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Advancing women in STEM

A data-driven assessment of the gender gap across Europe's innovation ecosystem

March 2026 | Executive Summary

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Executive Summary

Women account for almost half of Europe's workforce and a growing number of doctoral graduates in science, technology, engineering and mathematics (STEM) – around 37% in the European Union (EU) – highlighting their growing presence in highly skilled and knowledge-intensive roles (EIGE, 2025; SheFigures, 2025). Yet, as shown in the European Patent Office's (EPO) 2022 study on women's participation in inventive activity, only around 13% of inventors named in European patent applications in 2019 within Europe were women, underscoring a persistent gender gap. At a time when Europe is placing R&D talent at the centre of its competitiveness agenda, this topic is especially timely. The European Commission is now shaping its EU Action Plan for Women in Research, Innovation and Start-ups, and this report provides the evidence base needed to turn that ambition into targeted action.

The present study explores this "leaking pipeline" issue, whereby the share of women tends to decline along the pathway from university enrolment in STEM disciplines, through progression to PhD and other STEM doctorates, and further still in the transition to R&D personnel, researchers, and ultimately to patenting. This pattern suggests that women face increasingly pronounced barriers when advancing in STEM-linked and technology-driven careers, and implies that a sizeable pool of innovation potential remains untapped in Europe.

Building on the findings of the first EPO study on women inventors, the present report develops new indicators and offers fresh perspectives on the role of women in Europe's innovation landscape. It tracks long-run trends in women's participation as inventors and extends the analysis to women in the patent profession, who provide essential services within the European patent system and shape how inventive activity is supported and protected. The report also examines the participation of women as founders in technology-based startups, where similar under-representation patterns are observed, suggesting that gender gaps extend across different segments of the innovation chain. In addition, it investigates the leaking pipeline specifically among women PhD graduates in STEM, asking to what extent the technological relevance, field distribution and knowledge-type of research outputs from women scientists can help explain their weaker transition from academia into higher-impact innovative roles.

As part of the work programme of the EPO's Observatory for Patents and Technology, this study aims to provide a comprehensive, evidence-based analysis of women's participation across key segments of the European innovation ecosystem, including deep-dive analyses for individual EPO member states whenever data quality permits. By combining longitudinal patent indicators with PhD, labour market and startup data, it seeks to support policymakers, industrial actors and research organisations in monitoring progress towards greater gender equality and designing more effective, targeted measures to unlock the full innovation potential of Europe.

Outline of key findings:

A. Gender gap in patenting

Patents are a key instrument for protecting and valorising new technologies and are widely used as an indicator of inventive activity. In this context, the contribution of women — not only as inventors but also more broadly to the patent ecosystem, for example as patent examiners and patent attorneys — is an important dimension of Europe's innovation landscape.

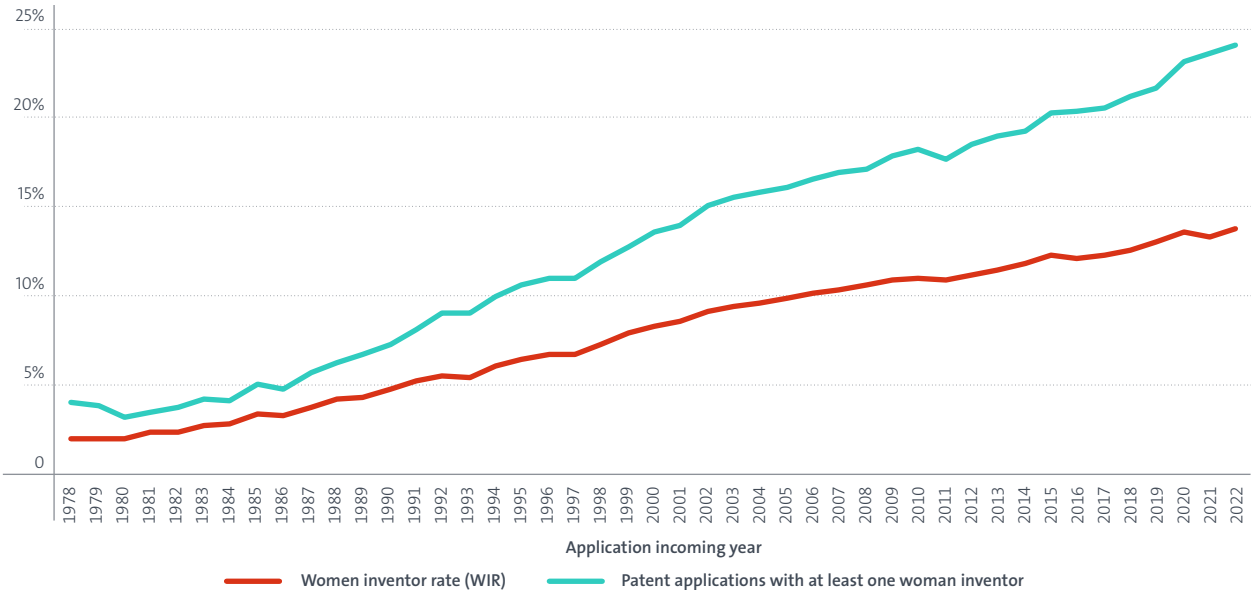
KF1 Women's participation in European inventorship is rising, but the gap remains wide.

Women's participation in patenting at the EPO has increased steadily over the past decades, but at a relatively linear pace. The main indicator, the women inventor rate (WIR) – defined as the share of women inventors out of all inventors listed on European patent applications in a given period – rose from around 2% in the late 1970s to around 13% in 2019, and further to only 13.8% in 2022, indicating that the gap remains substantial over the entire period.

Despite slow overall convergence, some positive trends emerge. A complementary indicator – measuring the share of European patent applications that list at least one woman among the inventors on a given application – shows that women's participation through team-based patenting has expanded more rapidly than their representation as individual inventors. The share of European patent applications naming at least one woman as an inventor increased from less than 4% around 1980 to 21.6% in 2019 and 24.1% in 2022, widening the difference to WIR and pointing to a faster growing role of women in collaborative inventor teams. Moreover, women's participation has risen notably in Food chemistry, Pharmaceuticals, Digital communication, IT methods for management and Computer technology. Small corporate applicants show the fastest WIR growth, while among young star inventors the gender gap nearly disappears. In addition, Europe's most innovative regions exhibit lower gender gaps than national averages, suggesting leading innovation clusters provide more inclusive environments.

Figure E1

Women's participation in patenting at the EPO in EPO countries, 1978–2022



Source: EPO - PATSTAT

KF2 Technology mix and applicant type drive WIR differences across EPO member states, yet significant national patterns persist.

Across EPO member states, the women inventor rate (WIR) increased between 2013–2017 and 2018–2022 in most countries, although the changes are generally moderate. Portugal recorded the highest WIR in the 2018–2022 period at 29.3% among countries with at least 1 000 inventors in that period, followed by Spain (24.1%) and Türkiye (21.2%).

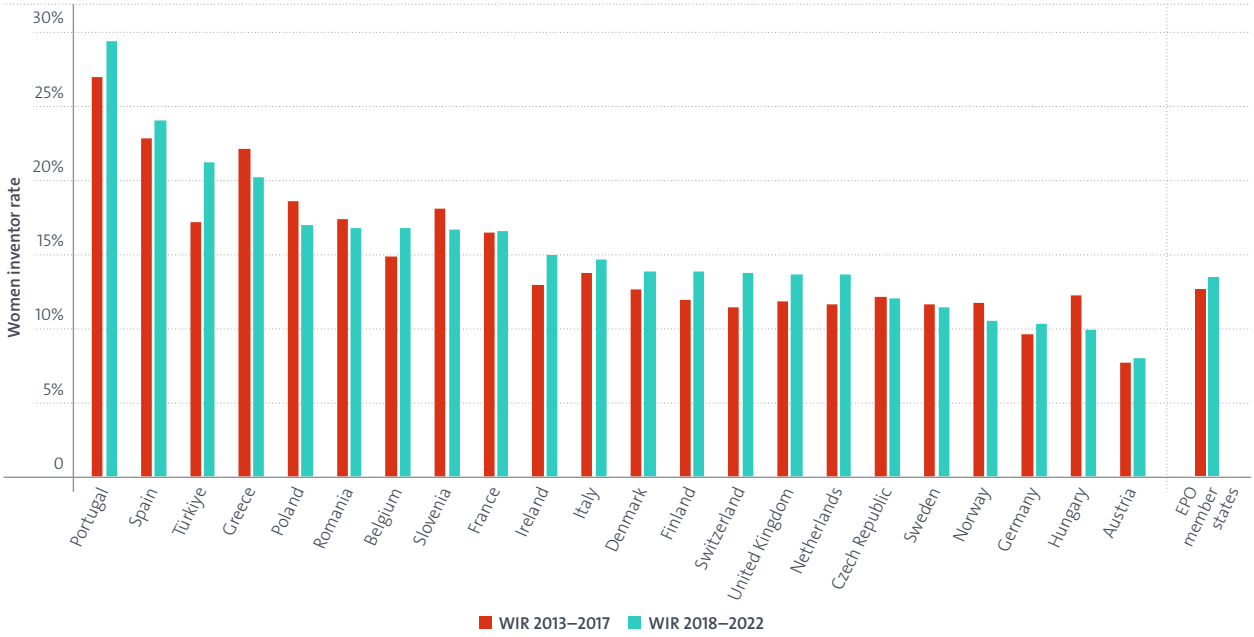
Portugal and Türkiye also showed the largest absolute increases in WIR among the larger jurisdictions, with gains of 2.4 and 4 percentage points, respectively, between the two periods. At the other end of the distribution, Austria had the lowest WIR in 2018–2022 at 8%, despite a small improvement over time. Hungary (-2.3 percentage points), Greece (-1.9 percentage points) and Poland (-1.6 percentage points) recorded the largest absolute decreases in WIR between 2013–2017 and 2018–2022.

Country-level differences in WIR are closely linked to the composition of patenting across technology fields and applicant types. Among the 35 technology fields, pharmaceuticals (34.9%), biotechnology (34.2%) and food chemistry (32.3%) show the highest WIR in 2018–2022, while machine tools (5.7%), basic communication processes (5.5%) and mechanical elements (4.9%) exhibit the lowest values. Across applicant types, universities and public research organisations (PROs) display a WIR of 24.4% in 2018–2022, clearly above business companies (11.6%) and individual inventors (12.5%), which are themselves quite close to each other.

This pattern is largely driven by the strong specialisation of academic institutions in high-WIR technological fields, and may also reflect a relatively higher openness of universities and PROs to women's participation, whether for historical or cultural reasons or due to regulatory frameworks. However, differences in technology specialisation and applicant-type structure do not fully account for the variation in WIR across EPO member states, suggesting that additional country-specific cultural and institutional factors also play a role.

Figure E2

WIR by EPO member state across the periods 2013–2017 and 2018–2022 (priority year)



Note: The Figure includes all EPO member states with at least 1 000 unique inventors in the period 2018–2022.

Source: EPO - PATSTAT

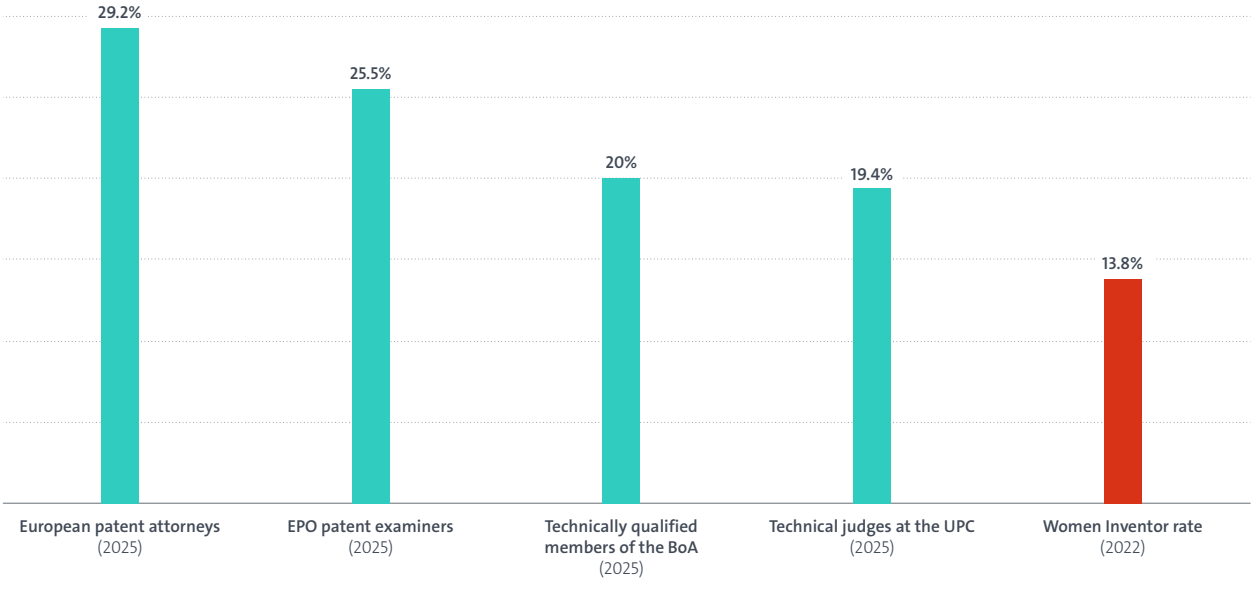
KF3 The gender gap in patent professions is markedly smaller than among European inventors.

Patent professionals form a backbone of the European innovation ecosystem. With regards to the European patent system, this includes professionals in the private sector such as patent attorneys, patent examiners, members of the EPO Boards of Appeal and patent judges who advise on IP and business matters, examine and adjudicate patent applications, facilitate technology commercialisation and resolve disputes. Most of these roles require a technical qualification followed by specialised legal training. Overall, the share of women in patent professions is significantly higher than the WIR in EPO member states, suggesting that women with technical backgrounds show a stronger propensity to pursue careers in a patent profession than to work as inventors in the business sector.

The percentage of female patent examiners at the EPO has increased over time, reaching 25.5% in 2025, with women accounting for over 30% of new hires. Among more than 14 000 European patent attorneys in 2025, 29.2% were women, up from 28.0% in 2015. For late-career, high-requirement positions such as technical judges at the Unified Patent Court (UPC) or technically qualified members of the Boards of Appeal (BoA), the female share is closer to 20%.

Figure E3

Share of women in different patent professions in Europe



Sources: EPO - PATSTAT

B. Women tech founders and patenting

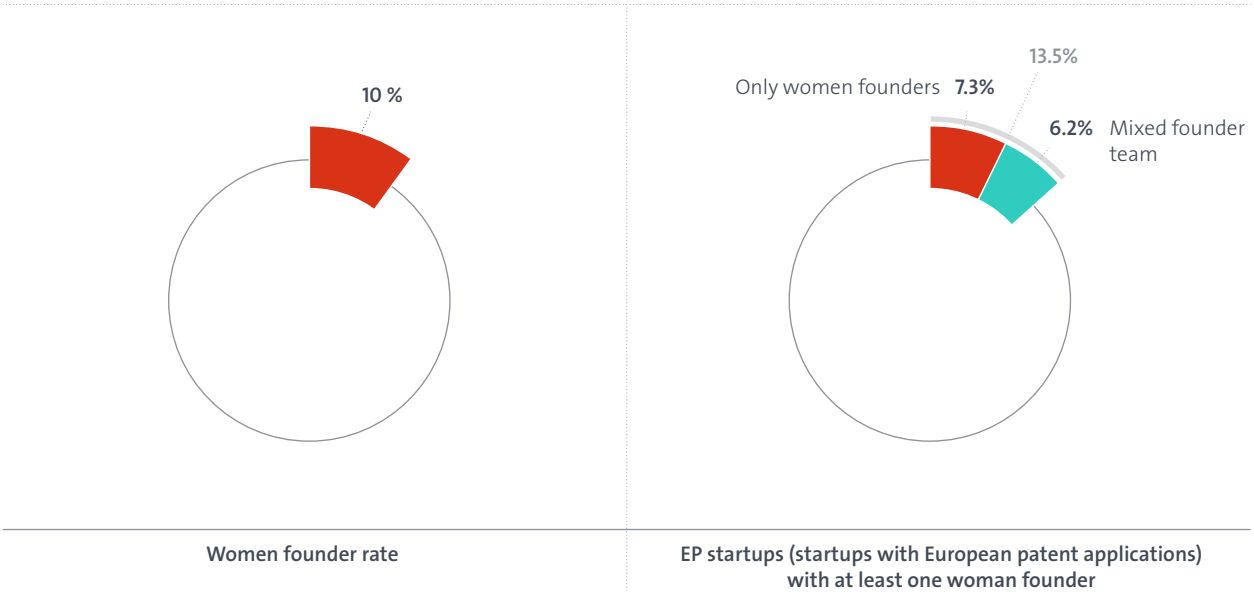
Technology startups are engines of European innovation, driving the development and commercialisation of cutting-edge technologies. Patents play a crucial role in this ecosystem, enabling startups to protect their inventions, attract investment, signal technological credibility to markets and partners and establish competitive advantages as they scale. Against this backdrop, data from Dealroom are utilised to assess the participation of women as founders in over 10 000 such European technology ventures that engage with the European patent system and are featured in EPO's Deep Tech Finder.

KF4 Women represent less than 10% of founders of tech startups with patents in Europe

The share of women among founders of European technology ventures, i.e. startups with European patent applications, is approximately 10%, comparable to the WIR for patent applications from small businesses and individual inventors among EPO member states. These women founders created 13.5% of startups with European patents, with 7.3% founded by all-female teams and 6.2% by mixed-gender teams.

Figure E4

Women's participation as founders in EP startups, 2025



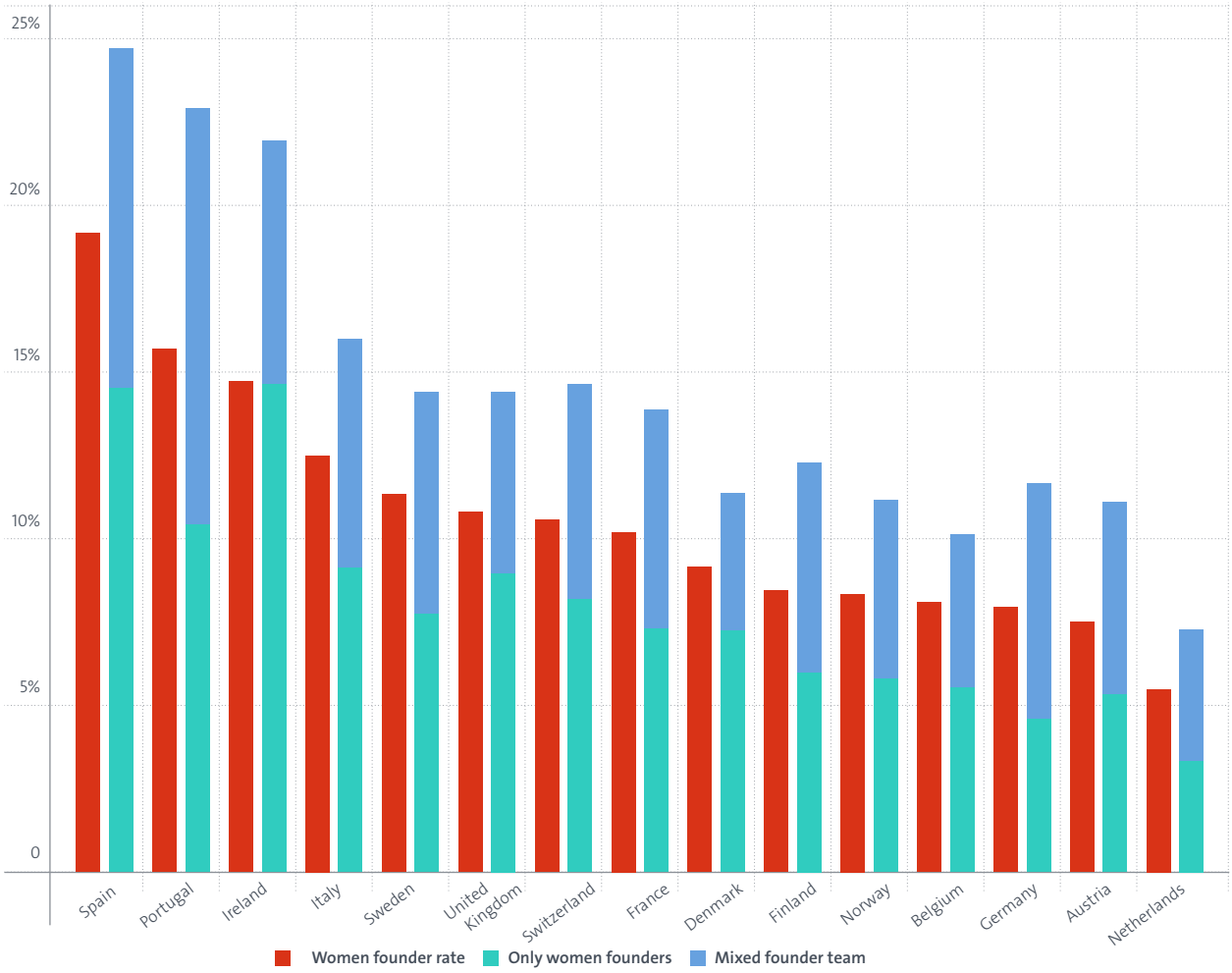
Sources: EPO - Dealroom; Crunchbase; own calculation

Significant variation exists both across countries and sectors. Spain (19.2%) and Portugal (15.7%) show the highest women founder rates, aligned with their elevated WIR, followed by Ireland (14.8%), while, Germany (8.0%), Austria (7.5%) and the Netherlands (5.5%) record the lowest. By sector, women founders are most active in Chemicals (15.6%), Agrifood (14.8%) and Health Tech (14.0%), but markedly under-represented in Transportation (5.9%), Robotics (5.5%) and Consumer Electronics (4.4%).

As with the WIR, industry specialisation patterns alone do not fully explain cross-country differences, suggesting that country-specific institutional and regulatory factors also shape women's participation in technology entrepreneurship.

Figure E5

Women's participation as founders in EP ventures (startups with European patent applications) by country of company, 2025



Sources: EPO - Dealroom; Crunchbase; own calculation

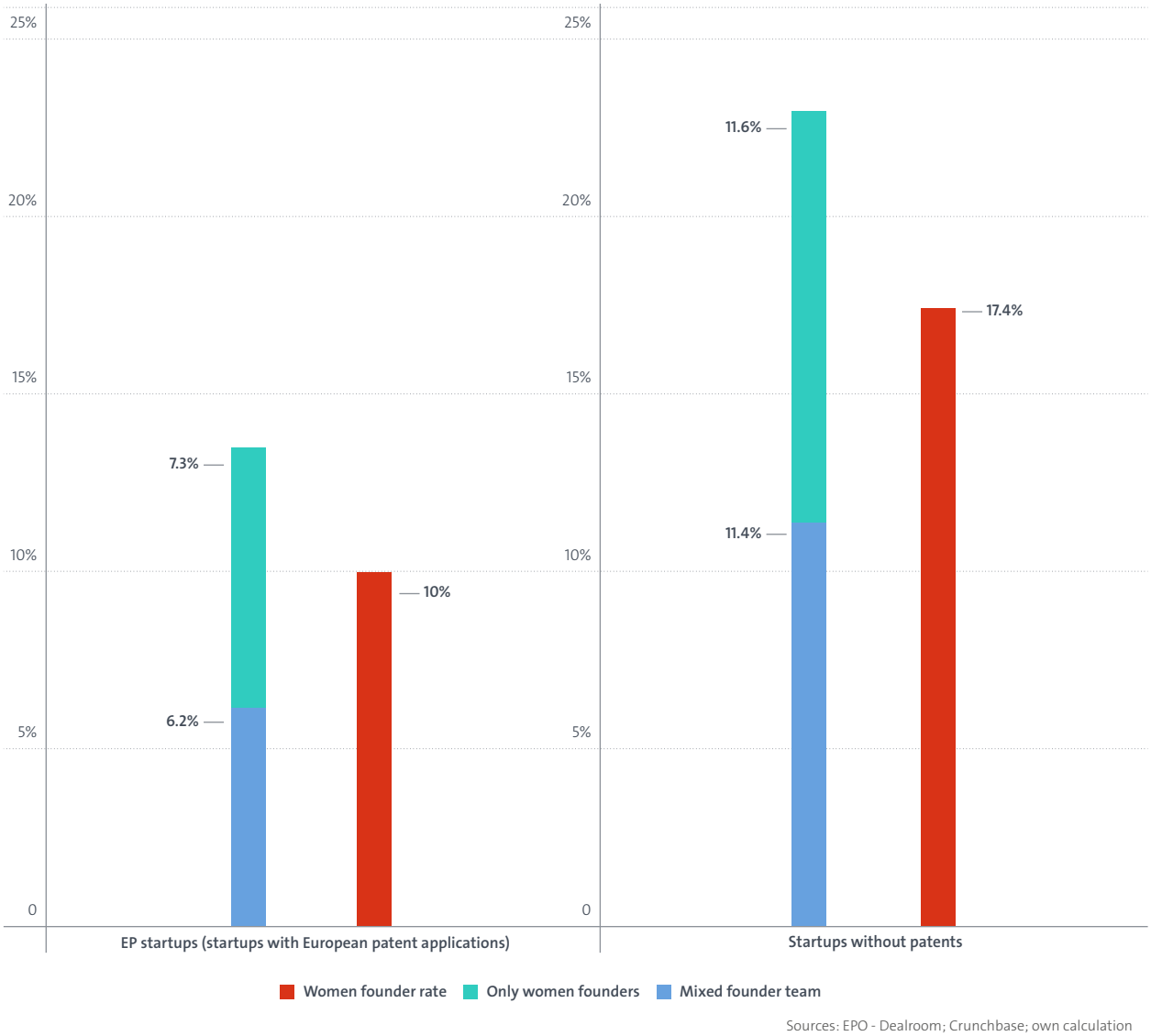
KF5 Patenting startups show a substantially wider gender gap than non-patenting startups

The gender gap is markedly wider among founders of patenting startups than among non-patenting startups with similar industry distributions. Women accounted for 17.4% of founders in non-patenting startups, compared to just 10% in patenting ventures – a gap of over 7 percentage points.

Similarly, the share of founding teams with at least one woman was 9.5 percentage points higher among non-patenting startups than among those relying on patent protection, a difference that remains significant even after controlling for factors such as country, age and growth stage of the company.

Figure E6

Comparison of women's participation as founders in EP startups and non-patenting European startups, 2025



Sources: EPO - Dealroom; Crunchbase; own calculation

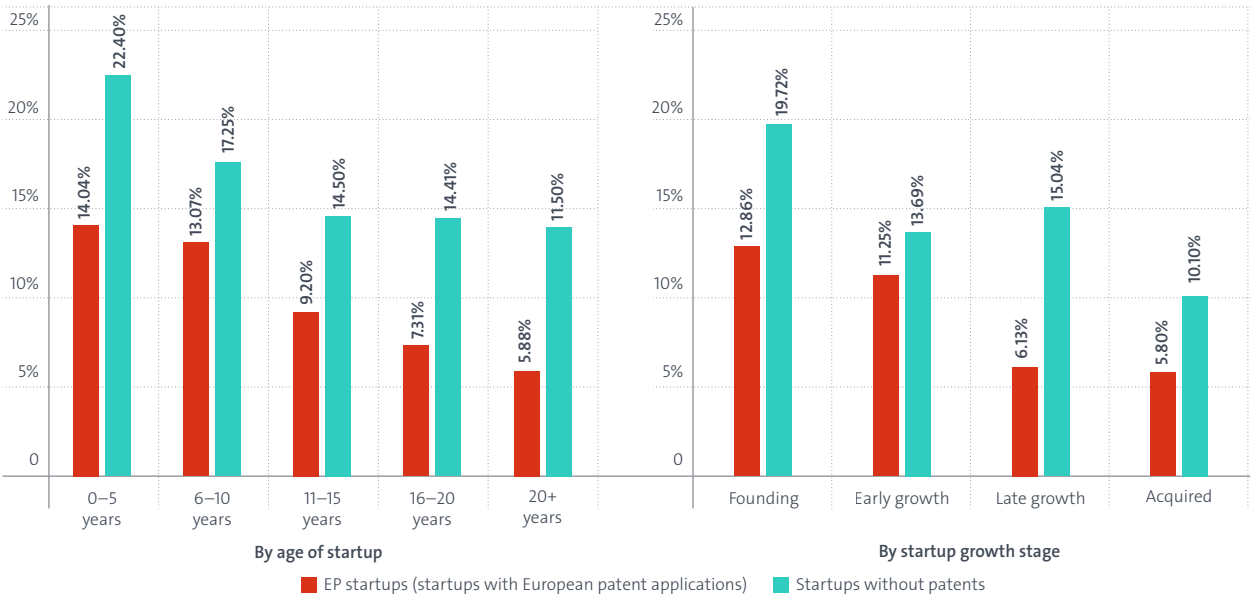
KF6 The gender gap is narrower in new technology startups, but remains high at late growth stages.

The participation of women founders in European patenting startups is higher among younger cohorts: ventures founded fewer than five years ago show a 14% share of women founders, compared with 5.9% among startups older than 20 years. However, the difference to non-patenting startups persists across all company age groups.

At the same time, analysis by growth stage suggests that companies co-founded by women face greater difficulties in scaling: while women-founded patenting startups account for between 11.3% and 12.9% of ventures receiving early funding, their share drops to around 6% among those reaching later growth stages or successful exit. This pattern is consistent with other studies showing that, as companies mature, women and gender-diverse founders become rarer and more severely underfunded. Comparing patenting with non-patenting startups suggests that this problem may be more pronounced for tech ventures, since the largest gap in the share of startups with women founders occurs among late-stage companies, where the difference to non-patenting ventures reaches 8.9 percentage points.

Figure E7

Share of EP startups with at least one woman founder by age and growth stage of the company, 2025



Sources: EPO - Dealroom; Crunchbase; own calculation

C. Women STEM graduates and patenting

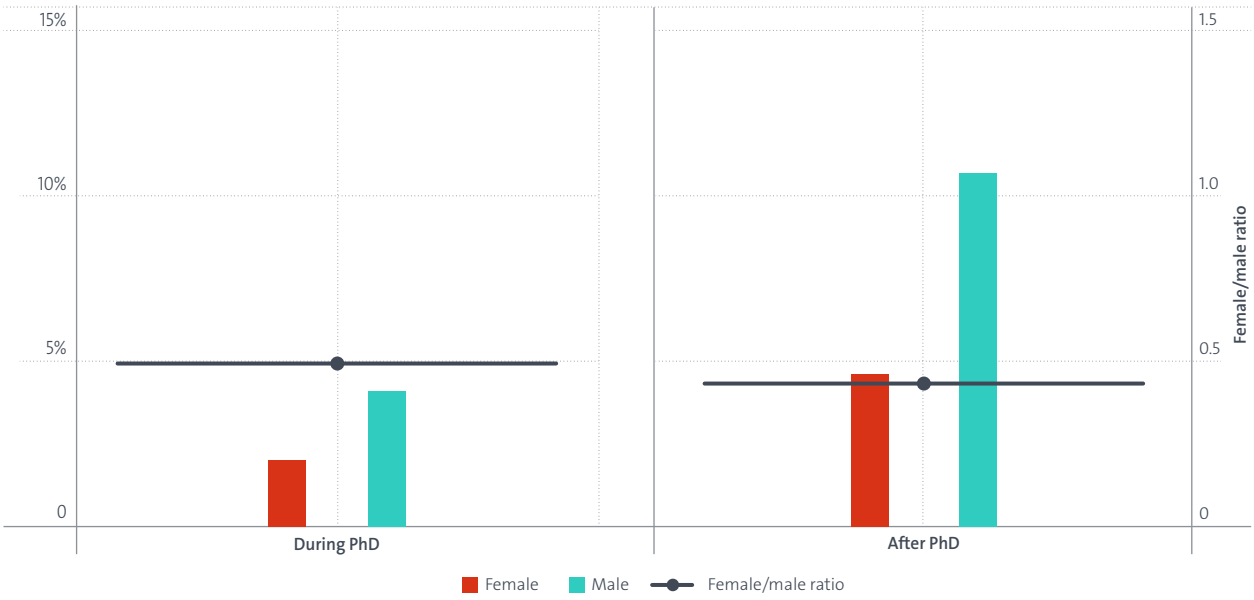
STEM education is not a strict requirement for becoming an inventor, but it is often an important pathway into careers in technology and innovation. Women remain under-represented among undergraduates and doctoral graduates in science and engineering – accounting for around 30% and 37%, respectively, in the EU – although their participation varies across specific STEM disciplines. This raises the question of whether additional attrition occurs between STEM doctoral training and subsequent patenting activity. DOC-TRACK, an international research project funded by the European Patent Office (EPO), links scientific publications with the patenting activity of STEM doctoral graduates from 2000 to 2020 across seven European countries (Austria, France, Germany, Italy, the Netherlands, Spain and the United Kingdom). This dataset makes it possible to analyse how women and men transition from doctoral research into inventive activity, providing crucial insights for understanding gender gaps in innovation.

KF7 Women PhD graduates in STEM are less likely to become inventors than their male counterparts, compounding the lower propensity of women to engage in STEM studies.

The share of women PhD graduates in STEM fields listed as inventors on at least one patent (filed during or after graduation) is roughly half that of men. Women are systematically under-represented among patent-active PhD graduates relative to their share in the doctoral population across all STEM disciplines. The ratio of shares of women inventors to men inventors slightly declines from 0.49 to 0.43 when comparing pre- and post-graduation patent filings at the EPO. Overall, these findings establish that the lower representation of women among patent inventors is already visible at the graduation stage, even among women who did engage in STEM curricula, and increases even further over the course of their careers.

Figure E8

Share of graduates with at least one patent filed pre- and post- graduation; 2000–2020



Sources: EPO - DOC-TRACK; PATSTAT

Note: The red and green bars represent, respectively, the shares of female and male graduates with at least one patent filed during (left graph) and after (right graph) their PhD. Their values are reported on the left-hand vertical axis. The black line represents the ratio between the shares of female and male graduates (female/male ratio), as measured on the right-hand vertical axis. If the two shares are equal, the ratio takes the value one; if the share of female graduates is larger than that of male graduates, the female/male ratio takes values larger than one, and vice versa.

KF8 The inventive potential of women's research is comparable to that of men, suggesting other reasons for the gender gap in patenting.

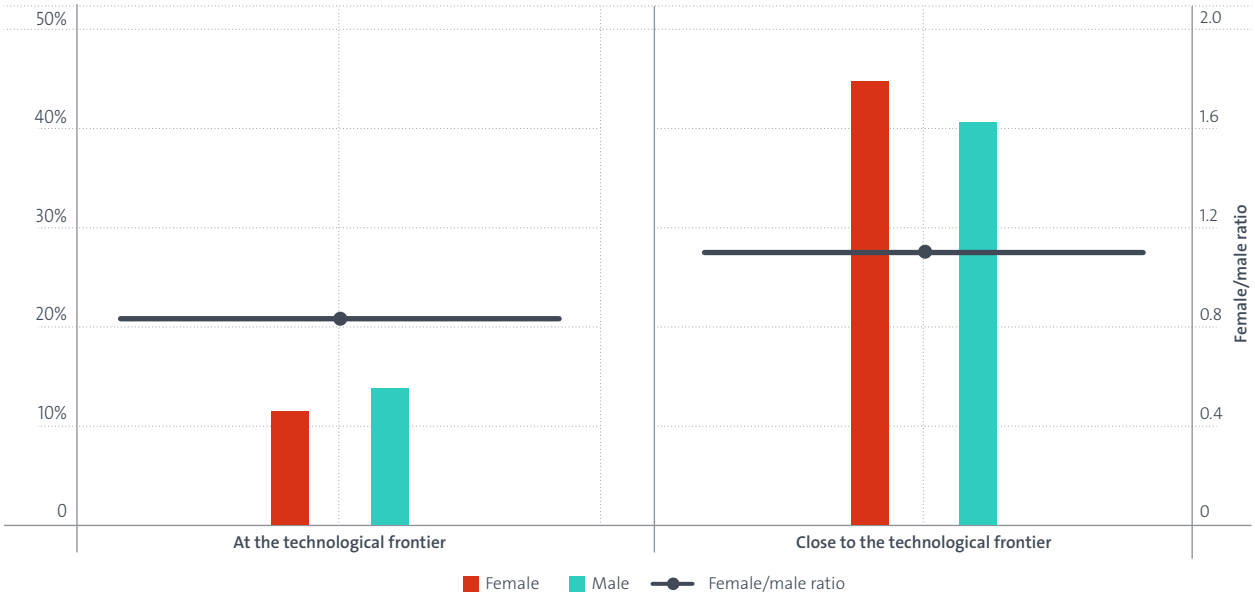
Evidence shows that gender gaps in patenting among STEM PhD graduates cannot be explained by differences in their inventive potential. Using indicators that measure the proximity of PhD graduates' publications to the technological frontier as a proxy for its inventive potential, the analysis reveals a leaking pipeline from doctoral research to patenting that filters out more women than men.

In contrast to patenting, there is no gender imbalance for publications close to the technological frontier, where the ratio of women's to men's shares is around 1.1, and only a moderate imbalance for publications at the technological frontier, where this ratio is about 0.83.

This pattern suggests that lower female participation in patenting is unlikely to be driven by a lack of frontier-relevant research results, and may instead be associated with institutional, cultural, and economic factors shaping women's careers.

Figure E9

Share of graduates with at least one publication at or close to the technological frontier, 2000–2020



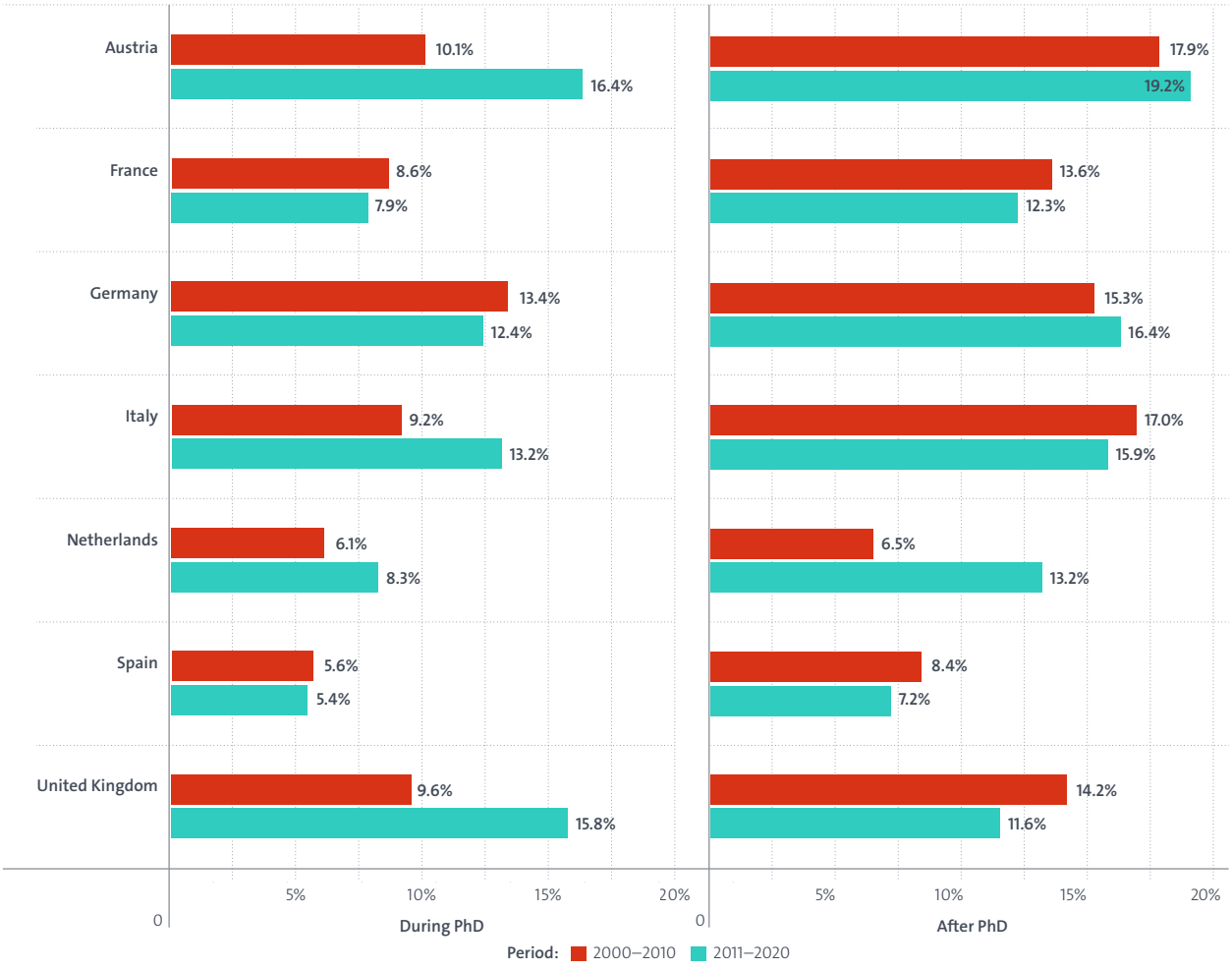
Sources: EPO - DOC-TRACK; PATSTAT

Note: The red and green bars represent, respectively, the shares of female and male graduates with at least one publication at the technological frontier (left graph) and close to the technological frontier (right graph) during their PhD. Their values are reported on the left-hand vertical axis. The black line represents the ratio between the shares of female and male graduates (female/male ratio), as measured on the right-hand vertical axis. If the two shares are equal, the ratio takes the value one.

KF9 Systematic under-representation of women in patenting persists among STEM PhD graduates across all countries, with limited and uneven progress toward parity.

Another way to assess the gender gap in patenting across countries is to compare the share of women among patenting STEM PhD graduates with their share among all STEM PhD graduates. As STEM disciplines differ markedly in patenting intensity and gender composition, regression techniques are used to monitor for these effects.

The analysis shows that women are systematically under-represented among patenting PhD graduates relative to their share in the PhD population in every country, time period and career stage examined. Moreover, comparing PhD-period with post-PhD outcomes confirms that the gap widens over career progression. Progress toward parity has been limited and uneven over the past two decades, with some countries, such as Austria and the Netherlands, experiencing deterioration and others, such as France and Spain, showing improvement. For other countries, developments over time were mixed.



Note: These plots illustrate the gender gap distribution across two dimensions for each of the seven countries: It shows the magnitude of female under-representation in patenting relative to their presence among doctoral STEM program graduates (measured in percentage points): it represents the difference between the share of women among all PhD graduates, averaged across fields, and the predicted share of female inventors among all PhD graduates who hold patents.

Sources: EPO - DOC-TRACK; PATSTAT

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