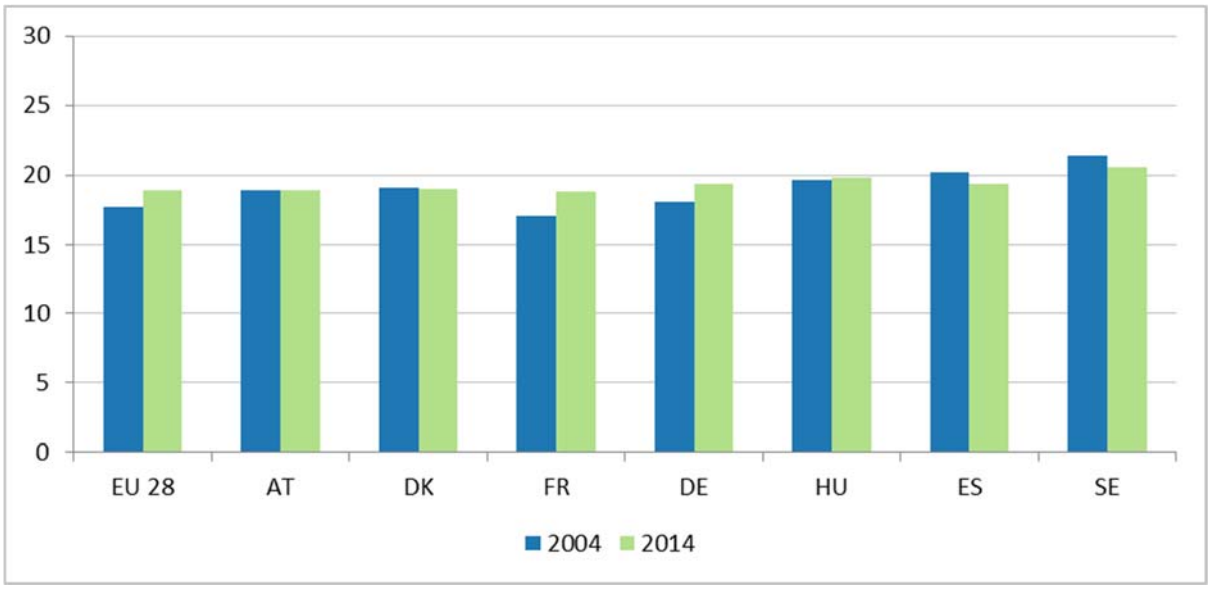


Source: EC 2016, Report on equality between women and men, p52

In 2014, gender segregation in occupations is above the EU level in all EFFORTI countries; highest in Austria (27 %) and Hungary (28 %), lowest in Denmark, Germany, Spain and Sweden (all 25 %). It decreased in all the countries except for Austria, where it rose by 1 percentage point. The biggest reductions were made in Denmark and Sweden (-3 % points).

Regarding gender segregation in sectors in 2014, most countries reflect the EU average (19 %); only Hungary (20 %) and Sweden (21 %) are listed modestly above average. From 2004 to 2014, the index stagnated or decreased slightly in the EFFORTI countries, while it increased minimally on an EU level. Therefore, it can be concluded that the EFFORTI countries exhibit highly segregated labour markets in respect to occupations and sectors. The labour market is strongly segregated in male and female dominated sectors and professions.

Figure 31: Gender segregation by economic sectors



Source: EC 2016, Report on equality between women and men, p52

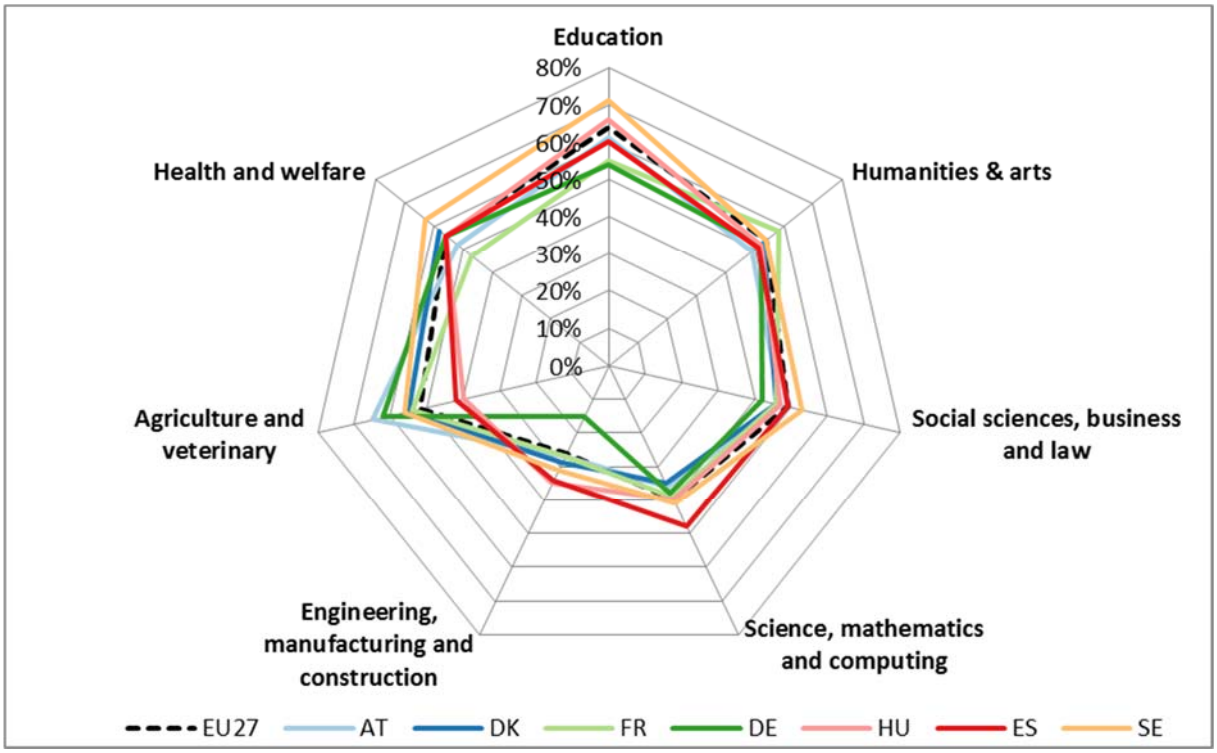
3.2.4.2 Development of the proportion of women ISCED 6 graduates by field of study

In the EU28, the share of women among ISCED 6 graduates has increased in all subject areas between 2006 and 2010 apart from science, mathematics and computing where stagnation can be observed. Figure 32 offers a closer look across the different fields of study in 2010. The patterns between the EFFORTI countries are quite similar with some exceptions. Education, Health and Welfare, Humanities & Arts, Social Sciences, Business and Law and Agriculture and Veterinary are study fields with high proportions of women graduates – ranging between a share of female graduates of 40 % and 70 %. Science, Mathematics and Computing as well as Engineering, Manufacturing and Construction exhibit lower proportions of female graduates – mostly below 30 %.

Nevertheless, there are significant differences between countries. For example in Spain, the proportion of women ISCED 6 graduates has nearly reached 50 % in Science, Mathematics and Computing and 34 % in Engineering, Manufacturing and Construction. On the other hand, Germany has the lowest proportion of female ISCED 6 graduates in Engineering, Manufacturing and Construction (15 %).

Therefore, the horizontal segregation in respect to fields of study is quite significant in all countries but differences between countries are observable. Unfortunately, the country notes did not provide specific explanations for these differences. Longitudinal comparative studies to explore and explain these differences are needed.

Figure 32: Proportion of women ISCED 6 graduates differentiated by field of study in 2010



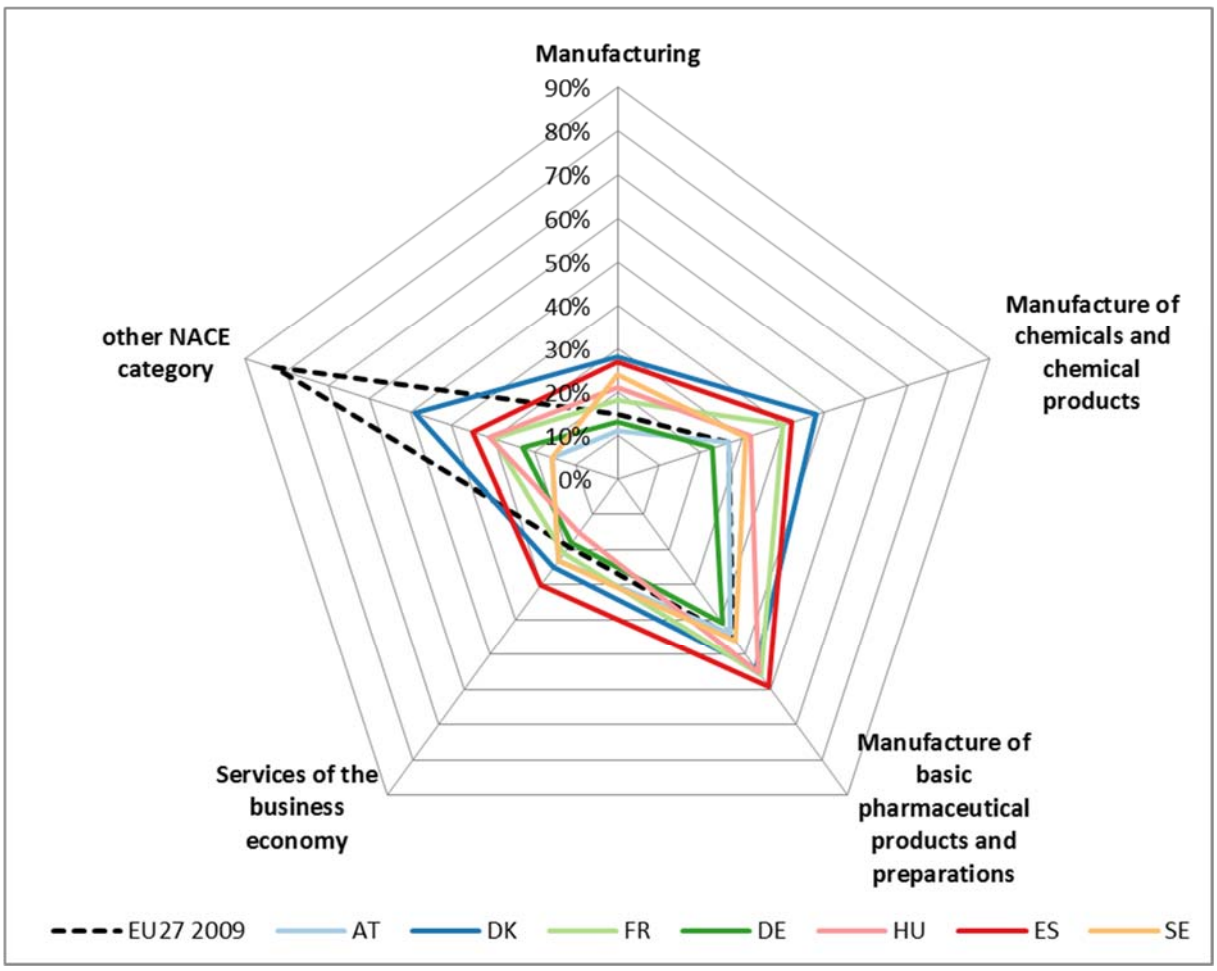
Source: SHE Figures 2015, p26 (data for 2012); SHE Figures 2012, p79 (data for 2010, calculations JOANNEUM RESEARCH); SHE Figures 2009, p51 (data for 2006)

3.2.4.3 Proportion of women researchers across economic activities in BES

The horizontal gender segregation is also visible across economic activities in the BES. Across the economic activities on EU27 level, Manufacturing shows the smallest share of female researchers (15 %) in 2009[22]. In 2012, Austria (11 %) is rated still below this average - together with Germany (13 %). The highest shares can be found in Denmark (28 %) and Spain (27 %). In the Service sector, the share of female researchers is also quite low on the EU27 level with 19 %. Spain has the highest proportion of women (30 %) and Hungary the lowest with 15 %, followed by Germany (18 %). The proportion of women in Manufacture of chemicals and chemical products is the second highest in the EU 2009 with 27 %. Among the EFFORTI countries, in 2012, Germany is below this average with 23 %, while Denmark (48 %) tops the list. The largest share of women occupies positions within Manufacture of basic pharmaceutical products and preparations; in 2009 45 % in the EU27. Austria (44 %) and Germany (41 %) display lower shares; Spain exhibits the highest with 59 %. The data for the unspecified NACE category seems hardly reliable and comparable between the countries and is therefore not discussed here. The Austrian country report offers an explanation for the different share of women researchers in economic sectors. The horizontal segregation in the BES is a result of the already gender-segregated output of the higher education system; the low share of female researchers in the manufacturing sector and the higher share of female researchers in the pharmaceutical sector in Austria can be explained by the fact that the share of female graduates in life science is considerably higher than it is in engineering (see also the following chapter of this report).

[22] No data for 2012 for EU27 was available.

Figure 33: Proportion of female researchers in the business enterprise sector, by economic activity (NACE Rev. 2) 2012



Source: SHE Figures 2015, p26

3.2.4.4 Horizontal segregation by scientific field in HES

Medical sciences as well as Social sciences are scientific fields with a high share of female researchers in nearly all EFFORTI countries. In Denmark, male researchers are also quite likely to work in Medical Sciences. In Hungary and Spain, female researchers prefer Social sciences. The more male-dominated fields appear to be Natural sciences as indicated in Austria, Germany and Hungary and Engineering and technology in Sweden with a high proportion of 47 %.

Austria in general is one of the countries that display a traditional segregation regarding the fields of science, where female researchers tend to work more often in Social Sciences, Medical Sciences and Humanities and male researchers prefer Engineering and Natural Sciences. When it comes to the choice of studies, the interest in the teaching subject plays a crucial role. Therefore, the reason for the low proportion of women in industrial science must be sought in the Austrian school system.

Figure 34: Distribution of researchers in the Higher Education Sector (HES), across fields of science, 2012

Source: SHE Figures 2015, p56

As France is not included in the data presented above, information about the segregation in France comes from a different source. The gender distribution of researchers across scientific fields is comparable to the one concerning students to a certain extent. The broad picture is that women are strongly overrepresented in literature and highly underrepresented in engineering. Nevertheless, some differences can be highlighted. The first one concerns life sciences, where the gender imbalance is less strong for researchers than for students (women are even overrepresented in the field of

pharmaceutical research). The second one concerns economics and management (and law and political sciences to some extent); in these fields, women are less present than men, even though there is gender balance among students.

3.2.5 Vertical Segregation[23]

3.2.5.1 Share of male and female members of boards, supervisory boards or boards of directors

The vertical segregation in the EFFORTI countries varies quite significantly. The share of women in political and economic positions of power is lowest in Hungary compared to Sweden where it is considerably higher and approximates equality at least in political decision-making bodies. But even though the share of female ministers is high in Sweden, women often hold ministerial positions in less prestigious areas and in areas traditionally associated with women, e.g. social issues, culture, education and gender equality (Niskanen 2011, 115).

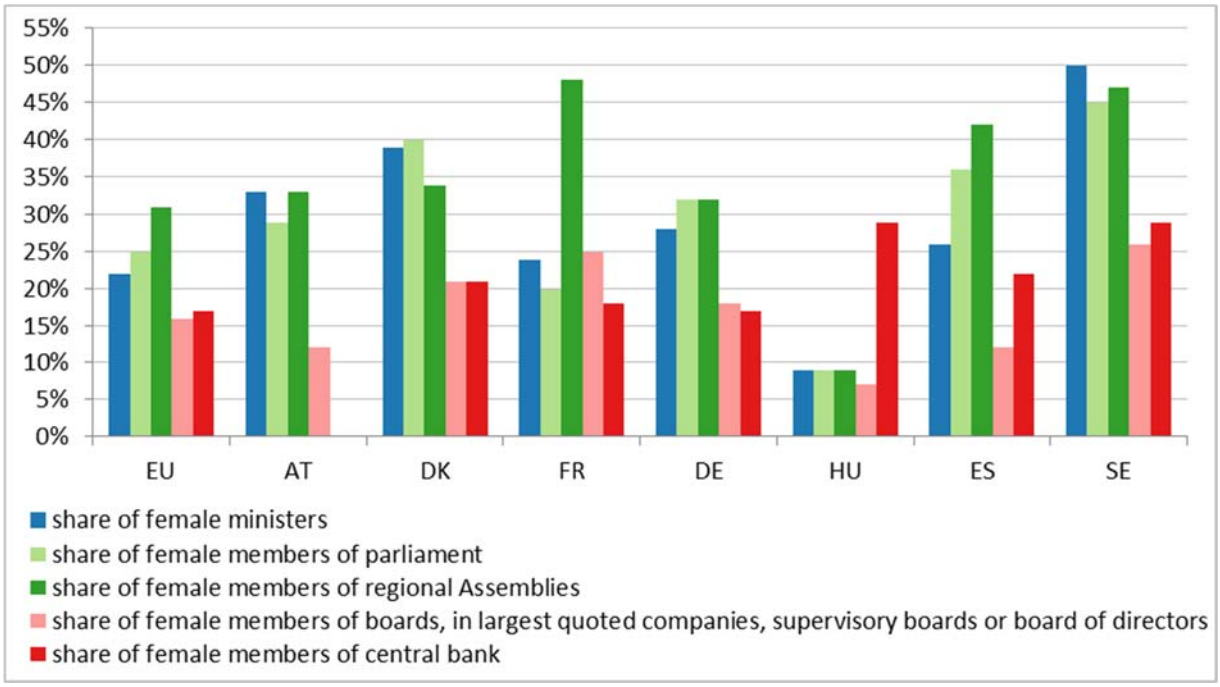
In nearly all EFFORTI countries, vertical segregation is high in the economic domain as the share of female members of boards in the largest quoted companies, supervisory boards or board of directors hardly exceeds 25 %. But also the share of female members of central banks is below 30 % in all EFFORTI countries.

The Swedish case is interesting as it reveals the highest share of women in boards, although the Swedish Code on Corporative Governance for listed private and public limited liability companies states that companies must strive towards an equal gender representation on company boards (Numhauser-Henning 2015, 5, 15). However, the implementation of this rule is voluntary and, despite the fact that the code has been in place for some years, women are still far from being equally represented on company boards. The Swedish government has declared that quota legislation might be an option should the proportion of women on company boards persists to be below 40% (Numhauser-Henning 2015, 5, Danbolt 2016, 25). Furthermore, men and women still occupy different functions within boards and managements. Even though 20 % of board and management members in limited companies (2013) and 29 % of board members and 55 % of deputy members in listed companies were women (2015), 87 % of the chairpersons in limited companies and 95 % of chairpersons in listed companies were still men. This leads to the conclusion that even though women are represented in boards and managements, they rarely function as chairpersons.

Hence the Swedish country report concludes that the vertical segregation seems to decrease in the public sector, while it remains roughly at the same level in the private sector. However, this might be a specificity of Sweden because “consideration for the autonomy of industry and respect for private self-governance has put limits to the gender equality discussion” in the Nordic countries (Niskanen 2011, 116). But this conclusion can be transferred to most of the EFFORTI countries.

[23] Comparing the results of the chapters on vertical segregation with the findings of the Glass Ceiling Index showed that the Glass Ceiling Index does not really fit into the overall picture. Especially the argumentation of chapter 3.2.5.3 made evident that there is a significant loss of women talent along the academic career ladder. Therefore it is not plausible that the GCI in Germany indicates high career opportunities and upward mobility of women. Therefore, we decided not to refer on the Glass Ceiling Index in this report.

Figure 35: Share of male and female members of boards



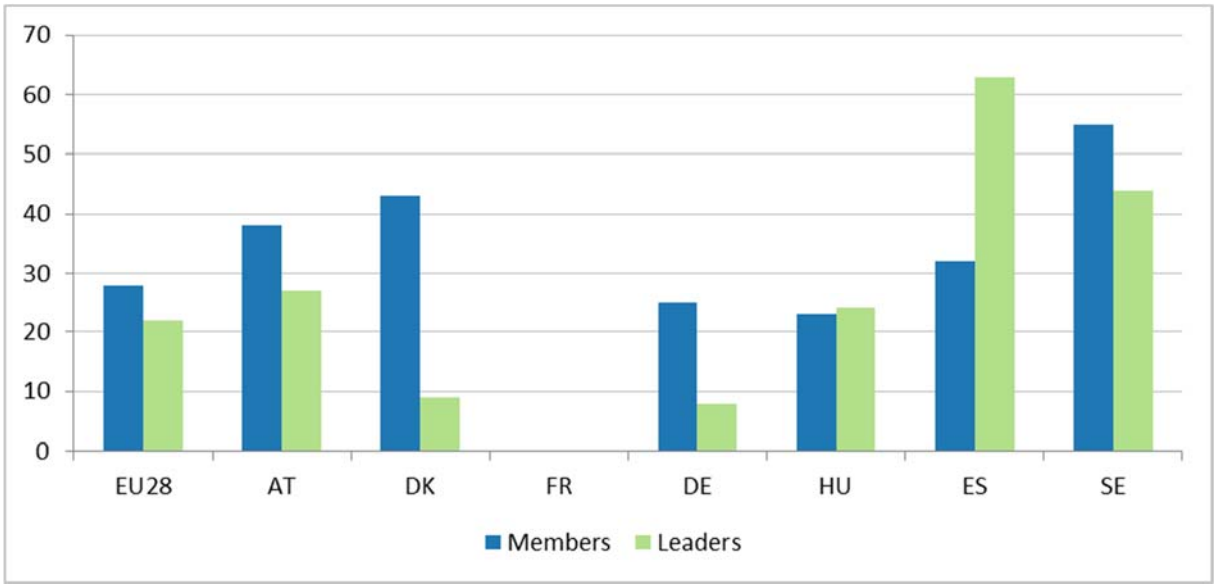
Source: EIGE gender equality index 2015, p173

3.2.5.2 Proportion of women on boards, members and leaders in RTDI

This table shows the presence of women on boards, such as scientific or R&D commissions, boards, councils, committees, foundations, academy assemblies, which usually hold a large degree of decision-making power. In the EU28, women occupy 22 % of RTDI board leadership and 28 % of RTDI board membership positions. The percentage of women as members is below the EU27 average only in Germany (25 %) and Hungary (23 %), whereas Spain (32 %), Austria (38 %), Denmark (43 %) and Sweden (55 %) are positioned significantly above EU28 average. The share of women in board leadership positions is considerably low in Germany (8 %) and Denmark (9 %) and clearly above EU28 average in Sweden (44 %) and Spain (63 %).

In a note from March 2017, the Danish Think Tank, DEA, states that today, women constitute nearly half of all directorship positions/ university board positions. However, university rectors and board leaders are still typically male; only one of the Danish universities has a female rector. Accordingly, there seems to be a tendency that the organisations appointing new board members usually chose men, which explains the skewed gender compositions.

Figure 36: Proportion of women on boards, members and leaders, 2014

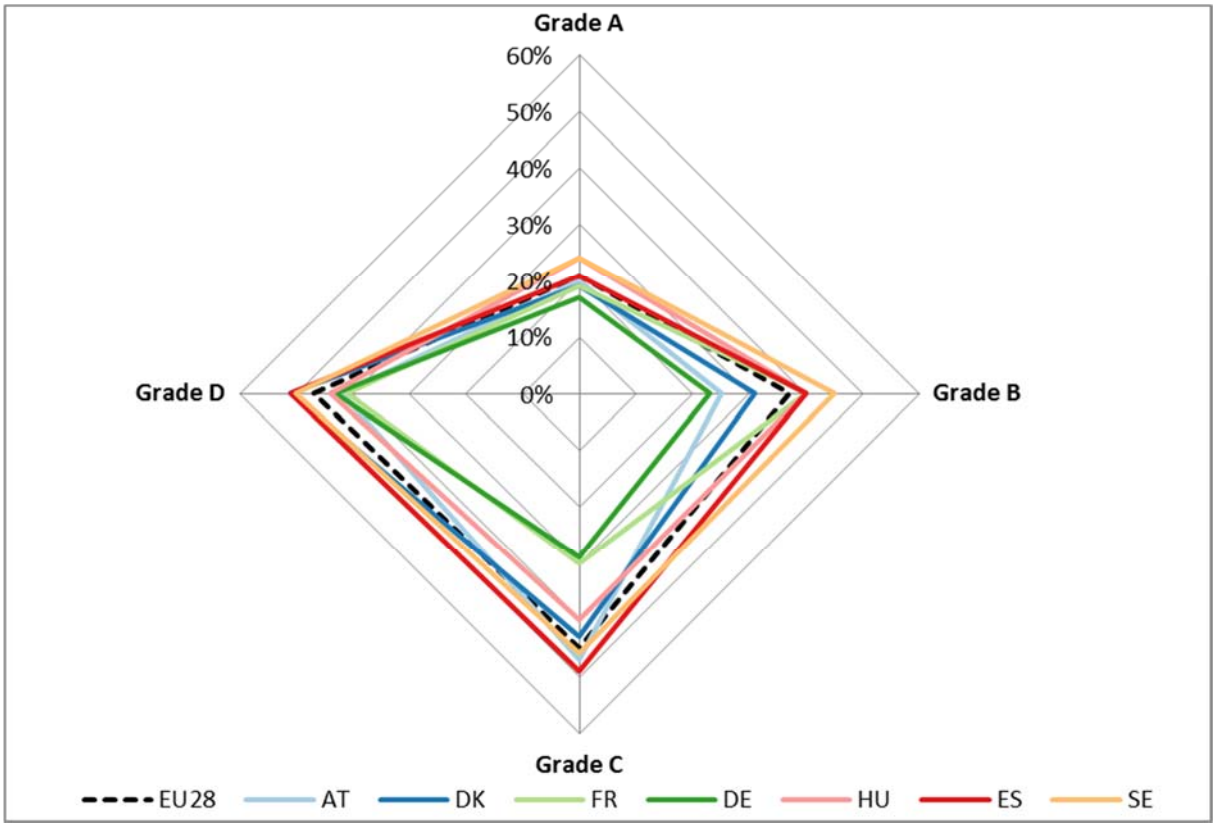


Source: She Figures 2015, p143

3.2.5.3 Proportion of women academic staff by grade

The higher the grade the lower is the proportion of women – this applies to both the EU28 and the EFFORTI countries and indicates a strong vertical segregation. At Grade A level, the share of women is lowest compared to all other academic staff levels and the differences between countries are not distinct. This means that in all countries women are considerably underrepresented on the Grade A level. Also on the Grade D level, the differences between countries are not pronounced. The share of women on this level lies in a range from 41% in France and 51% in Spain and Denmark. On the Grade C and B levels, considerable differences between the countries concerning the share of women can be recognized. A comparison between Germany and Sweden makes this evident: In Germany, the share of women drops nearly linear from Grade D (43%) to Grade C (29%) to Grade B (23%) and results in 17% women in Grade A positions. For Sweden, the share of women on the four career levels is quite different: Grade D (50%), Grade C (46%), Grade B (45%), Grade A (24%). Although the share on the Grade A level is quite different between Germany and Sweden, the career break or dropout of women seems to be located on different career levels as the gaps between these countries are highest on the Grade B and C levels. Whereas in Germany a significant decrease takes place between Grade D and C and continues until Grade A, the Swedish case exhibits a different pattern; here, the share of women declines between Grade B and A significantly, whereas it is quite stable between Grade D and B.

Figure 37: Proportion of women academic staff by grade, 2013



Source: She Figures 2015, p129

One explanation for the proportion of grade A staff in Sweden is that less professors have been recruited over the past years. However, this does not appear to be the only explanation. Other studies found that HES in Sweden is characterised by gendered hierarchies and prevailing gendered norms of the ideal researcher which contribute to a difference in the work conditions for men and women in higher education and research. The Swedish Research Council concludes that "the trend for men to become professors more frequently applies to most fields of research, and women also take longer than men to progress up the career ladder". Apparently, it takes longer for women than men after the completion of the PhD to obtain a position as a professor. Another structural difference is that women within humanities and social sciences tend to be employed as lecturers more often and spend more time on teaching activities, while men in the same research fields often hold positions with more time for research.

3.2.5.4 Proportion of women heads of institutions in HES

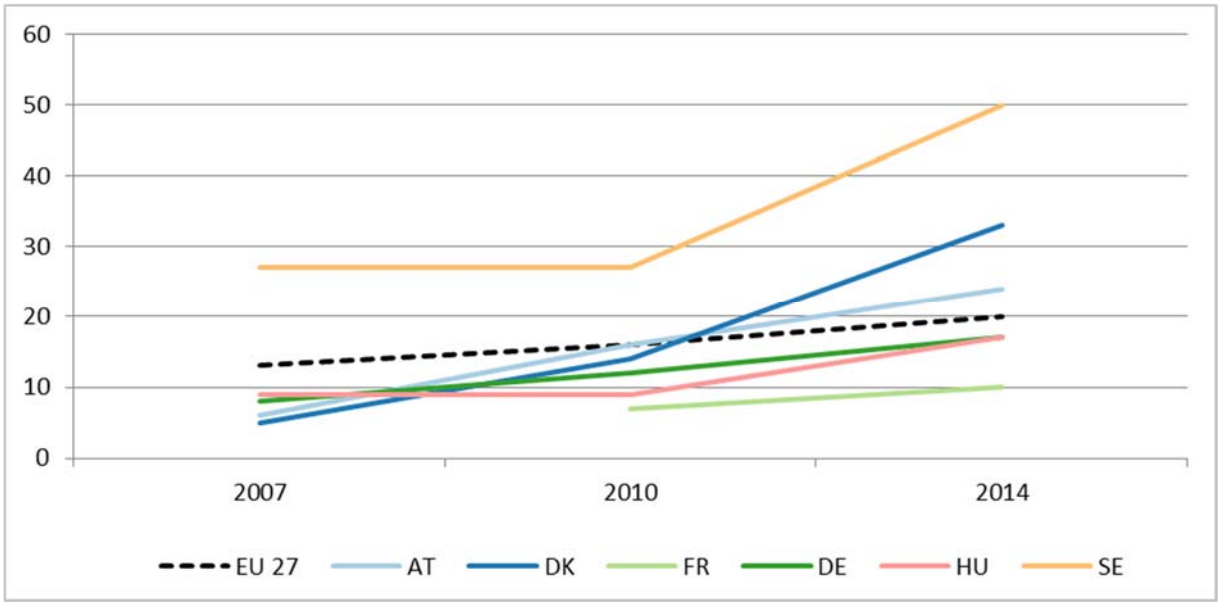
The figure below shows that the proportion of female heads of institutions in the higher education sector is increasing on an EU level from 13 % to 20 % between 2007 and 2014. Half of the EFFORTI countries are positioned above average in 2014; Austria reaches 24 %, Denmark 33 % and Sweden tops the list with 50 %, while Germany (17 %), Hungary (17 %) and France (10 %) lag behind. The problem in France is that women are not part of the so-called breeding pools in which necessary competences as well as relevant network contacts are established. In other words, women are still underrepresented in the prestigious (informal) groups from which future decision makers are selected.

The data also reveals interesting developments in several countries in the period from 2007 to 2014. In Austria, only 6 % of heads of institutions in HES were female in 2007; this figure was below the EU average of 13 %. Until 2014, the share of female rectors increased to 24 % and now excels the EU average of 20 %. Since the group of rectors is very small in Austria, such a rapid increase in the percentage of women is easier to achieve than in other areas of the university.

Sweden could also undergo a noteworthy development on an already high level raising its share of women by 23 percentage points. The share of women heads of universities or institutions accredited to offer PhD programmes is even more striking. The share of women on boards of academic institutions (in the capacity of board members and leaders) has reached well above the 40 % target in Sweden with over 50 %. Political targets have therefore been an important policy instrument to raise the number of women in top-level positions in higher education institutions.

In Denmark, the share of women could be increased from 5 to 33 %, but it has to be noted that while the overall percentage of women in university management has increased from 2008 to 2014, there has been a decrease in the share of female pro-rectors. Even on the management levels where most women are represented, they still account for less than a third - on all management levels in 2014.

Figure 38: Proportion of female heads of institution in the higher education sector[24]



Source: She Figures 2015, p141; She Figures 2012, p115; She Figures 2009, p97

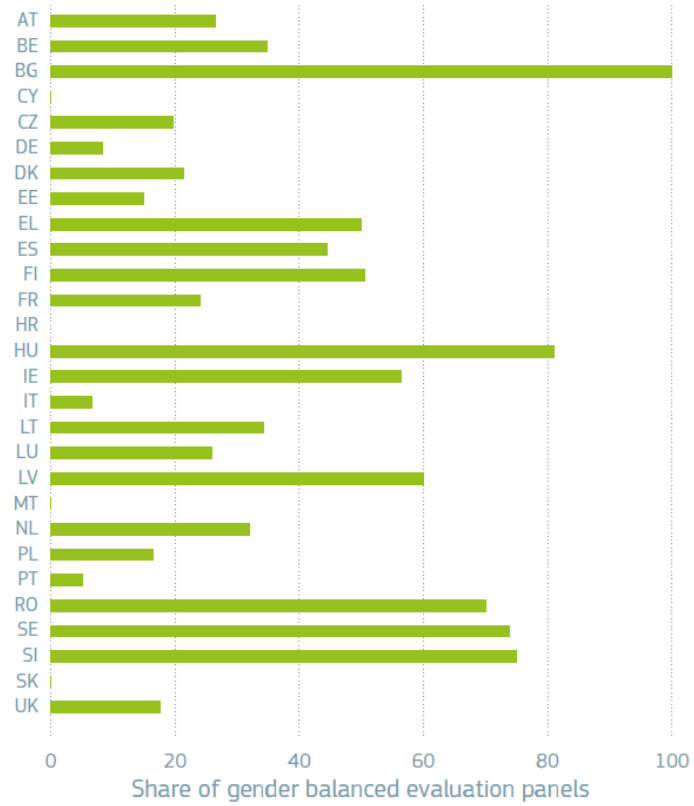
As no international comparative data for Spain existed, the Spanish country report made use of a national data source. This data shows that both private and public universities women researchers are underrepresented in all analysed single-member governing bodies. In 2015, only 2% of rectors in public universities were women. This is the result of a steady decrease since 2010. However, in private universities the proportion of female rectors was 29% in 2015. Therefore, only 10% of universities (public and private) are led by female rectors – which is substantially lower than the EU28 average.

[24] There is no data available for Spain.

3.2.5.5 *Percentage of research evaluation panels in RFOs that included at least 40% of the underrepresented sex in boards*

One of the targets of the European Commission's Horizon 2020 programme is to ensure gender balance in decision making. Therefore, another important issue concerns the participation of the underrepresented sex in evaluation and recruitment panels. A target of a minimum of 40 % for all panels has been agreed upon. According to the results of the ERA survey 2014, 36 % of research evaluation panels include at least 40 % of the underrepresented sex in their composition.

Figure 39: Share of gender-balanced research evaluation panels in funders, 2013



Source: EC 2015, ERA Facts and Figures 2014, p32

The share of gender-balanced evaluation panels in funding is above average in Hungary, Sweden and Spain; with exceptionally high results in Hungary. Austria, France, Denmark and lastly Germany with only approximately 10 % are rated below average.

Austrian research funding organisations are dealing with this topic in a different way. The FWF has anchored the goal of gender balance on its board in its guidelines. Corresponding changes have been observed during the last ten years in the composition of FWF committees. The FFG also strives for a balanced gender composition in juries, but there are no binding regulations at the moment. The Austrian Ministry for transport, innovation and technology has now set a minimum target of a female share of 10 % in juries in the context of results-based budgeting.

In France, an interesting observation was formulated recently, during an interview with the newspaper Le Monde, by Isabelle Kraus (the President of the permanent conference for equality in universities).[25] According to her, the system tends to "push" associated professors after 10 years towards full professorships allowing them to devote more time to research and less to teaching. In the case of female researchers, it is unconsciously assumed that they find a higher degree of self-realisation in teaching than in performing research, which clearly tends to slow down their career since excellence in research is considered more important in peer review processes than excellence in teaching. One of the "logical" consequences is that women become less represented in research evaluation panels and more generally in every type of scientific decision-making bodies.

Denmark observes that the gender composition in research council boards varies across different fields, with a total of 29 % women in council boards, but spanning from 50 % women in humanities to 17 % in the DFF Medical Science council. The gender balance among evaluation panels and external evaluators is far from equal. The Ministry of Higher Education and Science stated that this is because "all three councils and foundations have problems finding as many female evaluators as male".

3.2.6 Employment conditions

3.2.6.1 General working time culture compared to working time culture in RTDI

The number of hours worked per week influences the work-life balance, which in turn has an effect on the subjective well-being. However, this effect is not linear. Research has shown that the subjective well-being increases with the number of hours an individual works per week but only up to a certain point. Beyond this point it starts to deteriorate, possibly because excessive (over 48 hours per week) working hours reduce job satisfaction which results in a reduction of the overall fulfilment.

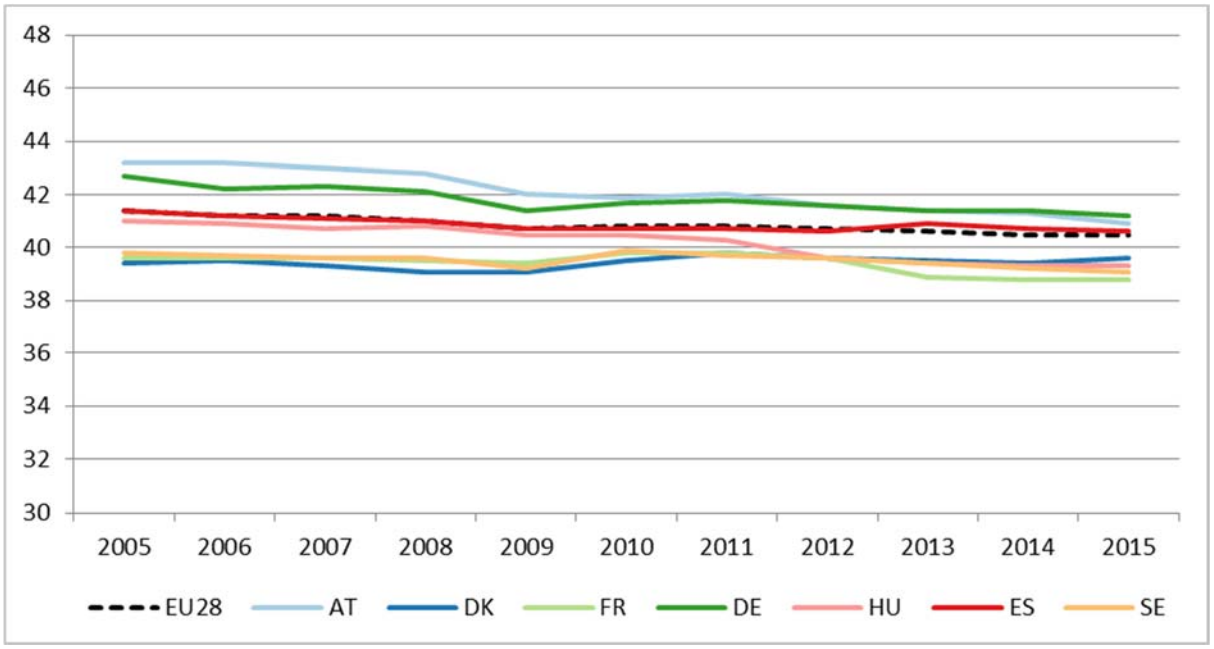
Average actual weekly working hours of full-time employed workers are highest in Austria and Germany among all EFFORTI countries in 2015 – although in both countries the working hours have decreased significantly since 2005. A study of the German Institute for Economic Research (Deutsches Institut für Wirtschaftsforschung (DIW)) comes to the result that 37 % of fully employed people in Germany in 2010 did not make full use of their vacation days. This is a forfeit of 12 % of the total capacity of holidays.

The average actual weekly working hours in Spain equal the EU28 average. In Spain, a long working hours culture exists, which tends to be coupled with rewarding physical presence as opposed to an achievement-oriented assessment culture. It is assumed that this has a negative impact on workers with family commitments – mainly women.

In all the other EFFORTI countries, working hours for all full-time employed workers are below the EU28 average. A significant decrease can be observed for Hungary between 2010 and 2015. In the other countries, working hours have been quite stable in this period.

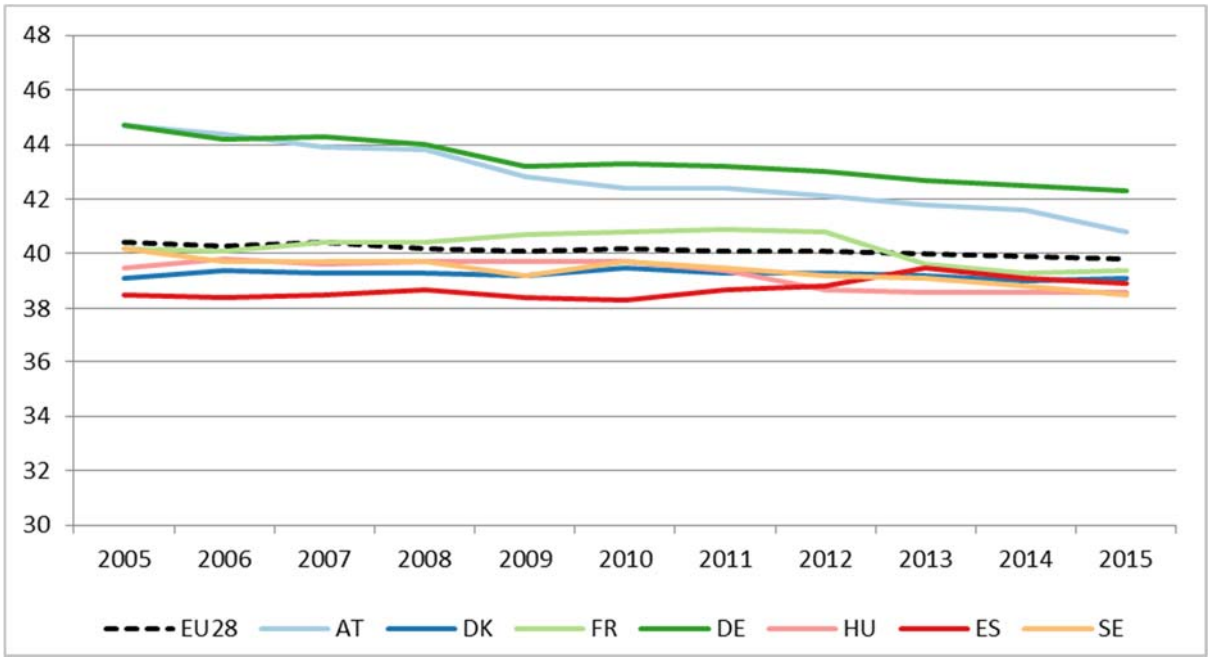
[25] http://www.lemonde.fr/campus/article/2016/09/14/les-moyens-manquent-pour-mettre-en-uvre-la-parite-a-l-universite_4997549_4401467.html

Figure 40: Actual weekly working hours of full-time workers by country, 2005 - 2015



Source: Eurostat, Average number of actual weekly hours of full-time work

Figure 41: Actual weekly working hours of full-time employed professionals[26] by country, 2005 - 2015



Source: Eurostat, Average number of actual weekly hours of full-time work

[26] Professionals increase the existing stock of knowledge; apply scientific or artistic concepts and theories; teach about the foregoing in a systematic manner; or engage in any combination of these activities. Competent performance in most occupations in this major group requires skills at the fourth ISCO skill level.

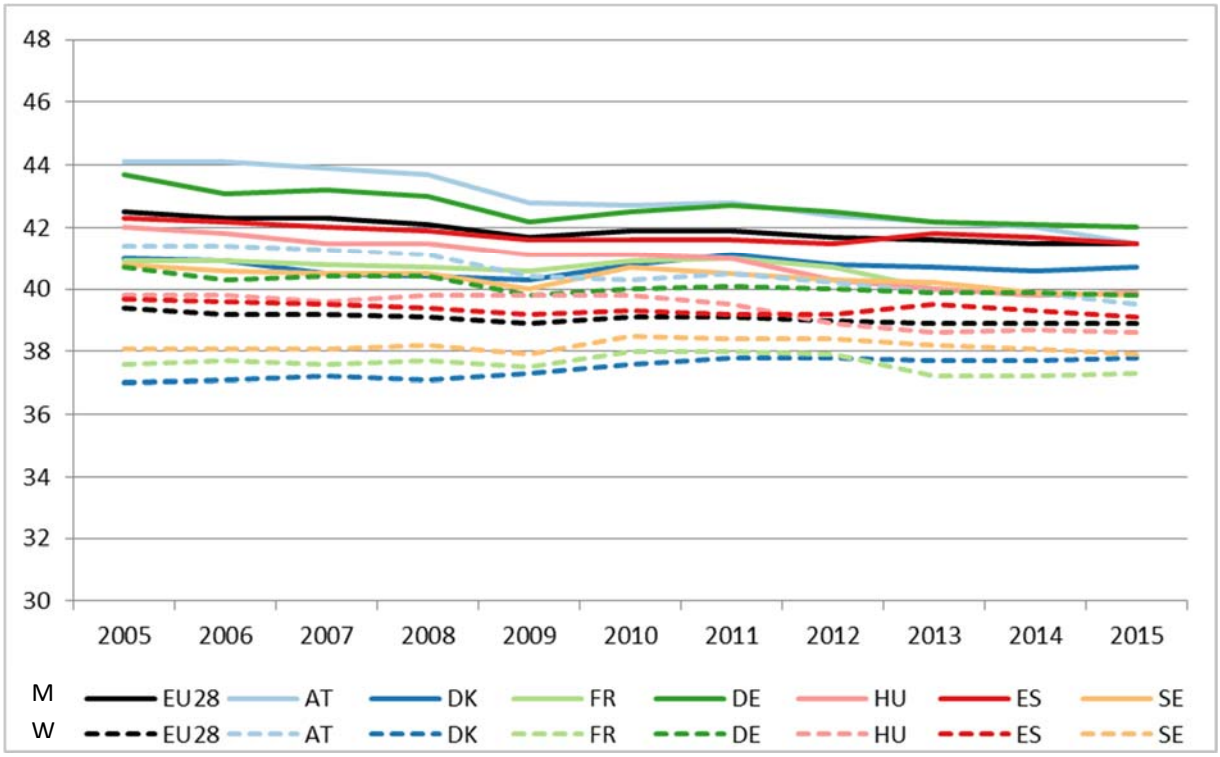
Germany and Austria show similar developments when comparing weekly working hours in general with weekly working hours for professionals[27]. Austrian and German full-time employed professionals work longer hours than employees in total, even though it was reduced by 2 hours in Germany and 4 hours in Austria between 2005 and 2015. Both countries rank significantly above the EU28 average which is 40 working hours per week. All other countries' average actual working hours of full-time employed professionals are below the EU28 average and quite similar to those of all workers. Again, hardly any changes can be observed between 2005 and 2015 for Spain, Denmark, Hungary and Sweden. A slight shift has been observable in France since 2012.

Figure 43 indicates that in 2015, full-time employed female workers in the EU28 tended to work less hours than their male counterparts; more precisely 3 hrs/week less. The same can be said about France and Denmark. In Germany, Austria, Spain and Sweden, women work 2 hours less per week than men on average, in Hungary the difference is only 1 hour. The Swedish country report notes that the difference in the working hours of women and men might be explained by women's larger engagement with domestic work and childcare.

Focusing on the development between 2005 and 2015, the gender difference in weekly working hours remains stable over time only on EU average and in France (Eurostat 2016a), while it has decreased by 1 hour in the other EFFORTI countries. For example in Austria in 2005, the average weekly working hours of female workers amounted to 41 hours, while those of men were 44 hours. In comparison, in 2015 male employers worked 2 hours less (42 hours) and women 1h less (40 hours); this convergence of working hours of female and male workers in Austria can be ascribed to the fact that Austria is moving away from the male breadwinner model and that men are beginning to face other needs regarding their work-life balance (Bergmann, 2014). Therefore, it can be concluded that in the EFFORTI countries, the actual working hours are aligning between male and female workers.

[27] As no international comparative data for working hours of researchers exist, we have made use of data for professionals as a proxy for the research field. We assume that these fields share similar working conditions and cultures and therefore have similar patterns of work hours.

Figure 42: Actual weekly working hours of full-time workers by gender and country, 2005 - 2015

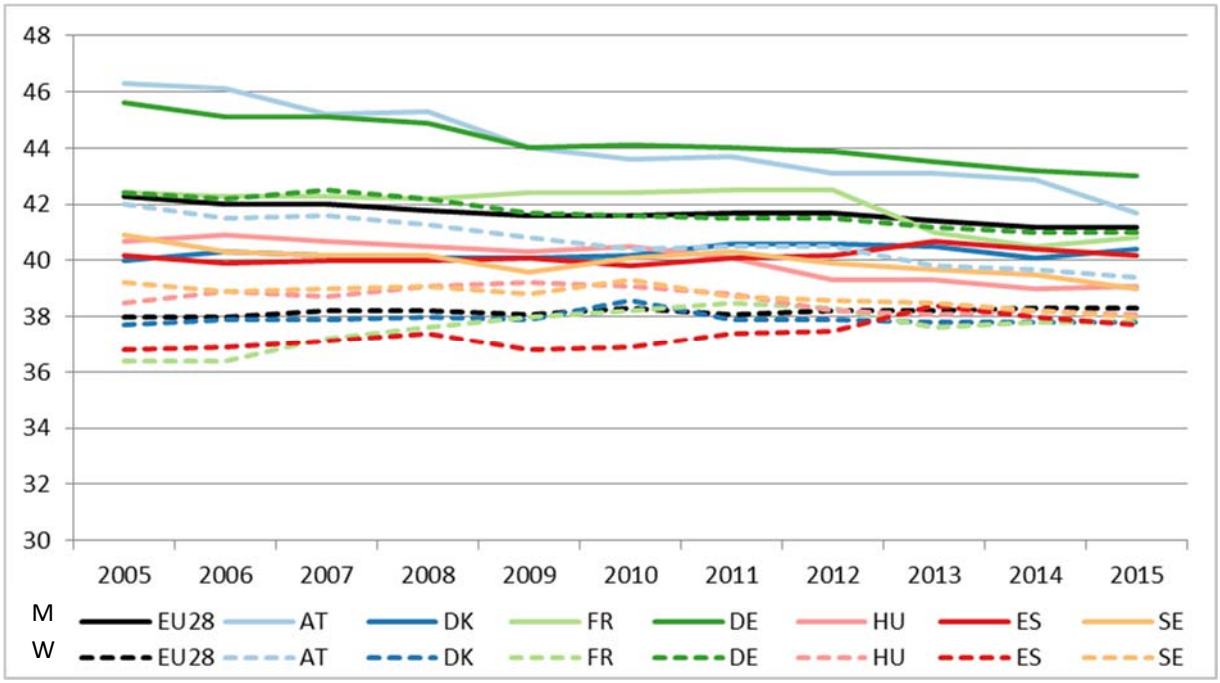


Source: Eurostat Labour Force Survey (lfsa_ewhais)

The observation that women tend to work fewer hours than men in the general economy can also be applied to academic professions; with a difference of 3 hours per week as well. Denmark, France and Spain reflect this EU average. In Austria and Germany, the difference is slightly smaller with 2 hours per week, while it is only 1 hour per week in Sweden and Hungary.

As in the general economy, the EU and most EFFORTI countries could decrease the gender difference in weekly working hours for full-time employed professionals by 1 hour per week on average from 2005 to 2015. Greater reductions can be seen in Austria (by 2 hours per week) and France (by 3 hours per week), while Spain and Denmark showed a stable development. Hence, an alignment of working hours between male and female professionals as well as in the general economy can be observed.

Figure 43: Actual weekly working hours of full-time employed professionals by gender and country, 2005 - 2015



Source: Eurostat Labour Force Survey (lfsa_ewhais)

3.2.6.2 Working contracts in RTDI

As shown in Figure 44, women in HES[28] are more likely to work in precarious working conditions[29] than men in all EFFORTI countries, resulting in a strong "safety gap". On the EU28 level, 7 % of men and 11 % of women have precarious working contracts in the HES. Women researchers are most likely to receive a precarious contract in Germany (19 %), Hungary (17 %) and Sweden (14 %). Austria corresponds to the EU average; below are Denmark (10 %), Spain (8 %) and France (6 %). The greatest difference between men and women can be found in Hungary: Among researchers in the higher education sector, 2.5 times more women work under precarious working contracts than men. The gender differences in Denmark might be explained by the fact that more men than women are at a higher career stage and therefore have more stable or fixed contracts.

All in all, 75 % of scientific personnel at Austrian universities are employed based on temporary contracts with only a few years duration. Their prospects to become part of the permanent staff are rather poor. This is evidenced by the number of permanently employed researchers in the HES sector merely increasing by 1,000 FTEs between 2002 and 2013. Temporary contracts are often based on competitively acquired research grants[30] and can be prolonged on a yearly basis up to six times

[28] For other R&D sectors no data on this issue is available.

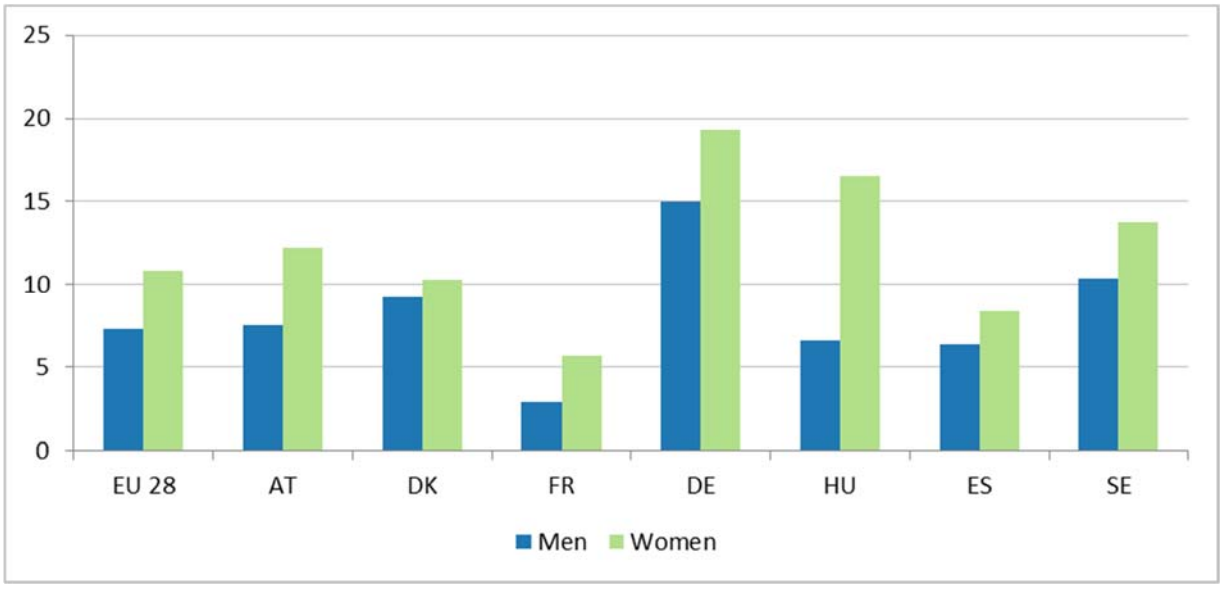
[29] Researchers with 'precarious working contracts' are those with no contracts, fixed term contracts of up to one year, or other contracts associated with student status (SHE Figures 2015, 104).https://ec.europa.eu/research/swafs/pdf/pub_gender_equality/she_figures_2015-final.pdf

[30] 268 For instance, as of December 31, 2014, the FWF funded the salaries of nearly 4,000 people working in science and research, mostly in the HES (which is almost a quarter of employees in this sector). This figure has more than doubled since the year 2000; FWF 2015. 30% of the researchers employed by universities are financed through competitively acquired grants (Leitner et al. 2014).

(respectively eight years in part-time employment). After that no further extension can be granted according to §109 of the University Act. Although in 2009 a collective agreement for university employees between the association of Austrian universities and the labour union was implemented, the provision of PhD and post-doctoral positions in combination with adequate career opportunities is still problematic; not least because of the practice of temporary contracting which is caused by a conservative approach towards hiring and recruitment.

For Sweden it can be said that since the implementation of the Quality and Autonomy reform in 2011, the HE institutions gained more autonomy. The reform entailed a far-reaching deregulation of the institutions' organisation, procedures for recruitment of teachers and researchers, categories of teachers to recruit, and promotion. Accordingly, one third of all teachers and researchers at Swedish universities have temporary contracts covering 3-4 years. Hence, a large fraction of employed researchers have time-limited contracts, whose continuation requires an intense effort, i.e. long working hours. The MORE2 project finds that the career track system in Swedish academia is vulnerable and does not deliver fixed positions before full professorships. Furthermore, the Swedish system does not include tenure-track positions. As such, and building on the findings from MORE2, a career track system without permanent positions, especially in the career start, disfavours women more than men when it comes to childbirth and childcare effects on career development.

Figure 44: "Precarious" working contracts of researchers in the higher education sector out of total researcher population, by sex, 2012



Source: SHE Figures 2015, p104, figure 5.2

Table 1 shows that the type of working contract depends on the career stage. As most European countries, the EFFORTI countries offer stable working conditions for researchers from R3[31] career stage onwards; Sweden from R4 onwards. In Germany, researchers with a master's degree, PhD degree, postdocs and assistant professors have temporary contracts which are often financed through external funding. Only associate professors and full professors have permanent contracts. In Hungary, similar

[31] R3: researchers who have developed a level of independence

to Western countries, fixed-term contracts are more typical for women, especially in the case of the younger and older cohorts in Hungary.

Table 1: Career stage with stable employment conditions

Career stage with stable working conditions	Number of countries	Countries
R1	2	Romania, Brazil
R2	4	Belgium, Ireland, Netherlands, Slovenia
R3	17	**Austria**, Bulgaria, Cyprus (no tenure-track option in R4), Czech Republic, **Denmark** (no tenure-track option in R4), Finland, **France**, **Germany**, **Hungary**, Iceland, Italy, Luxembourg, Poland, Portugal (no tenure-track option in R4), **Spain**, Turkey, Singapore
R4	11	Croatia, Serbia, USA, Australia, Japan, South Korea, Bosnia and Herzegovina (no tenure-track option), Lithuania (no tenure-track option), Montenegro (no tenure-track option), Norway (no tenure-track option), **Sweden** (no tenure-track option)
No career stage provides stable working conditions	5	Estonia (tenure-track option in R1+2), Macedonia, Latvia, Russia, China
Miscellaneous	1	Israel
Missing information	6	Liechtenstein, Switzerland, Canada, Albania, Greece, Faroe Islands

Source: (IDEA Consult et al. 2013, 68)

3.2.6.3 General Gender Pay Gap compared to Gender Pay Gap in RTDI

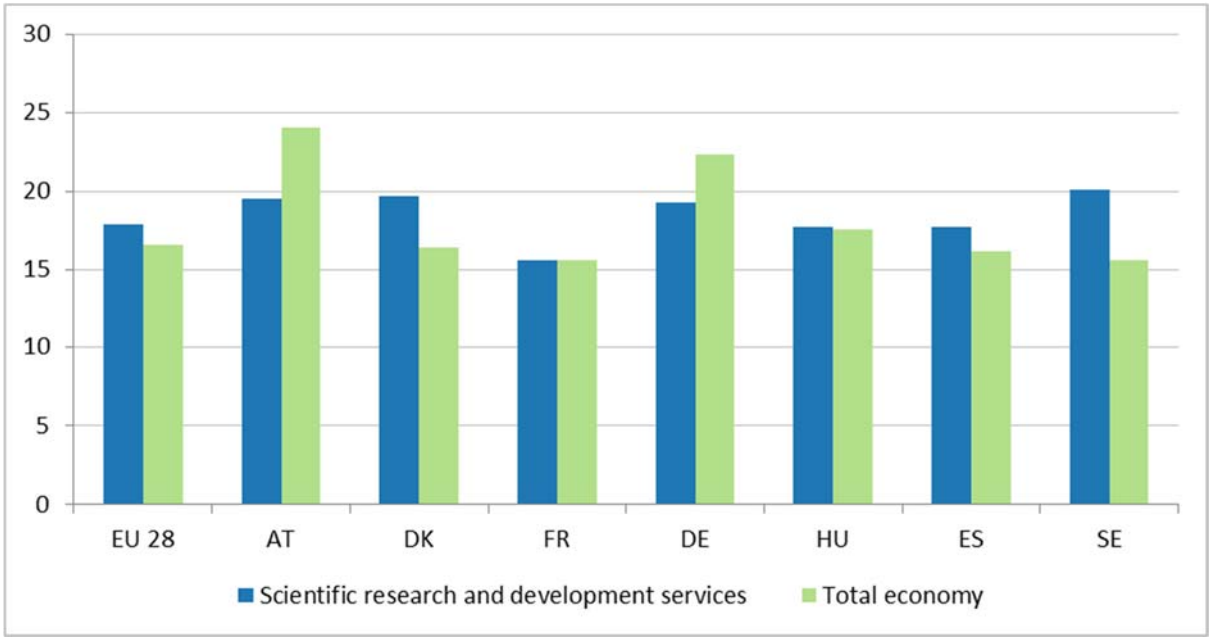
The gender pay gap is the difference between average gross hourly earnings of male and female paid employees, expressed as a percentage of the former. Figure 45 illustrates the gender pay gap for scientific research and development services in contrast to the gender pay gap in the total economy. On the EU28 level, women's average gross hourly earnings in scientific research and development services were 18 % lower than the earnings of their male colleagues. The gender pay gap is hence slightly higher in the scientific field (18 %) than in the total economy of the EU28 (17 %).

This is not the case in all EFFORTI countries. While in Denmark, Spain and Sweden the gender pay gap in the scientific field is higher than in the total economy, the opposite is true for Austria and Germany. Hungary and France present equal gender pay gaps in both sectors of the economy.

Higher gender pay gaps (above the EU28 average) in RTDI can be observed for Austria, Germany, Denmark and Sweden. The gender pay gaps are quite often explained by horizontal and vertical gender segregation in the whole economy as well as in the RTDI sector in the country notes. For instance, in Sweden, the high gender pay gap in RTDI is explained by the fact that science is a rather small and specialised sector with a large fraction of technological, engineering and consultancy firms where men often are employed in economic sub-sectors, fields and positions with higher salaries. Furthermore,

the pay gap widens with each progressive increase in age. Moreover, in the Swedish system, rights-based entry wages are supplemented with effort-based additional benefits at a later career stage.

Figure 45: Gender pay gap (%) in the economic activity "Scientific research & development" and in the total economy, 2010



Source: SHE Figures 2015, p109 (for 2010 only)

For Germany, the gender pay gap in the total economy is relatively high (22%) compared to other EFFORTI countries, but in the scientific field it is lower than in the whole economy (19%). The smaller gender pay gap in RTDI can be explained by the high number of employment contracts in this field which follow collective wage agreements. Collective agreements have a bating influence on the gender pay gap.

3.2.7 Gender Gap in Scientific Output

3.2.7.1 Gender Gap in Scientific publications

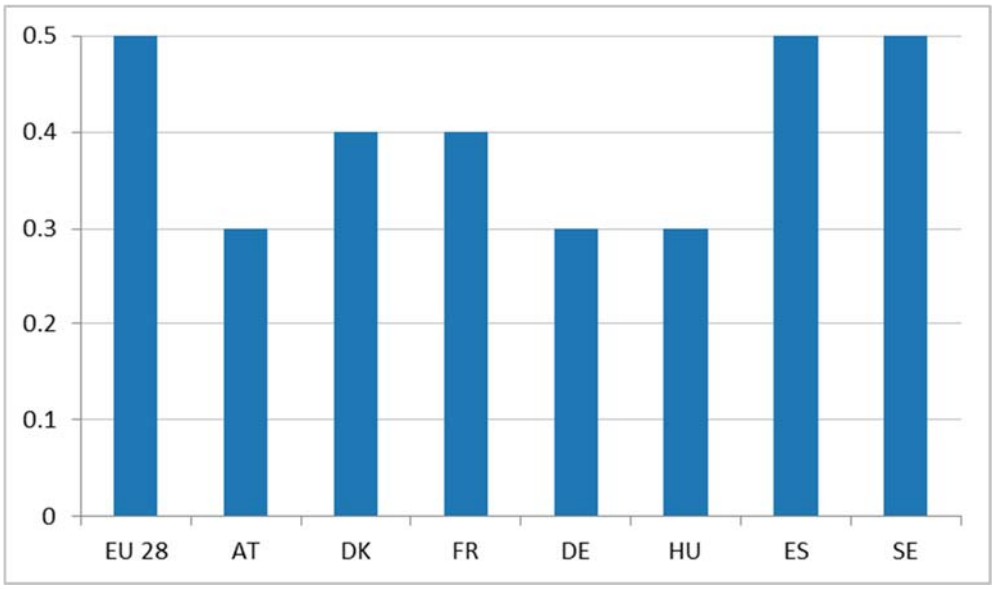
On the EU28 average as well as in Spain and Sweden, women are involved in 5 out of 10 publications as corresponding authors. Denmark and France are below EU average with a 4 to 10 ratio, but rank better than Austria, Germany and Hungary with a ratio of 3 to 10.

The Danish country note stresses that the lower publication output can be explained by the higher numbers of parental and maternity leave periods. Recent research (Nielsen 2015) shows that the publication rates of female researchers are low during the maternity leave period, which usually is at the post doc level, while the publication rates at full professor level are on the same level.

The Swedish country note provides a different explanation for the lower research output of women compared to men. Female researchers have less favourable possibilities for receiving funding for their work than men. An example of the inequality in funding is the research excellence fund, which targets established researchers (who usually are men). The Delegation for Gender Equality in Higher Education commissioned a study on women's and men's chances of receiving research funding from the

Excellence in Research programmes in the 2000s, in comparison with their scientific productivity. The study found that more than 87 % of this funding was allocated to men: “of the 20 researchers who received the largest share of the excellence in research funding, 19 were men”.

Figure 46: Women to men ratio of authorships (when acting as corresponding author) in all fields of science (2011-2013)



Source: SHE Figures 2015, p153

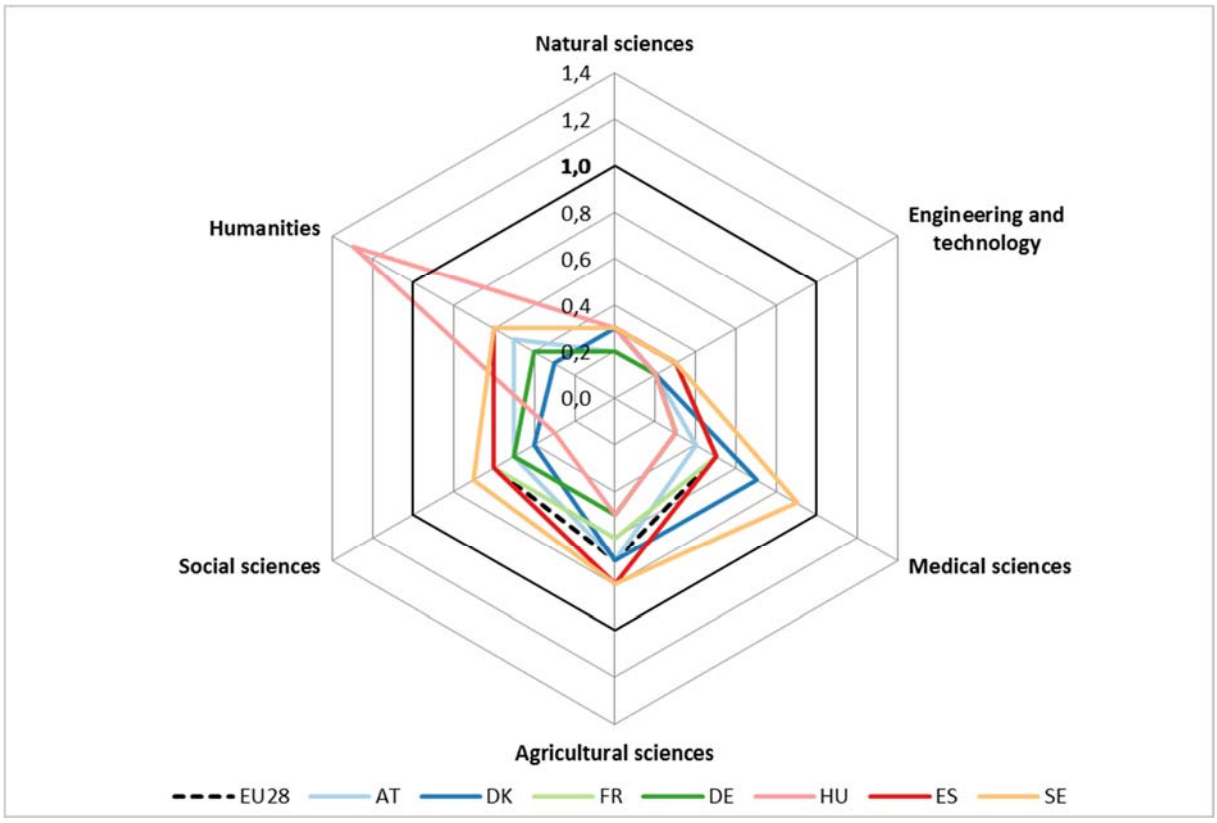
But also differences between scientific fields are important in respect to the gender gap in scientific productivity. In all fields of science for all years studied, the corresponding author in scientific publications is more often a man than a woman; thus there is no gender parity in any field of science on the EU28 level. The lowest man to woman ratio can be found in Natural sciences and Engineering and technology with a 3 to 10 ratio, followed by Medical Sciences (5 to 10), Social Sciences and Humanities (both with a 6 to 10 ratio), while Agricultural Sciences rates best (7 to 10 ratio).

Separated by fields of science, in 2011-13, Natural Sciences was the field where all the countries have gender ratios reflecting the EU average or are positioned below, as Austria and Germany. Engineering and technology presents a similar picture, but with more countries below the average. Even half of the EFFORTI countries show a gender ratio of 2:10, namely Austria, Denmark, Germany and Hungary. When it comes to Medical Science, more differences can be detected across the EFFORTI countries. While Sweden (9:10) and Denmark (7:10) are positioned relatively high, Germany and Austria show a gender ratio as low as in Natural Sciences. Spain and France reflect the EU28 average. In Agricultural Science, the highest gender ratio on EU level could be found. In the EFFORTI countries, it ranges from 5:10 in Germany and Hungary, 6:10 in France and 7:10 in Austria and Denmark; Sweden and Spain reveal a gender ratio of 8:10. In Social sciences, only Sweden ranks above EU average; Austria, Denmark, Germany and Hungary below. In Humanities, Hungary stands out as an outlier with a high gender ratio of 1:3. The other countries could only produce gender ratios as high as average (Sweden, Spain, France) or below (Austria, Denmark, Germany).

This description revealed that all in all, Spain and France score relatively close to average, Sweden is often better than average, while Denmark, Germany and Austria present relatively low gender ratios.

Hungary shows a great variety, sometimes well below average, sometimes corresponding to the average, one time well above.

Figure 47: Women to men ratio of scientific authorship (when acting as corresponding author), by field of science, 2011-2013

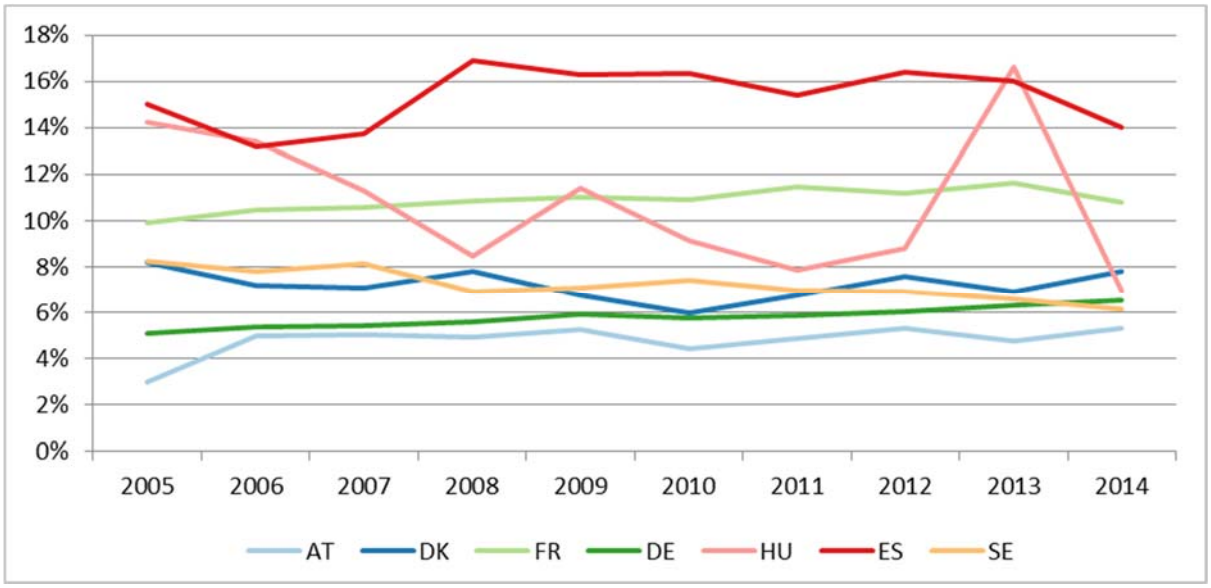


Source: SHE Figures 2015, p155

3.2.7.2 Gender Gap in Scientific patents

The share of women who filed patents varies considerably between the EFFORTI countries and over time. In Spain, the proportion of patents filed by women is highest – 14 % are filed by women in 2014. In France, the proportion is about 11 %. The Nordic countries Sweden and Denmark exhibit a share of 6 % and 8 %. Austria and Germany rank between the two Nordic countries with 5 % and 7 %. In Hungary, the variation of the proportion of patents filed by women varies significantly between 2005 and 2014 – in 2005, 14 % and in 2014, 7 % of patents were filed by women but in 2013 it were 17 %. Interestingly, a decreasing proportion of patents filed by women between 2013 and 2014 could also be observed in Spain (from 15 % to 14 %) and in Sweden (from 8 % to 6 %). But as Figure 48 indicates, the development of the proportion of patents filed by women is hardly linear in any of the EFFORTI countries. The Danish country report offers the following explanation of the low proportion of patents filed by women: More patents are filed in research fields which are male-dominated, such as engineering and natural and technical sciences, and men also occupy higher positions in the RTDI system and therefore file more patents.

Figure 48: Proportion of women in patents by country and year[32]



Source: Patstat, calculations by Fraunhofer ISI

3.2.8 Inclusion of gender in research and teaching

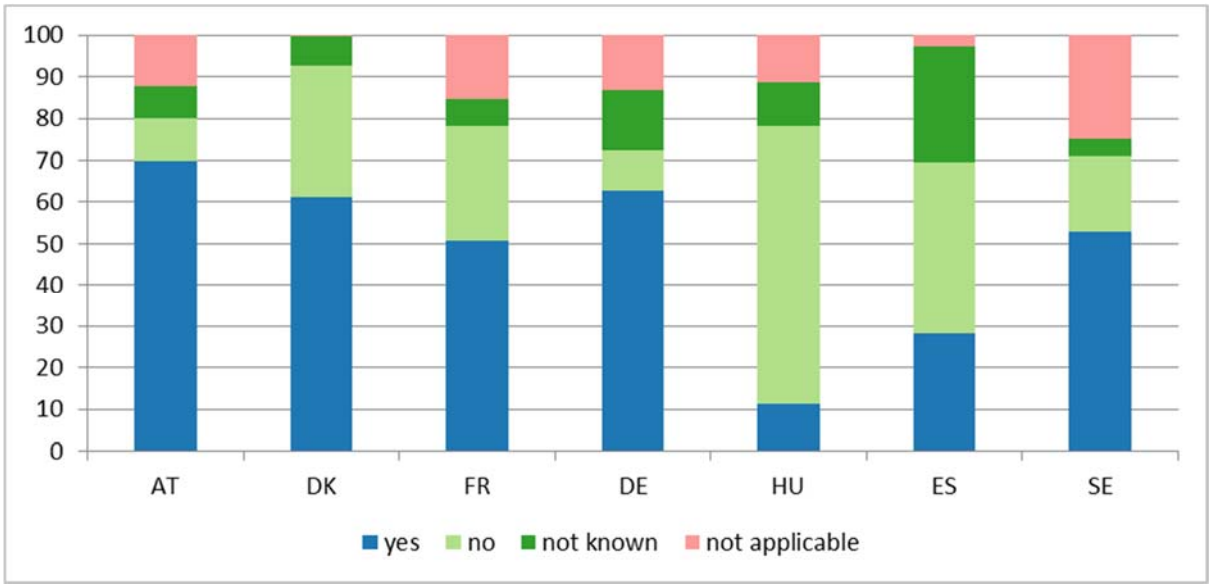
3.2.8.1 Inclusion of the gender dimension in research contents

Figure 49 shows that Hungary and Spain display a significantly lower level of inclusion of the gender dimension in research content compared to other EFFORTI countries. Austria ranks best with 70 %. Denmark (61 %) and Germany (63 %) are more or less on the same level, followed by France (51 %) and Sweden (53 %). But the high value for Austria is not comprehensible.

The Swedish country report notes that gender is widely included in Swedish research, but also that gender contents are not present in all research contexts. Research funding programmes aiming at integrating sex or gender analysis in research have been initiated in recent years, e.g. a research programme with an annual budget of EUR 20 million on the Swedish development policy, which includes gender equality (Pépin et al. 2015). Surprisingly, a higher share of RPOs reports the inclusion of the gender dimension in research content in Denmark than in Sweden although this is not perceived as an area of priority in the Danish RTDI policy.

[32] The calculation of the proportion of women is fractional; meaning if one in five authors of a patent is female, the patent is not counted as one patent filed by a woman, it counts only as a proportion.

Figure 49: Inclusion of the gender dimension in research contents (%RPO)



Source: EC 2015, ERA facts and figures, p85

3.2.8.2 Inclusion of the gender dimension in teaching/curricula

The inclusion of the gender dimension in teaching/curricula does only play a minor role in Hungary, Spain, France and Denmark. In Hungary, this situation has historical roots; the state socialism discredited the 'woman question' by the implementation of bureaucratic measures, which are nowadays perceived as disregarding the needs and interests of women. Therefore, gender is very rarely specified in Hungary as a relevant aspect of the equality discourse in educational policies. Whereas in Denmark, the reason for this is a general perception of the university as a gender neutral (or gender-blind) organisation, building on meritocracy, where there is no need for specific gendered efforts. Verges (2017, 16) shows in her research for Spain that the proportion of universities, which offer degrees with a specific module on gender, is very low at an average of 17 %. In France, there are some specialized masters and PhD programmes but only a few students can access a teaching track centred on gender issues. Teaching on gender is generally spread over different formations which may constitute a weakness in terms of visibility of the field. Gender teaching is less represented at bachelor level, mainly in the form of optional courses. Nevertheless, the situation is better in large universities.

Regarding gender in teaching/curricula, Austria, Germany and Sweden are more advanced. All Austrian universities, with the exception of the Veterinary University and the University for Mining, Metallurgy and Materials in Leoben, offer either gender studies as courses or individual gender courses as optional compulsory subjects. At two universities, there are compulsory courses with gender focus in certain areas of study. In Germany, the influence of gender research in teaching began in fields like cultural studies, humanities, social sciences and pedagogy. Meanwhile, the inclusion has been expanded to STEM fields and medicine as well. Following the implemented gender equality perspectives in the Swedish society in general, some effort is put into gender mainstreaming education. The recent initiative Gender mainstreaming in academia supports and underpins the demand for such teaching and curricula. The Swedish Higher Education Authority, UKÄ, is in charge of the gender dimension in teaching: "Gender equality and gender mainstreaming are key quality factors to be considered in the

reviews and, like many other authorities, including the HEIs, it is an area that UKÄ has been tasked to develop" (Swedish Higher Education Authority 2016, 17).

3.3 Comparison of the assessments of Gender Equality Policies in RTDI

Focusing on the challenges the EFFORTI countries are facing regarding gender equality in RTDI and the assessment of the current situation, we first want to take a look at the policies in place. In the assessment of the gender equality policies in RTDI in the country notes, some critique is mentioned when it comes to the consistent implementation of gender equality policy in RTDI.

Austria, Denmark, Germany, France, Spain and Sweden have a comprehensive legislation regarding gender equality in RTDI but in Denmark the Higher Education Act lacks statements addressing gender equality and the legislative frameworks provide no clear responsibility structures for gender equality in universities. In Spain, gender indicators for measuring progress of the RTDI strategy are missing and effective implementation mechanisms in general are lacking. In Austria, France and Germany, the gender equality policy is legally binding but sanctions are missing. Gender equality measures are mainly built on voluntary commitment of elites. In Sweden, the government largely leaves it up to RPOs to achieve a gender balance in the academic sector (Directorate-General for Research and Innovation 2015, 611). Since gender divides are taking place at a much earlier stage, which is reflected in educational choices, not all gender equality issues can be solved by management in the HES (Dryler et al 2016, 16). In contrast to these EFFORTI countries, gender equality in Hungary is no independent issue in public politics as the government does not focus on gender equality and gender mainstreaming in research. These political conditions make it particularly difficult to drive gender equality in RTDI.

When it comes to concrete gender equality measures and programmes, aims and problems addressed are not always sufficiently specified. Subsequently, gender equality activities seem vague and implementation is difficult, as reported from Germany, Spain and Sweden. In addition to weaknesses in implementation, a lack of knowledge regarding evaluation methodologies of gender equality policies in RTDI (France), missing tools and guidance for dealing with gender equality in evaluation panels (Sweden) and lack of comparable gender disaggregated statistics (Denmark and Hungary) are reported.

The structure of the gender equality policy and measures implies an attitude to gender equality: For Denmark, a tendency of individualizing gender equality and leaving structural barriers unaddressed can be stated, whereas in Sweden the debate focusses on structures and culture inhibiting gender equality. In Austria and Germany, a balanced mixture of individual and structural measures could be identified.

A lack of resources is another challenge in some countries: In Spain, the economic crisis had a substantial negative impact on gender equality policies in RTDI, the available budget and its institutional framework because public spending on RTDI has severely declined. In France, a lack of measures requiring substantial financial investments like childcare facilities at universities can be reported. And in Hungary, civil organisations have a less important role than before regarding the promotion of gender equality on a national level because of the insufficient resources to do so.

Looking at the current situation regarding Gender Equality in RTDI in the EFFORTI countries, Austria, Germany, Hungary and Sweden see the persisting traditional role models, traditional occupational choice and labour market segregation as a main challenge. More women have to be encouraged to

study male-dominated disciplines. In addition to the horizontal segregation, the vertical segregation in RTDI seems to be an even bigger issue concerning challenges and assessment of gender equality in RTDI. The share of women in decision-making positions in RTDI increases rather slowly in Austria, Denmark Germany, Hungary and Sweden. France has had good experiences with the introduction of quotas in HES. But especially in the BES, it is very difficult for all EFFORTI countries to increase the female share in leadership due to weaker or completely missing legislation, and therefore it is very difficult to involve R&D companies in implementing gender mainstreaming.

Male-dominated organisational cultures in RTDI may be another reason for low shares of women on all levels in R&D companies. Regarding this issue further efforts are needed, especially in the BES but also in the HES, where the leaky pipeline persists and women have temporal contracts more often than men, particularly in early career stages, as Austria, Germany and Sweden report. In Austria, cultural change in RTDI has been addressed but not yet been fully pursued. In Hungary, only sporadic steps on the organisational level towards gender equality were taken but a policy on national level targeting this issue is missing. In France, progress concerning the fight against sexual harassment in the academic world was achieved. And in Germany, gender equality is institutionalised and monitored on university level but not effectively implemented. It appears that scepticism towards gender equality increases within the hierarchy of academic decision makers.

One general reason why it is so difficult to implement gender equality in RTDI could therefore be the currently prevailing academic regime. As long as the epitome of the excellent scientist is defined as male and living only for his work, as it still applies to Austria, women in academia will face problems with their work-life balance, if they do not adapt to the system, as it is experienced in Germany. The German country report research findings document prevailing values and stereotypes in the German research system that favour men. This finding corresponds with research results from Denmark, were women need to be twice as experienced as men in terms of their scientific track record to have the same chances for receiving a research grant funded by the Danish Council for independent Research. The impartiality of peer review assessments is also questioned in Sweden but is still the established model for allocating funding, recruiting staff and assessing manuscripts for publication. The research findings reported in the Swedish country note make evident that gender-related bias against women is existing in HES but that they are subtle and often play out unconsciously. Therefore, they are difficult to observe and to identify, and it is also hard to avoid and to act against these biases. However, research makes evident that gender bias is prevalent in different organisations, countries and cultures[33].

But sometimes resistance against gender equality measures is very visible: In Germany, some heads of big research institutions argued publicly against quotas. These elites lack consciousness that gender equality and quotas support equal opportunities and do not give unreasonable advantages to women. In Denmark, a funding programme for women professors was discontinued because of resistance against positive discrimination, although it was successful in supporting gender equality in RTDI. And in France, gender inequalities are downplayed in the academic field as well as in private companies.

Last but not least, the gender dimension in research and teaching was an issue for Austria, France, Hungary and Spain when discussing challenges and assessments of gender equality in RTDI. In Hungary,

[33] https://www.hastac.org/blogs/superadmin/2015/01/26/gender-bias-academe-annotated-bibliography-important-recent-studies

the gender dimension is seldom considered in research content; in Spain, RFOs rarely support the integration of the gender dimension into research. Only in France, a progressive emergence of gender issues in research and teaching is detected that may have positive impact in the future. In contrast, the extent to which gender is taken into account in research is not known in Austria. It is also unknown how the juries deal with gender criteria and how much influence the criteria have on the decision-making process in the allocation of funding because evaluation is missing.

4 Evaluation Culture and Policy

This chapter provides an overview with regard to the developments and current status quo of the evaluation tradition and culture, as well as policy and practice in the analysed countries. Section 4.1 presents the current status of the evaluation culture, the following section 4.2 gives an overview of national framework conditions and related development processes, including the use of evaluation standards. Section 4.3 deals with overall responsibilities with respect to evaluations in RTDI, identifies evaluation functions and features, and discusses related aspects of transparency. Section 4.4 summarises aspects with regards to gender equality in RTDI evaluations. Section 4.5 gives an overview of current literature on the use and utilisation of RTDI evaluations and its effects on policy making. Finally, section 4.6 summarises recent trends and developments regarding RTDI policy evaluation.

4.1 Description of Evaluation Culture

With the increased interest in 'evidence-based' policy making in recent years, evaluations have become somewhat of a common phenomenon in the public sector worldwide. Historically, evaluations as assessment tools started to emerge in public management in the US in the late 1960s (Wollmann 2003). In this time, the public policy narrative was strongly linked with planning and with a careful design of measures and programmes as means to achieve societal and political goals. In the wake of a worldwide economic and budgetary crisis (see e.g. Krippner 2011), a second wave of public sector reform and evaluation started in the mid-1970s, which led to budgetary retrenchment and increasing calls for cost efficiency (Furubo and Sandahl 2002). A third wave of evaluations started in the late 1980s and 1990s, strongly shifting towards control and effectiveness against a background of decreasing public expenditures. This wave can be seen as example of public sector reform that heavily borrowed from views and strategies of the so-called New Public Management (NPM) paradigm (Rothwell 1985). In Sweden and Denmark, to some extent also in Austria and Germany, a fourth wave of public sector reform is suggested to have emerged that re-focuses on the scientific approach to evaluation, putting emphasis on experimentation, control trials and meta-analysis.

In addition to the pressures on public expenditure and the associated requirements of greater accountability, other factors that have promoted the demand for evaluation in recent years were the growing complexity of policy issues and the desire for enhanced social responsiveness and societal support (Pattyn et al 2017). In Europe, the demand for evaluations increased when new programmes of regional and technical development by the European Union (EU) as well as the reorganisation of structural funds were introduced (Pattyn et al. 2017, Bachtler 2012).

While there might have been different activities and practices across countries, the overall development processes can be largely associated with these waves of public sector reforms. Countries like Germany and Sweden, which have a longer history of policy reviews and evaluation, were able to deploy relevant activities earlier in the overall policy making culture compared to Austria, Denmark, France and Spain, in which evaluations have been adopted rather late. Accession to the EU is acknowledged to have had an important impact on the national evaluation culture in all EFFORTI countries, in particular Spain (Fernandez-Ramirez and Rebolloso 2007), as it introduced new standards and norms with regards to evaluations.

Recent research studies (e.g. Jacob 2015, Bachtler 2010, Heijs 2010) refer to Germany, Austria, Denmark and Sweden as leading countries in evaluation as they have built up a well-established culture

of evaluation and carry out systematic evaluations of programmes and institutions. France and to a lesser extent Spain have also strongly reinforced evaluation practices and related structures in recent years, though evaluations are rather carried out on an occasional basis. The youngest membership country, Hungary, joined the EU in 2004. Since the EU required countries to build up evaluation capacities before their accession during its more recent enlargement rounds in Eastern Europe (Stern 2009), Hungary continues to foster, somewhat similar to Spain, its effort to develop a public policy evaluation culture. It particularly draws on the EU's structural funds as guidelines as well as learning from experiences in other countries. Because of the requirement to have some level of evaluation capacity built up before the entry into the EU, it is suggested that Eastern European countries tend to have their evaluation activities more concentrated in ministries, while countries in Southern and North-Western Europe follow a more decentralised approach of evaluations (Stern, 2009).

Seen from this perspective, evaluations have also been increasingly devoted to shed light on research, technology development and innovation (RTDI) policy, which has shifted from simple R&D support to setting research priorities and offering a variety of structured instruments in recent years. In Germany and Austria, an important feature of RTDI promotion is a persistent programme orientation, which has led to a focus on programme evaluations in recent years. This development was fostered again by the EU in the context of priority-setting processes and mission-led approaches, such as tackling the 'Grand Challenges' (Streicher 2017).

The overall shift towards NPM also led to a stronger focus on control and performance measurement in the course of RTDI evaluations. In this regard, Germany and Austria have built a strong and well-established RTDI evaluation culture in a rather short time period. In Austria, the trend of separating policy making and policy implementation in RTDI Governance ('agencification'), and the incorporation of respective laws and regulations played a particular important role in promoting the evaluation culture (Heijs 2010). In Sweden and Denmark, RTDI evaluation activities have also become quite common during the last two decades, putting on control and accountability. While the French evaluation culture is still somewhat oriented towards centralised, top-down approaches, questions with regards to efficiency and impact recently gained more importance. The Spanish evaluation culture of the Spanish RTDI system is dominated by an auditing function due to strict requirements regarding public accountability. In Hungary, evaluations of RTDI policy measures are currently not a widely used practice (Heijs 2010).

Importantly it is noted that the term 'evaluation' has often been used interchangeably, not only in the EFFORTI countries, with e.g. audits, impact assessment or benchmarking – which can, however, also be part of an evaluation. Thus, as is the case in Sweden and Spain, evaluation typically refers to more of an overarching family label containing a number of more narrowly defined activities. It is also noted that terms such as 'evaluation capacity' or having a 'culture of evaluation' tend to overlap. While the former refers to processes that aim to increase 'individual motivation, knowledge, and skills, and to enhance a group or organisation's ability to conduct or use evaluation' (Labin 2012), the latter is often used to state that regular policy evaluation takes place in several policy domains, addressing not just the input/output relationship, but also achievements and results (Pattyn et al. 2017, Jacob et al. 2015).

In sum, evaluation culture development and evaluation capacity building and processes have been different in most countries worldwide. A uniform, homogenous national evaluation culture does not exist (Barbier and Hawkings 2012). Major reasons are the specific national political and administrative culture, conditioned by existing formal institutions (e.g. laws, regulations) and informal institutions

(e.g. norms, values, 'ways of doing things'), as well as the state and non-state actors, their perceptions and preferences that are involved in policy making and evaluation processes (Pattyn et al. 2017; see also Georghiou 1995).

4.2 Framework conditions and evaluation standards

With regard to formal rules and codes of conduct, Germany and Austria have particularly explicit legislation and rules on evaluation in RTDI in place. The German Federal Ministry for Economic Affairs and Energy (BMWi) emphasises the Administrative Rule No 11a to §44 of the Federal Budget Code (BHO – Bundeshaushaltsordnung) in combination with Administrative Rule No 2 to §7 BHO as basis for their performance reviews for which programme evaluations are a part of. The subject here is the monitoring of targets, impacts and programme completion as a basis for monitoring profitability and suggestions for further development. In Austria, statutory foundations are provided by a series of laws, most notably the 2004 Act for Creation of the Austrian Research Promotion Agency, the 2010 Research and Technology Promotion Act and the Research Organisation Act. In addition, there are guidelines for research funding based on these laws and for the promotion of commercial-technical research, technology development and innovation.

In Spain, evaluations are regarded as part of a broader system to ensure accountability, also in RTDI, building on a complex system of legal administrative controls. France has seen some changes with regard to the legal policy context, but evaluations are largely conducted by the national court of auditors. In Hungary, the Law LXXVI of 2014 on 'Scientific Research, Development, and Innovation' defines the National Research, Development and Innovation (NRDI) Office tenders as being responsible for the elaboration of methodologies, background analyses, reports required for the planning of RTDI programmes, concepts and strategies, as well as for the evaluation and monitoring of the funding programmes. The most significant changes of the research and innovation system are intertwined with the evolution of the legal policy context.

In Sweden and Denmark, it is noted that there is no legislative framework guiding the overall initiation of evaluation activities or its objectives, nor are there any particular standards for ways in which evaluations have to be carried out. However, because evaluations have become compulsory in many countries – also in the EFFORTI countries – and are often installed as preconditions, particularly when public funding is involved, related activities have been developed to become informal institutions, meaning a routinized procedure, sometimes without specific formal rules and mechanisms or institutionalization of evaluation in public administration. They are increasingly considered as part of the public administration practice, such as in Germany, Austria, Sweden and Denmark. In France, Spain and Hungary, evaluations also seem to be widely recognised as part of strategic policy advice, but related procedures might not be as institutionalised as compared to the other countries. However, France is considered to have a long-standing tradition regarding ex-ante evaluations. In sum, while various organisations have evaluation mandates and carry out a range of evaluation practices, a systematic, coherent approach to evaluation that spans multi-actors in different policy domains apparently does not exist in the EFFORTI countries.

To promote and support evaluation capacity building and to foster and develop the existing evaluation culture, so-called 'evaluation societies' have been developed on the national level (e.g. Bachtler 2012) – in Austria (1996), Germany (1997), France (1999), Denmark (2000), Spain (2001), Sweden (2003) and

Hungary (2006). For instance, the Austrian Platform Research and Technology Policy Evaluation and the German Gesellschaft für Evaluation e.V. provide fora for evaluation debates focusing on RTDI, training courses, and relevant publications. In 2006, the Spanish Evaluation Agency (AEVAL; not to be confused with the Spanish Evaluation Association) was established under the responsibility of the Ministry of Public Administrations to promote evaluation activities, to evaluate public policies and programmes and to enhance the quality of services in order to improve the use of public resources and accountability.

National discourses concerning evaluations differ from country to country, with varying levels of discussion and patterns of attention. In some countries, such as Spain, the economic crisis of 2008–2013 affected political debates and shifted attention to more pressing matters, resulting in some sort of stagnation in terms of the development of the evaluation culture. In Denmark, complaints about the meaningfulness of evaluations fed into the national discourse surrounding evaluation. While France places more emphasis on the 'plurality principle' in evaluation activities, which is anchored in the French 'Charte de l'Évaluation', public debates with regards to evaluation are rare in Hungary (Jacob et al. 2015).

The creation of evaluation societies and the growing national discourse on evaluation as such has been accompanied by the launch of new evaluation journals, (online/offline) meetings, discussion groups and networking, the drafting of evaluation standards and methodological guidelines as well as the organisation of evaluation conferences (Bachtler 2012). In Germany and Austria, evaluation standards for RTDI were developed by the respective evaluation societies that serve as a framework and code of conduct for those involved in evaluation. These standards also address certain aspects related to gender. The German-speaking DeGEval Evaluation Society runs its own working group on gender mainstreaming, which also provides inputs for the development of standards. For the other EFFORTI countries, there are no special provisions and standards in place with regard to RTDI. In light of this, it is noted that the mere existence of a professional, evaluation-fostering organisation in a country does not necessarily mean a stronger national discourse. Barriers are often to be found in an overall lack of communication and discussion, a missing collective vision and initiatives that could cut across the traditional boundaries of evaluation societies (Jacob et al. 2015).

4.3 Responsibilities, function and transparency of RTDI evaluation

In Germany and Austria, evaluations are regularly scheduled and carried out. For instance, the German BMWi programmes undergo interim and/or ex-post evaluations with a focus on accountability, whereas the BMBF approach puts greater emphasis on formative evaluations. In Austria, the majority of RTDI evaluations have a formative character, especially interim evaluations are designed to give advice on how programme management can be enhanced or readjusted. In 2009, a rather broad systemic meta-evaluation of the Austrian system of research support and financing was carried out ('systems evaluation'; Aiginger et al. 2009). Also in Sweden and Denmark, evaluations of RTDI initiatives and programmes are conducted on a regular basis. Strong emphasis is put on control and accountability, ensuring that public and private organisations live up to their legal responsibilities.

Evaluations tend to be adjusted to the status of the measure or programme in the policy cycle, hence follow somewhat of a cyclical routine, for instance in Austria, Germany and Sweden. In France, evaluation of programme implementation is more widespread than the evaluation of the impact of

public policies. However, evaluations are mainly carried out on an occasional basis (Heijs 2010), e.g. when quick decisions are needed to develop the measure or programme in question. This is quite similar to Spain, where monitoring processes are more common. The strong focus on accountability in Spain is reflected in a more summative character of evaluation activities. In Hungary, evaluation practice is not spreading much beyond EU-funded programmes.

4.3.1 Actors and strategy processes

The extent to which evaluations and related assessment activities are embedded in practice and built into government institutions varies greatly across the EFFORTI countries. Thus, a wide range of different actors, typical governmental bodies like ministries, funding agencies or other legal bodies, are engaged in tendering RTDI evaluations. In most cases, this means that who runs the measure or programme in question is also responsible for commissioning and managing the evaluation.

For instance, in Germany, Austria and Denmark, RTDI-related evaluations are mainly commissioned by Federal Ministries. In case programmes and measures are managed by specific agencies, such as in Sweden, Denmark or Austria, they are also allowed to tender evaluations. Spanish research evaluation has been traditionally managed by specialised evaluation agencies. In France, the national Commission for the Evaluation of Innovation Policies is responsible for evaluating innovation policies. In Hungary, the National Research, Development and Innovation (NRDI) Office tenders evaluations.

Various councils, such as the German Council of Science and Humanities or the Austrian Council for Research and Technology Development (RFTE), conduct evaluations, tender evaluations and provide counselling at the federal and regional level. In Spain, the Spanish Conference of University Rectors (CRUE), the Spanish Confederation of Scientific Societies (COSCE), the COTEC Foundation and the Foundation associated with the trade union CCOO conduct and commission yearly research and innovation reports. In France, a specific mission with respect to the evaluation of innovation policies was assigned to the General Commission for Strategy and Economic Foresight by the Prime Minister, including the instalment of a related council.

The outcome and impact orientation of evaluations interlinks with the on-going implementation processes of RTDI-related strategies, overarching initiatives, e.g. on the EU level, and umbrella goals, which often serve as guidelines for what kind of outcomes specific policies should aim. They have been substantiated in recent years by evaluations. For instance, in the 2005 German 'Pakt für Forschung und Innovation', the BMBF defines performance criteria against which funded organisations are assessed. The 2011 Austrian RTI strategy notes that: 'All measures are oriented first and foremost in terms of their impact.' (BKA et al. 2011, p. 11) In France, the 2015 National Research Strategy contains orientations according to which research performers shall alter their research priorities in order to better meet societal challenges. The Spanish Strategy for Science, Technology and Innovation (2013–2020) calls for 'the setting up of an integrated information system and the improvement of the quality of indicators for monitoring the actions funded by the public administrations and their impact'.

4.3.2 Features of RTDI Evaluations

Evaluations may take place on different levels, from programmes to institutions or organisations, and can be carried out in various ways and forms (e.g. ex-ante, interim, ex-post), using different scientific methods for data collection, analysis and interpretation. In general, there are two main types of evaluation: formative evaluation, which is proactive and conducted while the measure is implemented, aiming at improving a policy; summative evaluation seeks, at the end of the term, to establish whether or not certain objectives have been achieved. The overall purpose of the evaluation and the evaluative questions is usually laid down in the terms of reference. As suggested by the case of Sweden, the general obligation of publicly initiated evaluation activities may pursue utility, feasibility, propriety and accuracy.

In Germany and Austria, where related standards and guidelines exist, reports indicate somewhat of a standard evaluation design that is used, typically building on a core set of methods. This may consist of document analysis, surveys among the beneficiaries and expert interviews. Depending on the case, the set is extended by focus groups or more sophisticated approaches such as social network analyses, input-output analyses and matching pair comparisons. In most countries that carry out RTDI evaluations, an extended set of methods is applied. However, descriptive statistics are found to be the most common approach, while more sophisticated, quantitative approaches are used more selectively. In terms of data collection, interviews and participant surveys are considered to be most important (Edler et al. 2010). Participatory approaches, i.e. involving stakeholders, particularly the programme participants or beneficiaries, are less common in all the EFFORTI countries. With regard to the available budget for evaluations, evaluation societies and standards provided in Germany and Austria suggest that around 1 % of a measure/programme budget should be spent on evaluations. However, this usually depends on the objectives and the scope of the evaluation task.

It is not mandatory for public authorities to publish evaluation reports or related documents in any of the EFFORTI countries. In Germany, for instance, where reports are published on an irregular basis, programme evaluations are often treated as an internal service to the ministry, hence results are kept confidential. In Austria, evaluation reports are collected and published to a high degree, for instance via the websites of the ministries or on the fteval platform. In France, an online platform was launched in 2013 by the government that provides an overview of all (current and finished) evaluations of public policies. In Sweden, many evaluation reports have been made publicly available and, in many cases, at least an excerpt of them is translated into English. While in Denmark and Austria many evaluations, at least in the form of an abstract, are available in English, the provision of RTDI evaluation reports is, in general, rather limited in Spain and Hungary.

4.4 Gender equality in RTDI evaluations

Monitoring and reporting on gender mainstreaming and aspects of gender equality have been developed throughout public sectors and administrations in recent years. However, gender-related initiatives and policies in RTDI are still scarce or underdeveloped. Therefore, related evaluations are also rare. But gender equality is not systemically addressed in RTDI evaluations either. Judging from

the country notes, standard RTDI (programme) evaluation usually pays attention to gender-related aspects in the following cases:

- If gender equality is the focus of the initiative and relates to goals or objectives of a policy or programme, the evaluation assesses whether this goal or objective has been reached or not. This might be likely when funding of individuals is involved. For instance, in an evaluation of the Bavarian cluster initiative the representation of women in the cluster management was one of the numerous evaluation criteria.
- If gender equality emerges as an issue strategically relevant for pursuing a certain goal, e.g. to 'strive for gender equality in research' as put forward by the 2011 Austrian RTI strategy, or for understanding certain developments, it receives more attention in evaluations.
- In addition, the topic of gender equality might be considered as a priority by individuals amongst the programme owner or staff that manages the policy. Relevant questions are collected and placed as part of the compiled list of questions in the tender.

In France, Spain and other countries, various councils, associations or task forces publish statements about the role of women, put forward ideas for gender equality initiatives, report on international best practices or present recommendations towards better equal opportunities for men and women. Roadmaps and strategy processes outline a long-term vision and directions concerning gender equality, while giving less insight into how this should actually be achieved and – aside simple head counts – measured.

For instance, both Sweden and Denmark have a long tradition of focusing on gender equality. In Sweden, the national gender equality discourse is highly acknowledged and politically prioritised. Recently, guidelines for reviewers in review processes have been updated with a focus on risks of gender bias. But despite the high importance and an on-going discourse on gender equality in these countries, assessments undertaken to determine deeper structural inequalities and gendering mechanisms are considered to be less comprehensive, often relying on statistical overviews. Sweden particularly highlights the importance of more nuanced, context-sensitive, qualitative measures and indicators. Still, evaluations of RTDI programmes or measures do not take gender equality sufficiently into consideration.

However, the experience in Spain shows that policy priority may change if there is a severe economic recession, perhaps causing a change in focus, away from gender equality measures and related evaluations to other important issues. Finally, there are currently no prescriptions and no practice in Hungary concerning evaluation of gender equality in RTDI evaluations.

Based on the country notes, it can be concluded that gender equality in RTDI is mainly focused on assessing the number of women (and men) benefiting from these programmes and measures. A more systematic and structural understanding and approach towards gender equality in these evaluations is still lacking.

4.5 Evaluation utilisation and policy learning

The importance of evaluations for public policy making has increased considerably in recent years. This has been accompanied by a growing line of research about the actual or probable consequences of evaluations, also in RTDI (e.g. Edler et al. 2010). The use of evaluating findings is traditionally divided into three types: instrumental, conceptual and symbolic use (King and Pechman 1984, Leviton and

Hughes 1981). Authors such as Patton (1997, 1998) have added further spin to the discussion by highlighting the aspect of process use, drawing attention to the impacts of participating in the process of an evaluation. More recently, new perspectives have been introduced in evaluation research, where the notion of utilisation (or use) has been dropped in exchange for a broader view on the influence of evaluations (see e.g. Kirkhart 2000, Henry and Mark 2003, Mark and Henry 2004).

In general terms, evaluation may serve different purposes, which is usually reflected in its objective, and linked with the uses that the evaluation is intended to have. These might encompass decision makers in ministries that draw on the evaluation for legitimation purposes, agency representatives who learn about the efficiency of the programme to (national or international) communities that use the evaluation for benchmarking purposes. Policy learning, which can be defined as the "change of policy relevant knowledge, skills or attitudes" resulting from assessments such as evaluations (e.g. Biegelbauer 2013, p. 50) may occur during the process of an evaluation and in the course of follow-up activities.

Instrumental use, e.g. changes in practice and procedures as a direct result of the evaluation findings, strongly links with the ideals of the NPM paradigm, and is found in most of the EFFORTI countries. In light of this, one effect of (programme) evaluation is the (on-going) adaptation and fine-tuning of existing programmes. Thus, the utilisation and use evaluation is often limited to the analysed measure and the directly involved actors (e.g. programme administration). It is noted, however, that pure instrumental use is not common (e.g. Weiss et al. 2005), meaning that evaluations are only one piece of evidence among several others to inform policy decision makers.

While there is limited evidence with regard to the actual extent of how evaluations may influence decision making, some aspects that may enhance or inhibit policy learning have been reported in the EFFORTI countries. Germany and Austria, for instance, which have a more comprehensive wealth of experience in the implementation of RTDI policy evaluation, have been able to develop a discussion culture that allows to feed back its results to stakeholders and an interested community, thus fostering policy learning. In France and Spain, the strong focus on accountability and strict requirements of administrative authorities may hamper policy learning resulting from evaluation exercises. In Spain and Sweden, it is argued that, instead of the mere provision of statistical overviews, more analytical approaches and nuanced indicators, in particular with respect to impact assessments and gender-related aspects may foster better learning. In Denmark, the lack of explicit evaluation purposes and evaluation questions is also found to limit policy learning.

Looking beyond the narrow category of evaluation use, effects of policy evaluations may also take place in much more subtle, gradually emerging ways. Here, changes are often the result of a combination of different impulses, such as other evaluations, that produce additive or cumulative ('trickle-down') effects. Recent research work for Austria suggests a number of factors and mechanisms which may condition the effects of RTDI evaluations. They encompass the legal and political framework conditions, the prevalent evaluation and discussion culture and the characteristics of the evaluation object (e.g. its age, continuity). Important aspects are also the drive towards outcome-orientation in New Public Management, and the increasing importance of what is termed as 'strategy orientation', which determines the relevance of policy fields and their long-term future. The individual interest and the specific needs of the organisations involved, in particular the agency, are also deemed important. Professionalism and credibility of the evaluators is also viewed as an important factor in increasing the use and utilisation. The lack of interaction with stakeholders in

evaluations is viewed as a limiting factor for the benefit of and learning from evaluations. This is particularly interesting as participatory evaluations, meaning the involvement of stakeholder, is not often used in the EFFORTI countries.

4.6 Recent trends/developments with regard to RTDI policy evaluation

Evaluations or evaluation-type studies have become, in particular in Germany, Austria, Denmark and Sweden, a more or less routinized procedure in public policy. They are regarded, also in France, Spain and Hungary, as important part of evidence-based policy making in RTDI governance. In Sweden and Denmark, evaluations continue to seek legitimation and accountability, reflecting the overall control-oriented purpose of evaluation. Achieving efficiency and accountability in all public administration actions, also in RTDI, is dominant in the Spanish approach to evaluation, too. France seems to pick up on the NPM paradigm and international standards in evaluation, paying more attention to input/output relationships for public funding. The recent establishment of the French National Commission for the Evaluation of Innovation Policies has been regarded as an important step for the identification of systemic weaknesses and necessary improvements. Hungary is continuously working to build up a broader public policy evaluation culture.

In the analysed countries, various steps were taken to improve and foster the RTDI evaluation culture, and to develop awareness and support for related evaluation activities and processes. In light of their well-developed evaluation culture, Germany and Austria recognise a strong trend towards professionalisation and standardisation. Expected future developments, which will – to a varying degree – affect all EFFORTI countries, can be summarised as follows:

- Continuing interest in impacts and effectiveness. The pressure to demonstrate legitimacy, profitability and transparency of public spending, not only in RTDI, is on the rise. However, the actual purpose and relevance of support measures, in particular in case of long-running policies, should not be left out of the discussion. Needs and expectations of evaluation exercises are to be made clear from the beginning.
- Increased demand for and use of more sophisticated methods in evaluations. This is, in general, reflected in the increasing desire to better understand socio-economic effects and the trend towards a systematic assessment and (quantitative) control of public support. Sophisticated quantitative and qualitative methods (e.g. econometric analysis, control group approaches, network analysis) are used only in very few cases. Lack of data availability and limited funding volumes for evaluations may stand against such efforts. Also, discussions about what constitutes methodological rigour measuring impact in RTDI are expected to continue.
- Increased complexity of measures and programmes as well as the emergence of new topics in RTDI challenge evaluation research and practices.
- In recent years, gender has been increasingly taken into account in RTDI evaluations (the intensity varies between the EFFORTI countries). But it is still not systematically considered and mainly focused on assessing the number of women (and men) benefiting from measures.

While conducting evaluations has developed to become a vital profession in the analysed countries, research suggests a growing future demand for evaluation capacity-building and skill development (Polverari 2015). This is particularly voiced in the context of the limited or even absent experience with impact evaluation in most EFFORTI countries. Hence, different skills and expertise concerning

evaluation – on all sides involved in the evaluation activity – are required. Another trend in evaluation research and practice suggests, although being discussed for some time now in the evaluation literature (e.g. Pattyn 2017, Vedung 2010), that stakeholder involvement in evaluation will become more important in the future.

5 Conclusions

5.1 Comparison between gender equality in the labour market and in RTDI

When dealing with gender equality in RTDI, the question arises whether this sector is different from or equal to the general labour market. Looking at the proportion of women in the overall labour market, we see that the EFFORTI countries are very similar to each other; the share of women in the labour market is between 45 and 49% in all countries. But the share of women in the RTDI sector differs widely (see 3.2.3.2): The highest share of women in R&D among the EFFORTI countries can be found in Spain (39%), followed by Denmark (33%), Sweden (28%), Hungary (27%) and France (26%). Austria and Germany (both 23%) reveal the lowest shares in comparison with the other EFFORTI countries.

Data shows that the RTDI sector in some countries is a bit more attractive for women than in others. One explanation for these differences may be the working time culture. All the EFFORTI countries have similar actual weekly working hours of full-time workers between 39 and 41 hours. And most compared countries have lower shares of part-time employed women in RTDI than in the general labour market. Moreover, in all EFFORTI countries except Denmark, women more often work part-time in RTDI than men. The working hours for Austria and Germany for full-time employees have so far been well above the EU average of 40 hours, but have been decreasing slowly since 2005. Both countries have hitherto been characterised by an overtime culture. For the RTDI sector, Austria and Germany still report a significantly higher weekly working time of 44 hours, compared to the other EFFORTI countries where there is nearly no difference between general working time culture and that in RTDI. This working time culture does not make RTDI attractive to women in Austria and Germany because both countries are also characterised by comparatively high shares of women working part-time in the RTDI sector as well as in the whole labour market – often to accommodate work and childcare. In contrast, e.g. Denmark shows a low percentage of both women and men in part-time employment in RTDI. This might be due to a combination of good childcare facilities but also due to high demands for a stable career path with high publication pressure. In Spain, part-time work has been traditionally low and this is also true for the RTDI sector. So women are used to work full-time and this is no hindering factor to work in the rather full-time-oriented RTDI sector. Hungary is the only country were flexible working patterns are not supported although recent developments seem to indicate change. However, in RTDI HES and GOV sectors are special in that sense: Home office is usually available and the opportunity for part-time work is higher in the public than in the private sector. This could make the sector attractive to women with children. But up to now, part-time is neither common nor attractive in the Hungarian labour market and the RTDI sector.

Income equality does not affect the attractiveness of the RTDI sector for women. Austria and Germany are the only EFFORTI countries, where the gender pay gap in RTDI is smaller than in the general labour market. In Germany, the smaller pay gap in RTDI can be explained by the high number of collective agreements in this field. France and Hungary show almost no difference between the RTDI pay gap and the pay gap for the whole labour market. And in Spain, Denmark and Sweden, the gender pay gap in RTDI is higher than in the total economy. In Sweden, it is also visible that in RTDI the gender pay gap increases with age.

Another possible reason that could influence the attractiveness of the RTDI sector for women could be a lower vertical segregation compared to the general labour market. But a high degree of vertical segregation can be observed in all EFFORTI countries – in the general labour market as well as in the RTDI sector. In this respect, the RTDI sector cannot score by more gender equality for women. In Spain,

vertical segregation is even higher in the RTDI sector than in general, which is in sharp contrast to a strong representation of women in the sphere of politics. Also horizontal labour market segregation can be observed in all EFFORTI countries with few differences between the total economy and RTDI.

Comparing gender equality in the labour market and in RTDI, the most pronounced differences can be found regarding working time and gender pay gap. Other relevant aspects like labour market participation of women as well as horizontal and vertical labour market segregation appear to show similar characteristics in most countries both in the economy and in RTDI, with few exceptions.

As no clear pattern arises from the comparison between the EFFORTI countries, the hypothesis that the different forms of labour market participation of women may influence the participation of women in RTDI could not be confirmed. Whereas Denmark, Spain and Hungary have lower shares of women working part time in the whole labour market compared to Austria and Germany, these three countries exhibit higher shares of female researchers. On the opposite, Austria and Germany are marked by a considerably low proportion of women researchers and a culture of long working hours in RTDI. Therefore, a hypothesis was formulated that countries where most of the employed women are working full-time also show higher fractions of women in RTDI which demands a full-time orientation and beyond. But this could not be confirmed as part-time work is also quite common not only in the whole labour market but also in the RTDI sector in Austria. Although there are quite a lot of possibilities to work part time in RTDI in Austria, the share of women remains low – but it has increased gradually between 2005 and 2013. On the other hand, in Germany the part-time orientation in the RTDI sector is considerably lower than in the whole labour market which would confirm our hypothesis. But also the patterns in the group of countries with higher full-time orientation of employed women and higher shares of female researchers are not fully consistent. For instance, the research sector in Spain is characterised by a higher part-time orientation (similar to Austria) than in the other countries in this group (Hungary and Denmark).

A pattern that is consistent between all EFFORTI countries is the difference between the relation of research personnel measured in head counts and full-time equivalent (FTE) in the HES and BES. Whereas in the BES the relation between head counts and FTE is high and is therefore indicating a higher tendency towards full-time employment, the ratio in the HES is quite low – mostly below 50% – which indicates a higher prevalence of part-time employment which might be due to the high numbers of early career researchers working in non-permanent and non-full time positions. The data for the EFFORTI countries but especially for Austria and Germany show that precarious working contracts are quite common in RTDI employment – but it seems that it is more prevalent in the HES than in the BES. Precarious working contracts might be one reason why young female researchers may leave the sector.

Although no consistent patterns can be identified on the basis of the EFFORTI countries, the results offer some hints to how labour market characteristics might influence the participation of women in RDTI.

5.2 Main characteristics of the innovation system and their impact on gender equality in RTDI

In this chapter, specific characteristics of the innovation systems in the different EFFORTI countries are highlighted and analysed regarding their impact on gender equality in RTDI. Only those characteristics (strengths and weaknesses) are included which seem of particular relevance for gender equality.

A main characteristic of the innovation system is the relevance of the constituent sectors. All EFFORTI countries except Spain are more or less dominated by the BES sector. Sweden (67%), Austria (64% and France (61%) have the highest shares of researchers working in the private R&D sector. Compared to that, the share of R&D personnel working in the BES sector in Spain (36%) is very low. Correspondingly, the HES and GOV sectors play a much greater role in Spain than in the other EFFORTI countries. Looking at the development of the sectors regarding employment, the BES sector has grown between 2005 and 2013 in all EFFORTI countries, especially in Hungary and France, least in Sweden. In the same period of time, the HES Sector also increased substantially in Austria, Denmark, Germany and Sweden and to a smaller extent in France and Spain. In Hungary, the HES sector stagnated regarding the number of researchers. The GOV Sector increased in Germany and Austria and to a smaller extent in France and decreased in Denmark (see footnote), Sweden and Hungary.

The different relevance of the sectors has an impact on gender equality in RTDI: The share of female researchers working in the BES sector remains lower compared to the higher education sector in all EFFORTI countries. An important reason for this is that gender equality regulations in RTDI mainly focus on the public sector and there is a lack of laws or regulations for the private sector in all compared countries. Furthermore, in some countries, e.g. Austria, the BES sector consists of many small SMEs which makes awareness rising and advocacy for gender equality more complex. The relevance of the BES for gender equality in RTDI was already reasoned by a report of the European Commission in 2008 (EC 2008). The data for the EFFORTI countries confirms these results: Spain exhibits the highest share of female researchers in RTDI among the EFFORTI countries but has the comparatively smallest BES. On the other hand, the share of female researchers has been declining significantly between 2005 and 2013 in Hungary but the BES has been growing fastest among the EFFORTI countries in the same period. Still, the number of women in RTDI has been growing steadily in RTDI in Hungary but the growth rates of men have exceeded those of women significantly. The growth of the BES sector has led to higher employment opportunities for men in Hungary. This is a further indication that the structure of the innovation system and especially the relevance of the BES have an effect on gender equality in RTDI.

Generally, gender equality is institutionalised differently in the compared innovation systems. In all compared countries except for Hungary, ministries responsible for research and innovation are involved in implementing Gender Equality in RTDI. In Hungary, these ministries do not implement specific gender equality policies but researchers benefit from general gender equality policies introduced by other ministries. Austria, Denmark, France, Germany and Sweden also mention research funding organisations that support national policies on gender equality in RTDI, but to a different extent. In Austria, Germany and Sweden, the funding organisations seem to be more involved in supporting gender equality than in the other countries as they provide financial incentives for organisations applying for research funds to promote gender equality. In Spain, a policy has been implemented since 2011 that requires applicants to specify whether they will consider sex or gender in their research design.

In Sweden, gender equality is generally considered as an intrinsically valid goal which does not have to be legitimised. Gender analysis and active inclusion of gendered aspects of research and innovation activities are common in the RTDI system and gender is taken into consideration in evaluations of RTDI initiatives. Gender budgeting and gender analyses are mandatory from 2017 onwards. There is a focus on excellence and quality in RTDI funding and support systems as well as in instruments for performance measurement. In contrast, the general perception, for instance in Denmark or Germany, is that academia and scientific research are gender-neutral and solely build on meritocracy, which implies that most gender-affirmative actions are seen as discriminatory and stigmatising. This is described as a key challenge for gender equality in RTDI.

5.3 Main issues of evaluation culture and policy in RTDI

5.3.1 Evaluation culture

Evaluation culture development and evaluation capacity building vary greatly across the EFFORTI countries. Germany, Austria, Denmark and Sweden have been termed as leading countries in evaluation as they have built up a well-established culture of evaluation and carry out systematic evaluations of programmes and institutions. The German as well as the Austrian evaluation policies and practices situation are characterised by a large variety of actors and evaluation approaches. All major RTDI programmes are evaluated, primarily by external experts. During the past years, a trend towards standardisation can be observed which was supported by the foundation of evaluation societies in Austria as well as in Germany.

Compared to Sweden, Denmark was somewhat late to adopt evaluation procedures and standards. However, public policy evaluation is nowadays considered an important activity in both countries that takes place throughout the sector and is increasingly institutionalised. Public funding of projects and initiatives often comes with the requirement for evaluation and many public RTDI organisations are regularly evaluated. Furthermore, many evaluation reports are made publicly available, which is, for instance, less frequently the case in France, where the evaluation culture is strongly oriented towards top-down approaches, and reports are often only for internal use. In Spain and Hungary, efforts continue to establish evaluation practices to further develop the existing evaluation culture. The provision of RTDI evaluation reports is particularly limited in both countries.

5.3.2 Types of evaluations

Evaluation traditions and types of evaluations also vary considerably across the EFFORTI countries. In France, there is a historical strong preference for ex-ante evaluations. According to experts, the French evaluation culture particularly suffers from approaches that are insufficiently oriented towards policy learning and/or participatory processes which, at least in part, can be observed in other EFFORTI countries. The Swedish evaluation culture is characterised by a pluralistic approach to public policy evaluation, i.e. the inclusion of various sources of knowledge and stakeholders. In Austria and Germany, interim evaluations for formative purposes dominate and evaluations are commonly used to support learning and RTDI policy making. In Spain, and to some extent also in Hungary, ex-post summative evaluations are more common than formative approaches. While the interest in impacts

and effectiveness continues to rise in all EFFORTI countries, approaches to quantify impacts have received particular attention in Austria and Germany.

Regarding the purpose of evaluations, there are also differences between the countries. In France, the evaluation of programme implementation is more widespread than the evaluation of the impact of public policies, whereas the Danish evaluation culture is characterised by efforts to measure causal mechanisms relating policy initiatives to their effects and impacts. In Sweden, a current tendency is the focus on control-oriented purposes.

5.3.3 Evaluation of gender equality (measures)

Sweden is the only EFFORTI country with a long tradition of monitoring gender equality. In the respective country report, gender is described as a natural dimension of RTDI evaluations. In the other EFFORTI countries, gender equality has only recently received growing attention in RTDI and thus also in RTDI evaluations. In Germany and Denmark, the evaluation of gender aspects in RTDI evaluations or the evaluation of gender equality initiatives are not very common. However, a number of evaluations and to some extent monitoring data can be found.

In Hungary and Spain, there does not exist any practice to consider gender equality in RTDI evaluations or to evaluate gender equality initiatives in RTDI (with the exception of RTDI programmes financed by the EU Structural Funds in Hungary which are evaluated with respect to gender equality). In Spain, however, the design and implementation of gender equality plans have been accompanied by an increased recognition that the evaluation of these plans is arguably the next major barrier for gender equality in RTDI. A total absence of evaluations of gender-related policies in RTDI was also reported for France.

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