Progress and Potential:
A profile of women inventors on U.S. patents

Andrew Toole, Chief Economist

Amanda Myers, Acting Deputy Chief Economist

Motivation & objective

- Women comprise a small minority of patent inventors.

- Harnessing untapped inventive talent may spur innovation and drive economic growth.

  - If women, minorities, and low-income children were to invent patented technology at the same rate as white men from high-income households, the **rate of innovation in America would quadruple** (Bell et al. 2017).

- *Progress and Potential: A profile of women inventors on U.S. patents* aims to study U.S. women inventors named on U.S. patents granted 1976-2016.

Methodology

- USPTO collects certain limited information on patent inventors.

- To study women's participation in patenting, it is necessary to classify inventors as men or women based on their names.

- Our report models similar prior studies, but offers two novel contributions:

  - Leverage the origin of an inventor's last name to classify the inventor's gender using his/her first name

  - Focus on the percentage of inventors that are women ("women inventor rate") rather than the share of patents with a female inventor

Share of patents vs. share of inventors

- **Share of patents with a female inventor: The percentage of patents granted in a given year with at least one female on the inventor team.**

- **Women inventor rate: The percentage of all unique inventors granted a patent in a given year that are women.**

50% of patents with at least one female inventor

50% women inventor rate

50% of patents with at least one female inventor
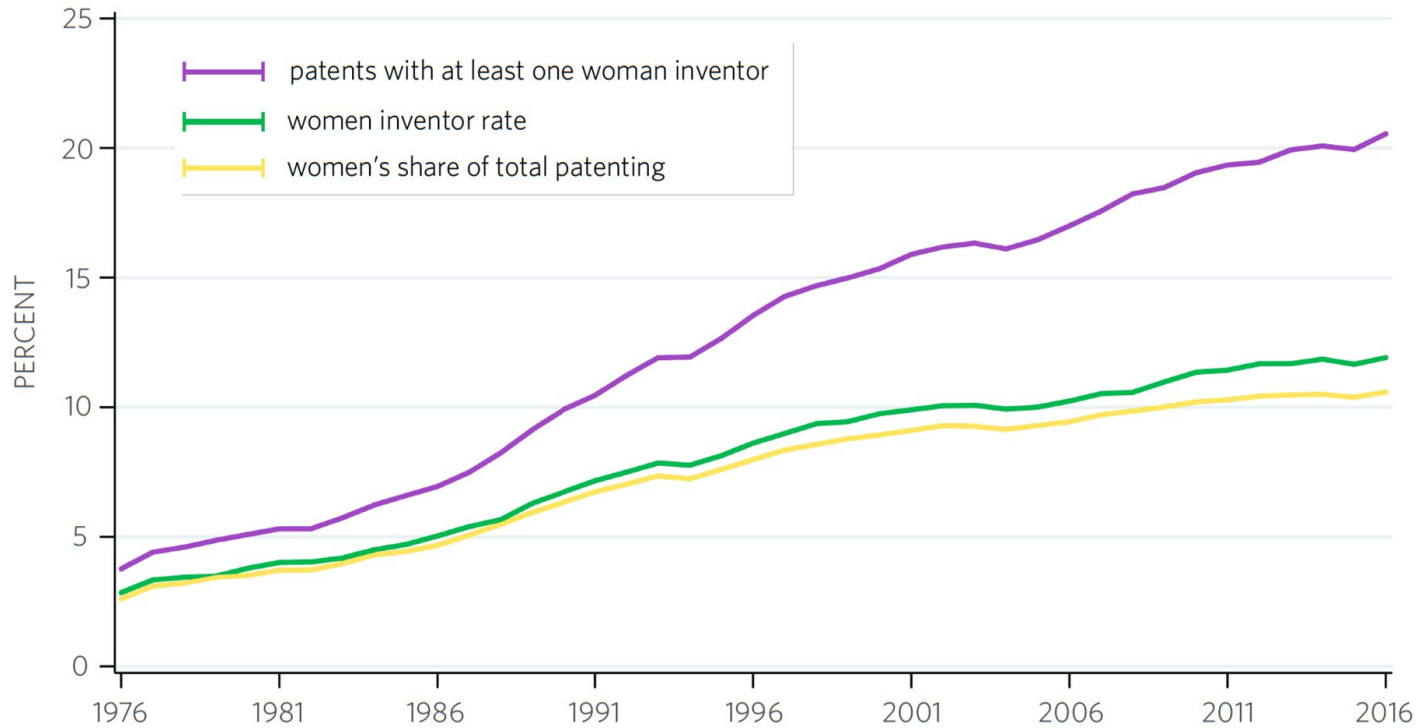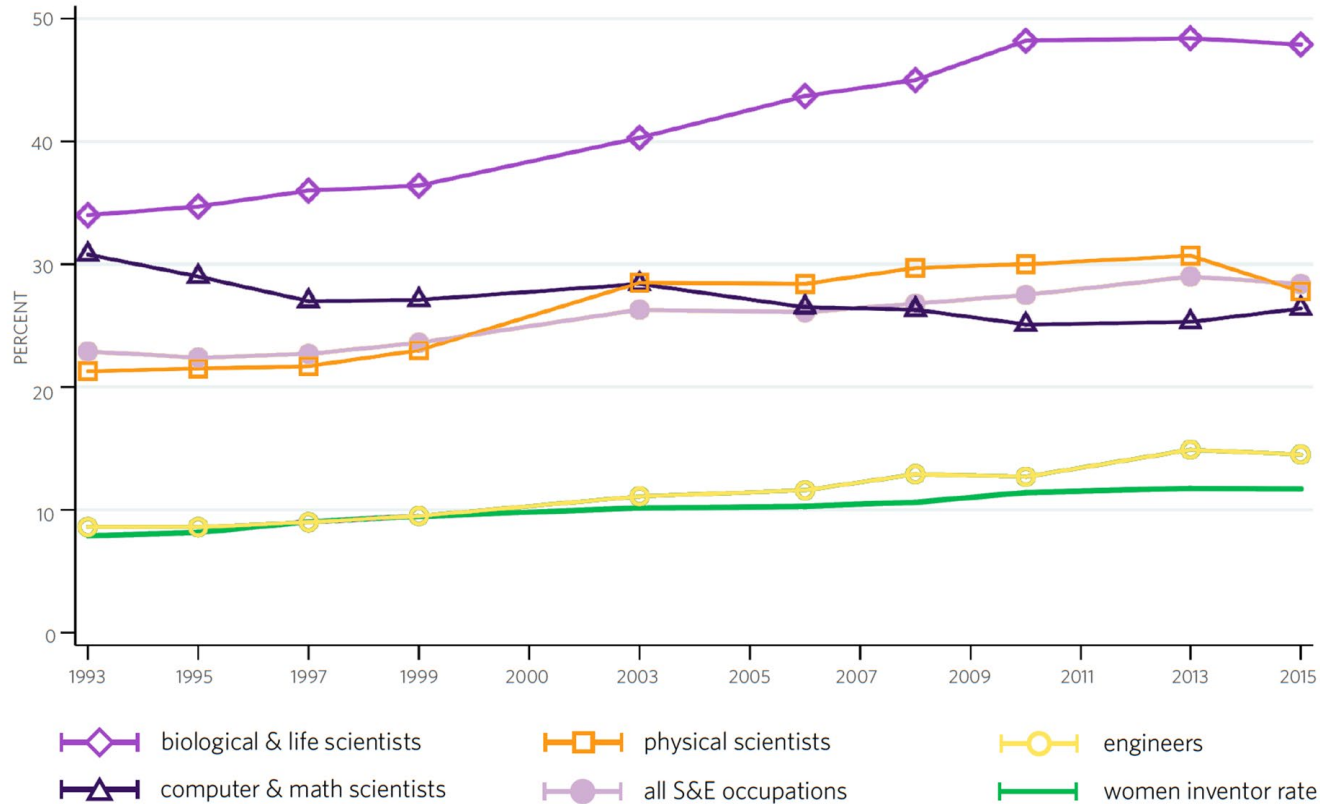
10% women inventor rate

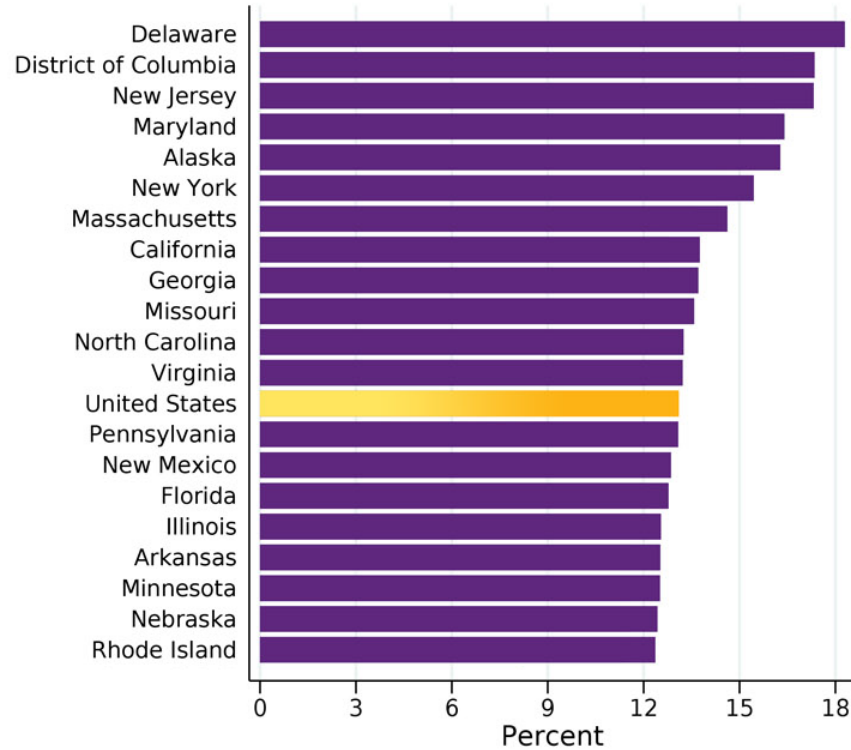# Forty-year trends of women in U.S. patenting

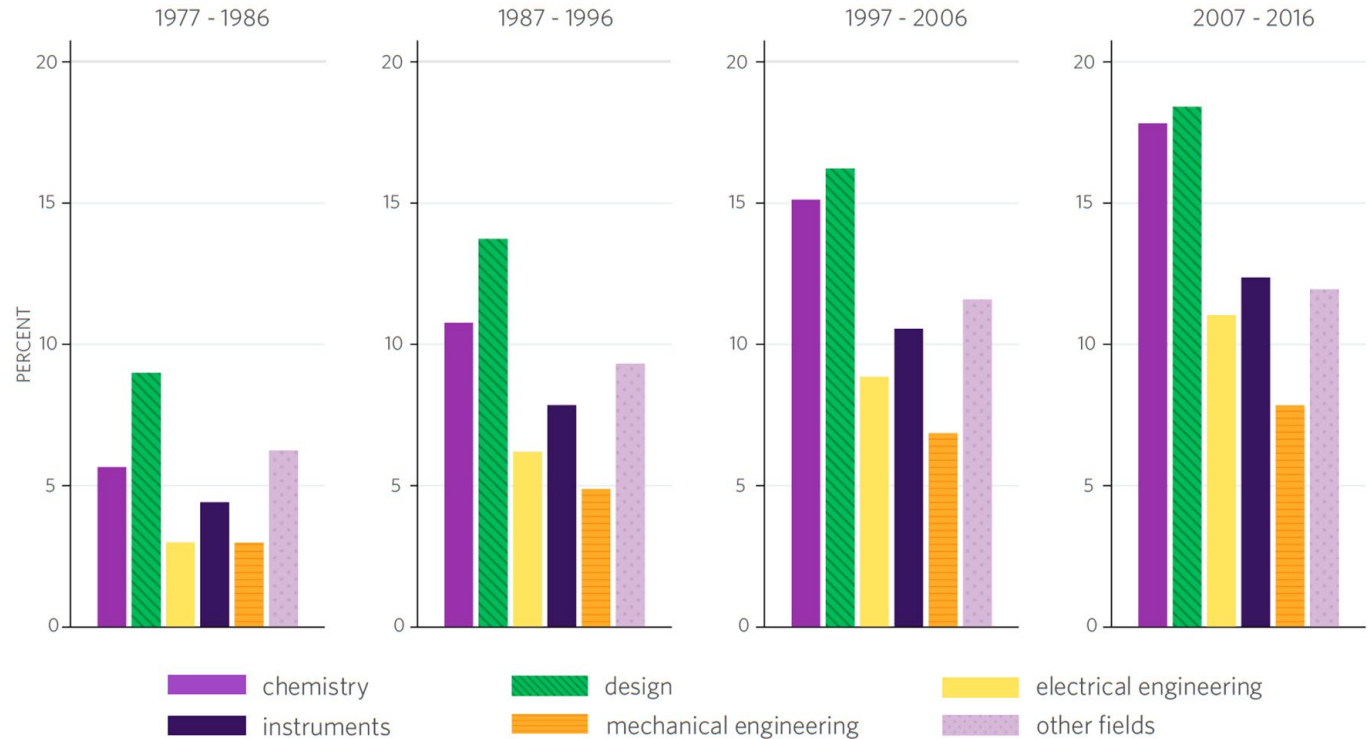# Women patent inventors vs. women in science and engineering occupations

Across nearly all science occupations, women participate at a much higher rate than they invent patented technology.

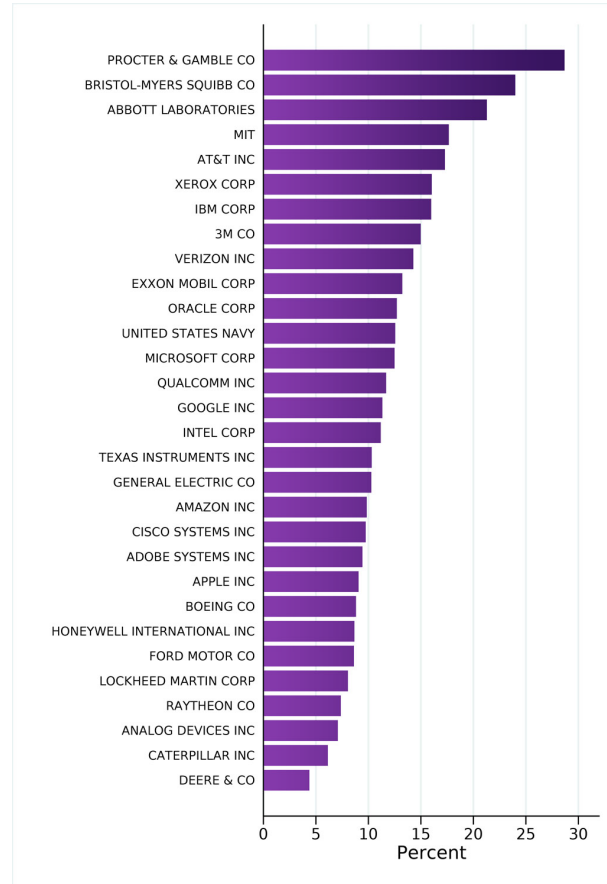# Women inventor rate by state (top 20)

Women inventor rate by technology sector

Women are specializing in technology fields and sectors where female predecessors have patented rather than entering male-dominated fields or firms.
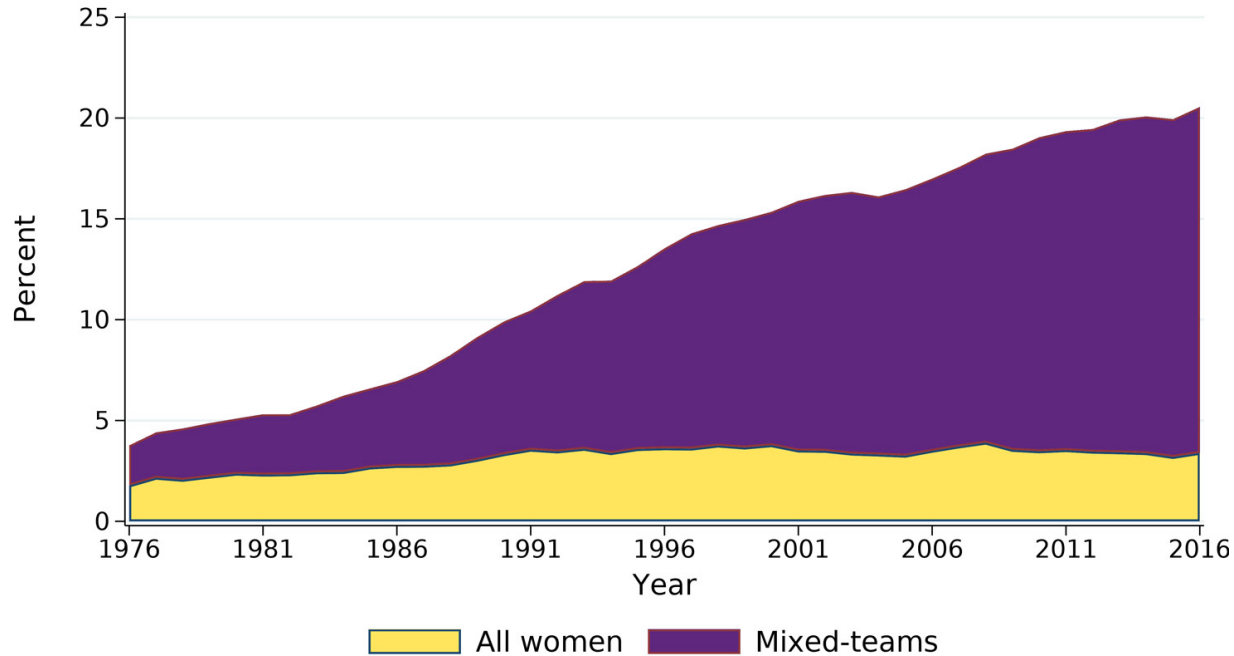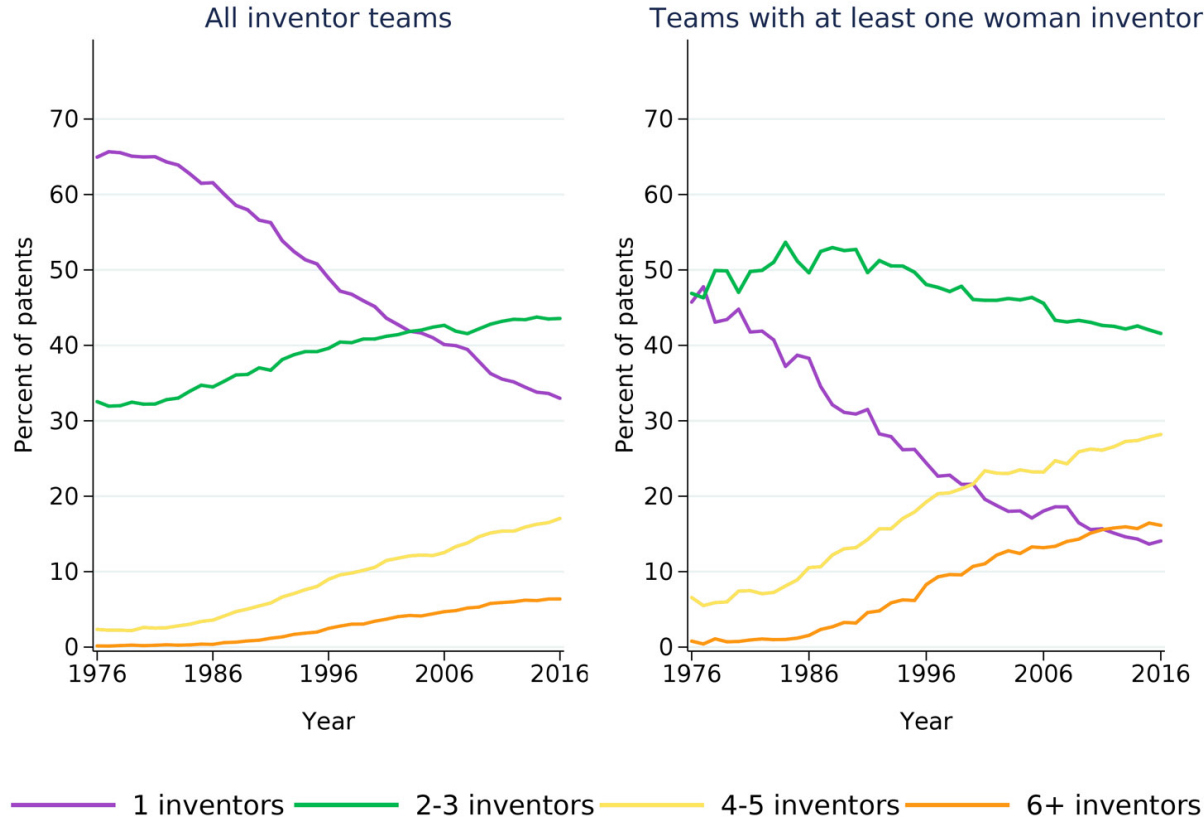
Women inventor rate at certain top patent assignees, 2007-2016

Share of patents with at least one woman inventor by gender composition

Share of patents by inventor team size

Key findings

- Women continue to comprise a small minority of patent inventors, accounting for only 12 percent of all inventors on patents granted in 2016.

- Gains in female participation in science and engineering occupations and entrepreneurship are not leading to broad increases in female patent inventors.

uspto

Key findings

- Technology-intensive states and those where women comprise a large percentage of the state's overall workforce show higher rates of women inventors.

- Women inventors are increasingly concentrated in specific technologies, suggesting that women are specializing in areas where female predecessors have traditionally patented.

Key findings

- Businesses have the lowest women inventor rates among the various categories of U.S. patent owners.

- Women are increasingly likely to patent on large, gender-mixed inventor teams, highlighting the growing importance of understanding the relationship between gender and innovative collaboration.

THANK YOU

ADDITIONAL SLIDES

Classifying inventor gender

- **Two sources of name-gender linked data**

  - IBM Global Name Recognition (GNR) system

  - World Intellectual Property Organization (WIPO) Worldwide Gender-Name Dictionary

- **PatentsView disambiguated inventor names**

  - Discriminative hierarchical co-reference method (Monath et al., 2015)

Classifying inventor gender

- **Gender classifying steps**

  - Step 1: Classify first names with high probability of being male or female in GNR

  - Step 2: Identify country of origin from GNR and match first name-country pair to WIPO Dictionary to classify gender

  - Step 3: Where no country of origin identified, classify gender if first name is identified as always male or female in WIPO Dictionary and in the majority of cases in GNR

  - Step 4: For unclassified inventors with surnames of East Asian origin, classify first name with a lower probability condition of being male or female in GNR

- **Method classifies gender for 96% of inventors residing in the U.S.**