Gender Gap in Patent Activities in Europe

Three Indicators discribing the Issue

Statistical Considerations about Patents

- European Patent Office EPO (main task to grant European patents): Annual reports and statistics

- Eurostat: Statistical office of the European Union

- Patent applications have applicants (sectors: Business BES, Higher Education HES, Government GOV, Hospital HOS, Private-non-profit PNP, Individuals IND, Others OTH) and inventors

- Patents are classified in technology fields (IPC)

- Geographical assignment:
    - EPO does statistics on the basis of first-named applicant
    - Eurostat does statistics on the basis of inventors´ residence

(Sources: EPO 2017, Eurostat 2017)

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Key Facts about Patent Activities in Europe

- Patenting is an increasingly important business factor, patents as indicator for innovation activities and success (output indicator)

- Patent activities differ in countries and technology fields (e.g. some countries and technology fields are more prolific than others, traditions of patenting)

- Overall numbers of patent applications (2014, EU-28):
    - Germany 20.7 thousand (36.5% of all countries EU-28)
    - France 9.1 thousand
    - United Kingdom 5.3 thousand

- Applications per million inhabitants per country (2014, EU-28):
    - Sweden 349 per million inhabitants
    - Finland 340 per million inhabitants
    - Germany 256 per million inhabitants

(Source: Eurostat 2017)

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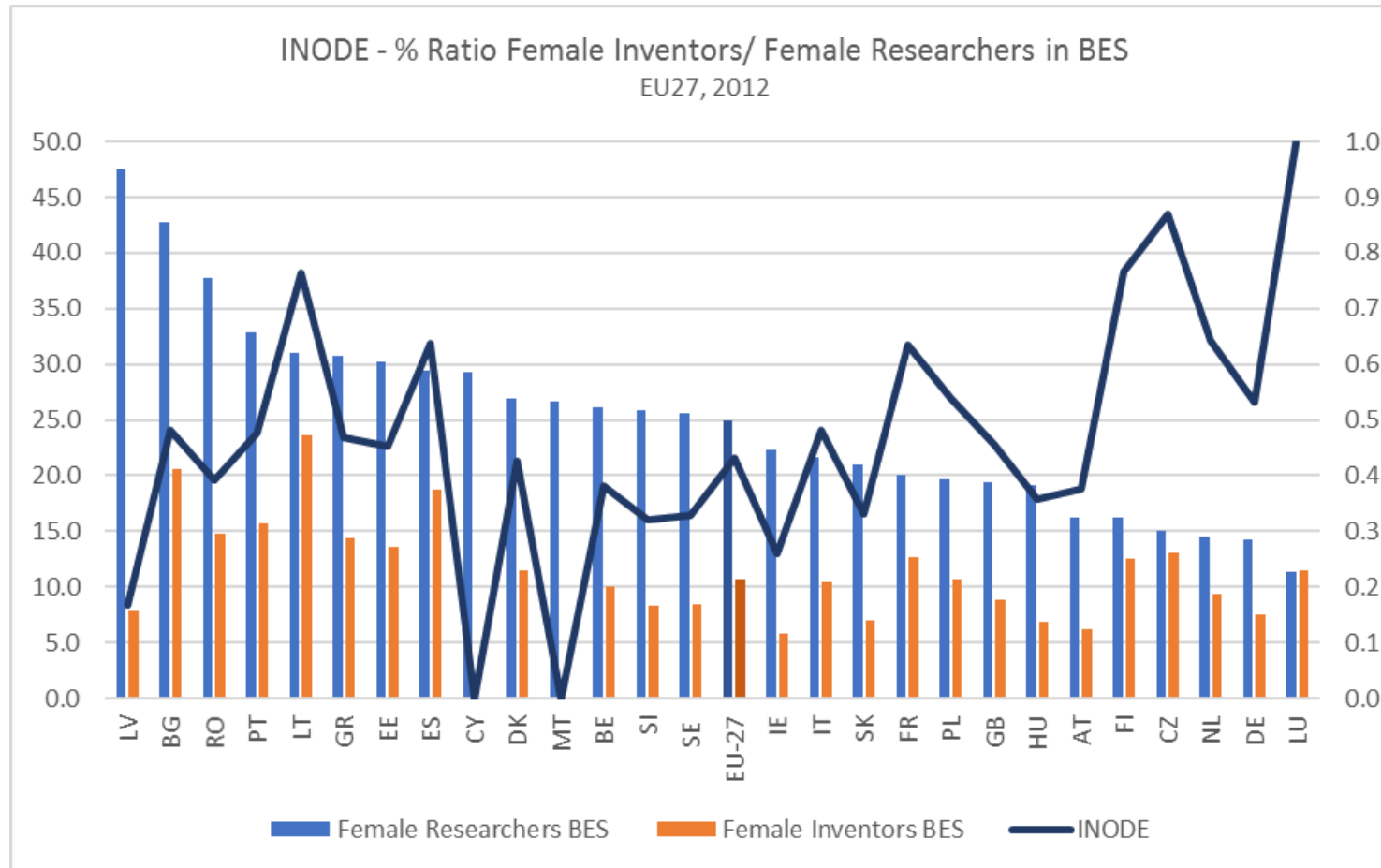
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The Gender Issue

- Gender of inventors is not recorded on the applications and therefore in the original database by EPO

- For building gendered indicators or conducting gendered analyses first of all a gender assignment to the inventors is neccessary (pionieering project on behalf of the EU: Naldi and Parenti 2002)

- Methodology: First name gender assignment

- She Figures 2015: Gendered statistics on patents for the first time (Eurostat)

- Also done so in various projects: Naldi & Parenti 2002; Busolt & Kugele 2009; Frietsch et al 2009; Busolt et al. 2014

- Own analysis on raw patstat data (EPO) on the data 2016

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INODE Indicator

- Output-input-ratio is introduced as **INODE** indicator (**in**venti**o**n gen**de**r gap indicator): relation of female researchers as input and the female inventors as output

- Dividing the percentage of female inventors (Head counts) by percentage of female researchers (Head counts) in Business Sector (BES)

- It shows gap and potential at the same time as inventions are done by researchers in BES generally

- Value of 1.0 indicates no gap at all, close to 1.0 indicates a narrow gap, whereas low values indicate large gaps and a significantly lower harvest of the women´s research and inventive potential

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INODE Indicator

INODE - % Ratio Female Inventors/ Female Researchers in BES
EU27, 2012

Legend: Female Researchers BES, Female Inventors BES, INODE

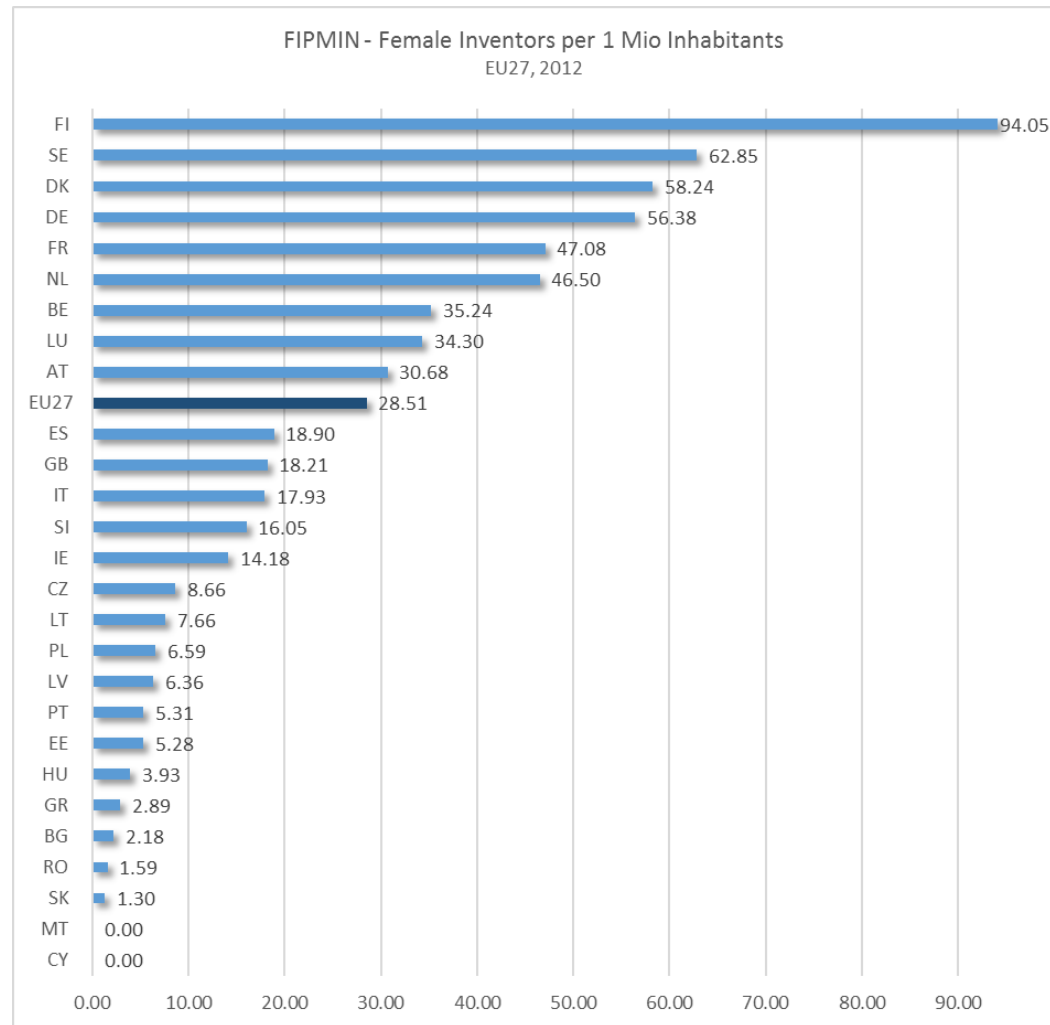STI 2017 Paris *** Gender Gap in Patent Activities in Europe - Three indicators INODE, FIPMIN and WIN discribing the issue

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FIPMIN Indicator

- Traditional indicator: applications per million inhabitants per country

- FIPMIN-indicator (number of **f**emale **i**nventors **p**er **m**illion **in**habitants indicator)

- Built by relating the absolute number of female inventors (Head Count) to the absolute number of inhabitants per country, similar as the established indicator for patents

- FIPMIN-Indicator provides important additional information on gender performance between member states

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FIPMIN Indicator

FIPMIN - Female Inventors per 1 Mio Inhabitants
EU27, 2012

Country	Value
FI	94.05
SE	62.85
DK	58.24
DE	56.38
FR	47.08
NL	46.50
BE	35.24
LU	34.30
AT	30.68
EU27	28.51
ES	18.90
GB	18.21
IT	17.93
SI	16.05
IE	14.18
CZ	8.66
LT	7.66
PL	6.59
LV	6.36
PT	5.31
EE	5.28
HU	3.93
GR	2.89
BG	2.18
RO	1.59
SK	1.30
MT	0.00
CY	0.00

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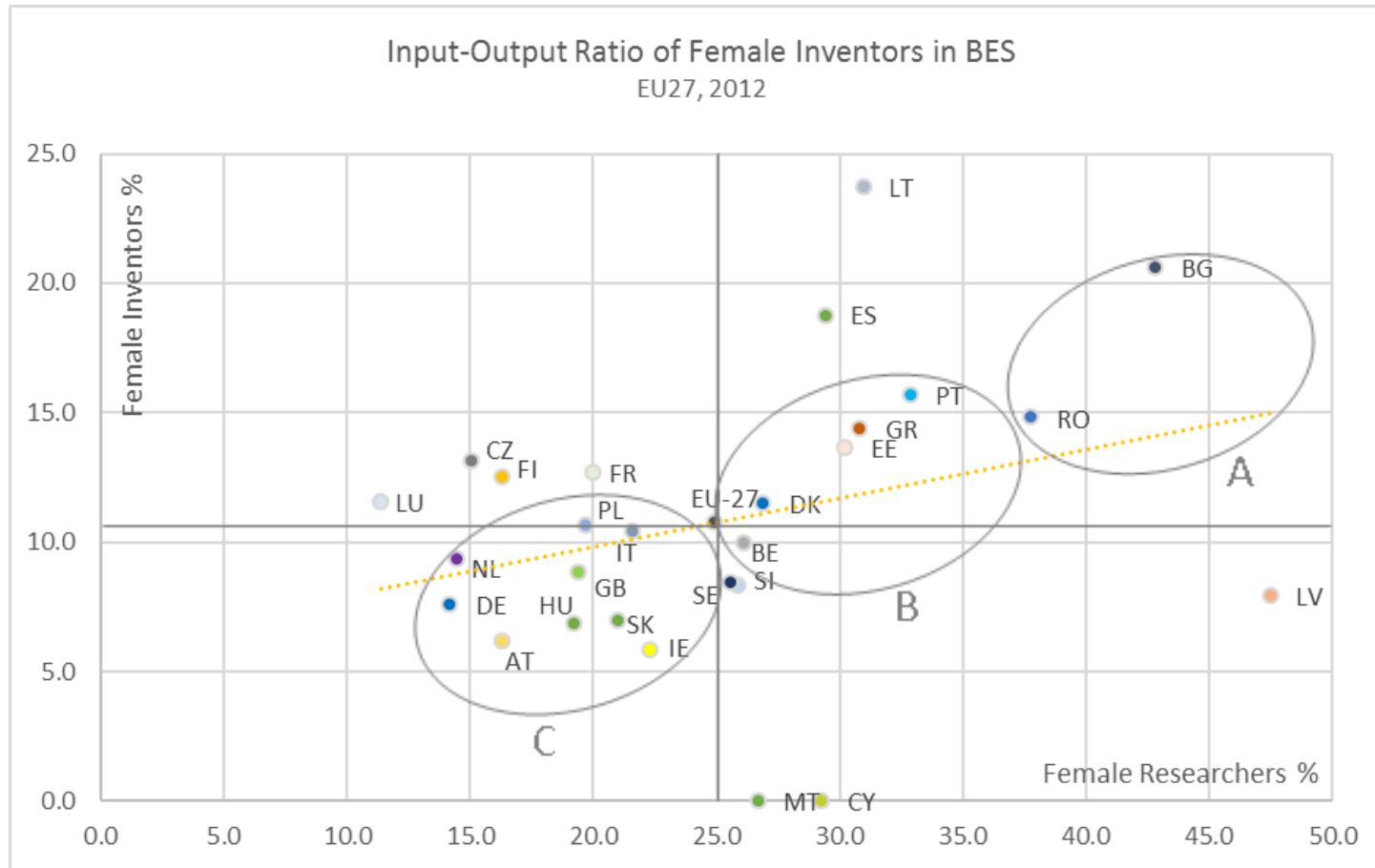
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WIN Indicator

- WIN indicator (**w**omen researchers and **in**ventors indicator) gathers the majority of the European Member States in three groups (A, B and C)

- The A-level group of Member States has the highest percentage of female researchers (Head Count) and the highest percentage of female inventors (Head Count) within the business enterprise sector (BES)

- Group B defines the EU Member States, which show a performance at medium level in both dimensions

- Group C represents EU Member States, which perform definitely below the EU mean values in both dimensions

- WIN indicator marks the performance enhancement

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Input-Output Ratio of Female Inventors in BES
EU27, 2012

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Conclusions

- **Women in science and technology have to play a more important role** in research and the innovation process if Europe strives to be the most innovative region of the world and to maintain a leading role in the global economy, especially in light of the current and upcoming challenges such as demographic changes or progressive digitisation.

- The patent activities in relation to the women workforce in R&D show that there is a **potential of women who could contribute on a higher level** in terms of performance. The proposed indicators INODE indicator (invention gender gap indicator) and FIPMIN-indicator (number of female inventors per million inhabitants) can give a swift **assessment of the use of potential of female researchers** and of the **female inventors** in relation to inhabitants of a country.

- All three indicators are necessary to get a detailed view as there are EU Member States, which perform badly regarding the INODE or the WIN indicator, but show a better performance regarding the FIPMIN indicator. The indicators enable countries to get a better understanding of their (gendered) performance.

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Thank you for your attention.

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