

Summary

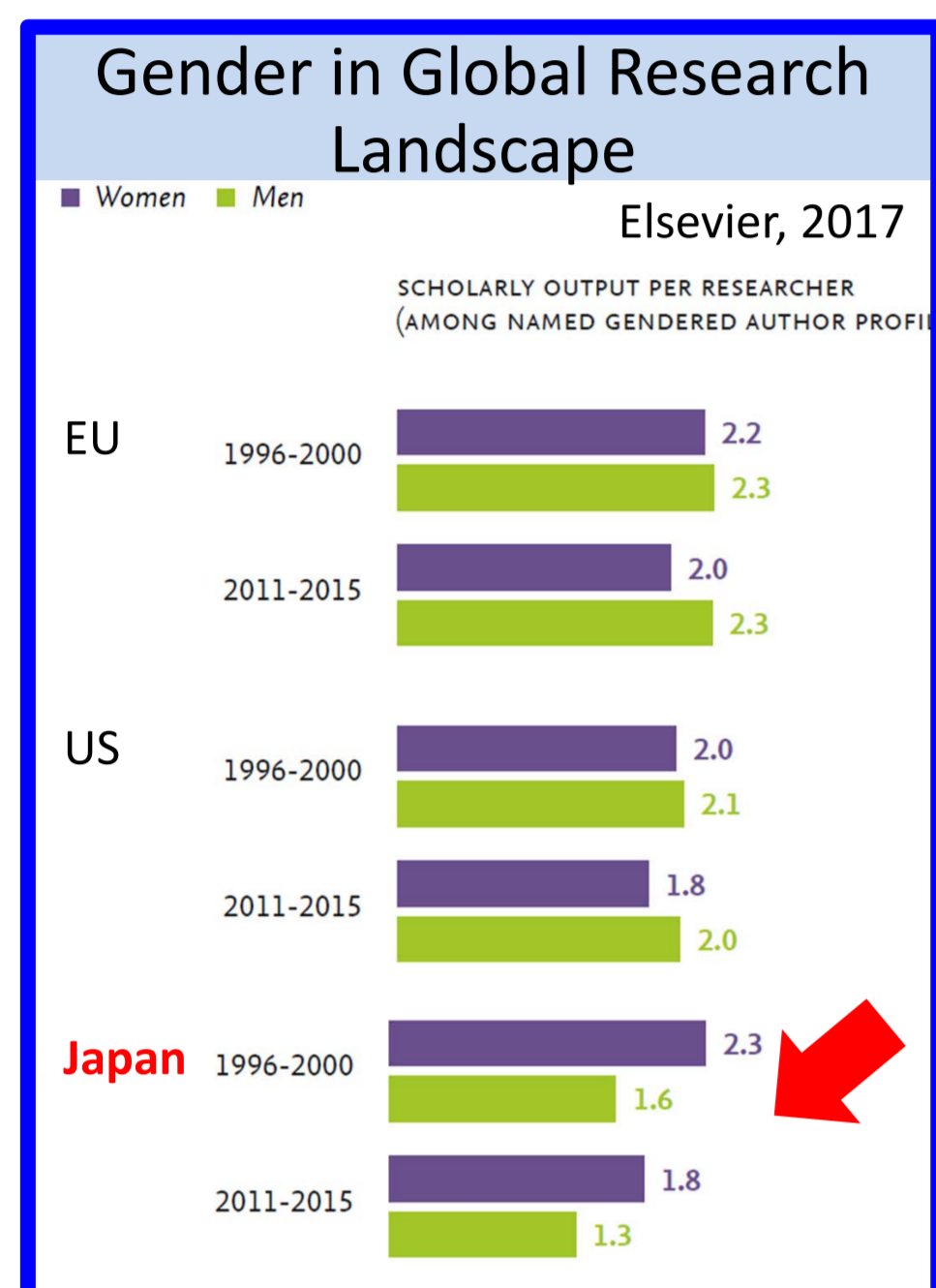
- Japan has had a difficulty in increasing women ratio in STEM, especially in physics.
- Member records in JSAP, the Japan Society of Applied Physics, both men and women in academia and industries, were analyzed.
- Clear indication of severe situation for women in applied physics field especially in early career stage both in academia and industry.
- It is important to support their career during their life-events, and once built-up the career, they will continue their activities after 40s.

Background and Purpose

- Gender in Global Research Landscape, Elsevier [1]
 - Women researchers superior to men researchers in Japan?
 - Only active women researchers can survive in Japan?
- Japanese women researchers have 50% more difficult in promoted to professors than men researchers in STEM [2]

Understand situations and long-term research activities of women researchers in applied physics using member records in JSAP, both of academia and industries.

This study



(1) Entering and leaving JSAP in each age (Figure 1)

- Both men and women entered when they started research in graduate schools at ~24 years old (YO), and left after they started working at ~26YO. (A) (B)
 - For men, the both numbers of entering and leaving decreased by the age. (Solid lines in (C)(D): approximate curves).
 - Women entered more than men until 32YO (solid arrow in (C)).
 - Less women entered than the approximate curves at 34-40YO (dotted arrow in (C)).
- There are periods of time for women to start new research fields (~32YO) and to retain the research fields (34~40s YO).**
- Women left more than men until 34YO (arrow in (D)).
 - Less women left after 40s YO (D).

Women leave the society in early 30s YO: due to their life events (childbirth or childcare), however they stay after 40s compared with men.**

(2) Entering member in each affiliation (Figure 2)

- In academia, both men and women entered when they were students, and not many after that.
- In industries and public research institutes, both men and women entered also after they started working.

Women change their field into applied physics when they start working at industries.

(3) Leaving member in each affiliation (Figure 3)

- In academia,
- both men and women left from JSAP after they started working.
 - women leave more than men in age of 30s (thin arrows)
- In industries and public research institutes,
- both men and women stayed after they started to work.
 - men tend to leave in 30-40s YO (gradual peak at black arrow)
 - women tend to leave early 30s YO (steep peak at white arrow)

In industries, men stop to research by transferred to different work fields and/or by promoted into the management.

Women stop to research for their life events both in academia and industries.

(4) Analysis of entering and leaving members (Figure 4)

- Women did not increase as many as than men in late 20s ~ mid 30s YO (red and blue lines); More women left in their late 20s ~ mid 30s than men.
- > **Difficulties in achieving both building up their career and their private life in Japan.**
- ** **Once women establish the career after 40s -> small number of leaving (Fig. 1, 3).**

Women who stayed in the society increased the scholarly output. -> Active women tend to survive.

Late 20s ~ mid 30s YO: Important to construct their research career. -> Large effects on academic output
Important to support women researchers of the

Severe research environment for women researchers both in academia and industries in Japan.

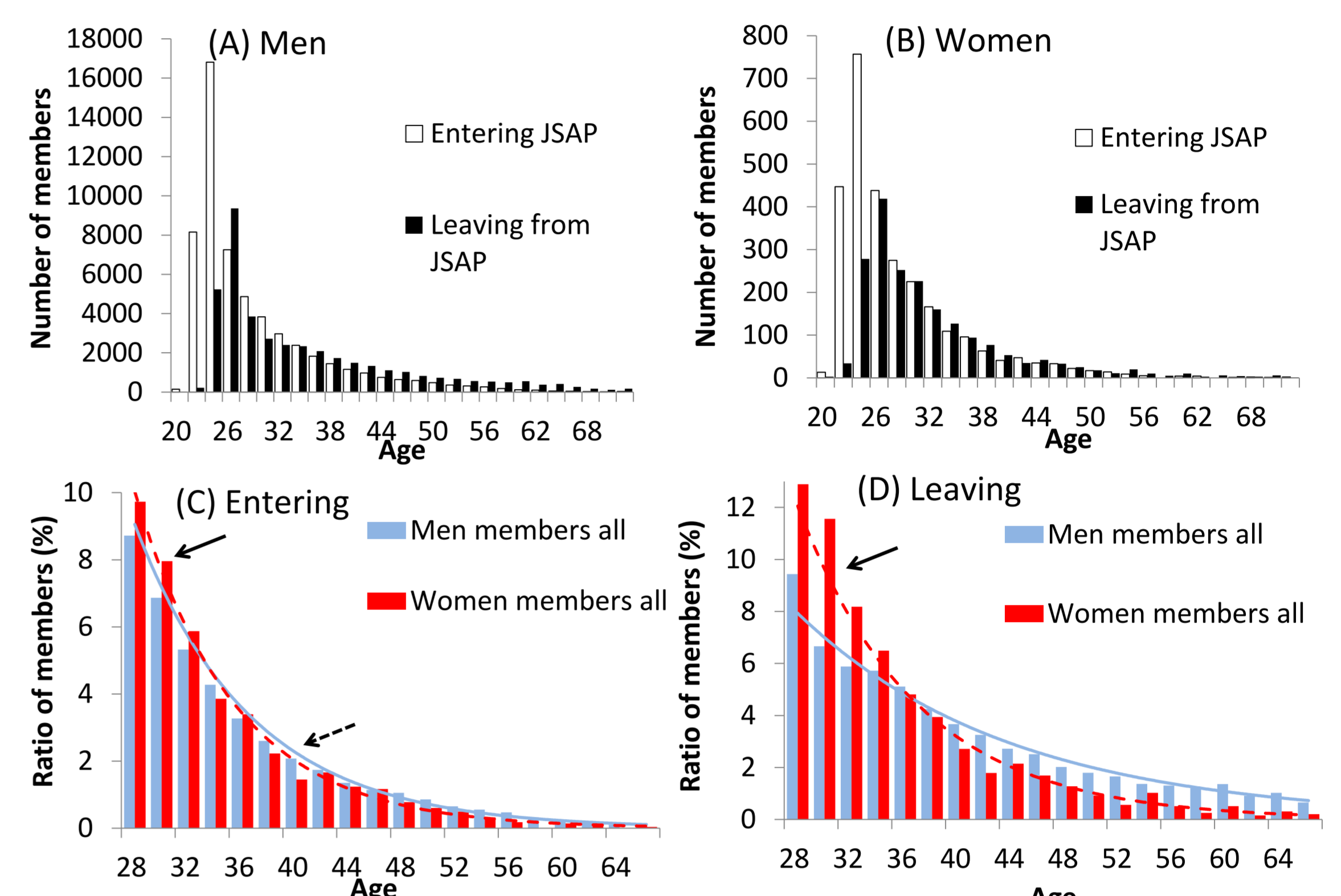


Fig. 1 Numbers of (A) men and (B) women members entering and leaving from JSAP at each age in 1980-2016. Data is rearranged to compare men and women researchers in (C) entering and (D) leaving from JSAP.

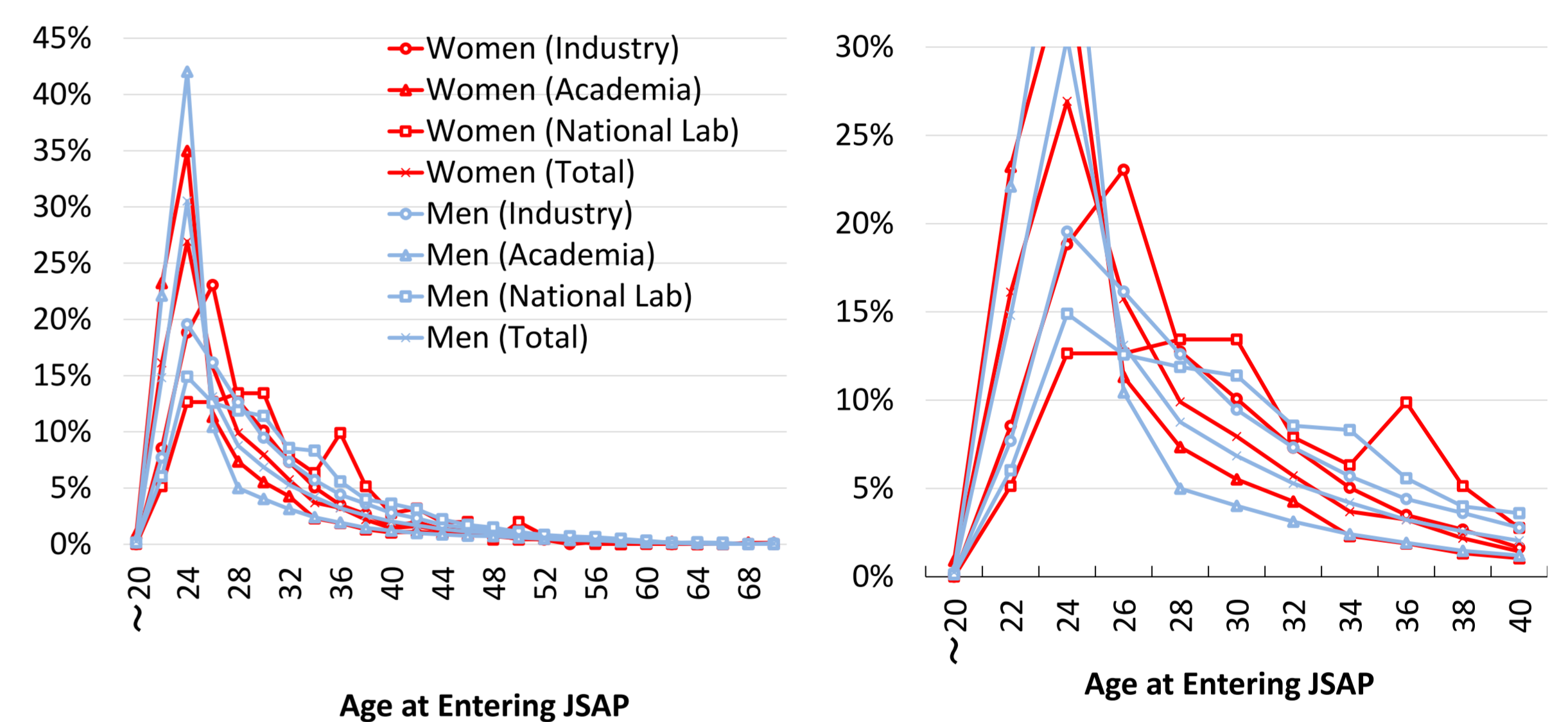


Fig. 2 Histograms of members entering JSAP who belongs to different affiliations at each age in 1980-2016. Right figure is magnified from the left figure. Numbers are standardized using entering numbers of men and women in each affiliation.

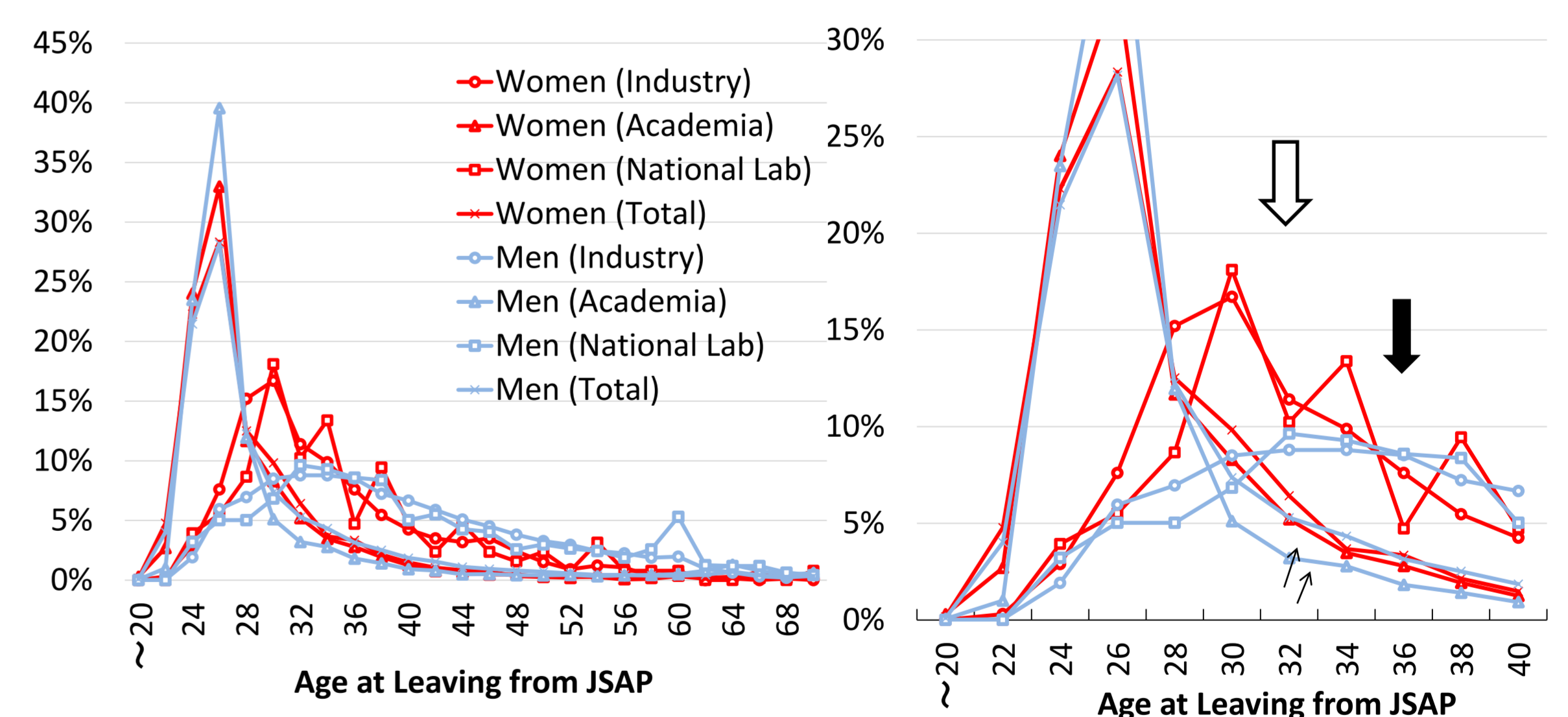


Fig. 3 Histograms of members leaving from JSAP who belongs to different affiliations at each age in 1980-2016. Right figure is magnified from the left figure. Numbers are standardized using leaving numbers of men and women in each affiliation.

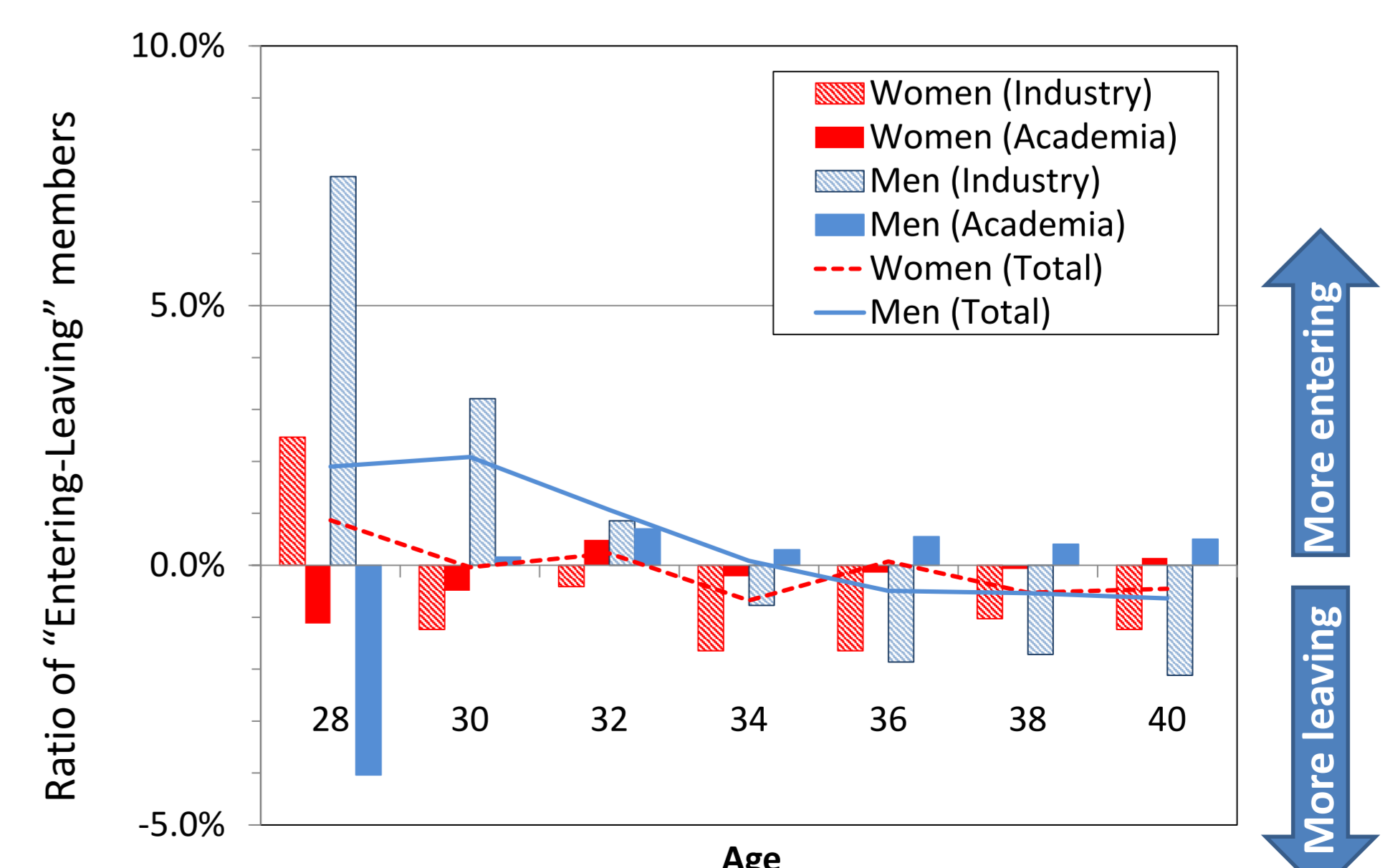


Fig. 4 Ratio of "Entering - Leaving" members in different affiliation at each age in 1980-2016. Numbers are standardized using entering numbers of men and women in each affiliation.

[1] Elsevier, V., Gender in the Global Research Landscape, 2017. https://www.elsevier.com/_data/assets/pdf_file/0008/265661/ElsevierGenderReport_final_for-web.pdf
 [2] A. Fujiwara, A consideration on the series of university reforms and expansion of professor's diversity - Event history analysis on characteristics of researchers and promotion -, 2017. <http://hdl.handle.net/11035/3163>