In youth we learn; in age we understand?

Gender-specific competitiveness over the life cycle

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January 2020
In a nutshell

1. men of all ages perform better against women in the Czech Republic
2. men do not perform better against women in Austria
3. if ability differences are large, women in both countries are more likely than men to
   3.1 lose against strong opponents
   3.2 win against weaker opponents
Existing literature

Gender differences in

- negotiations (Dittrich et al., 2014; Leibbrandt and List, 2015; Card et al., 2016)
- competitive behavior (Gneezy et al., 2003; Gneezy and Rustichini, 2004; Niederle and Vesterlund, 2007; Dreber et al., 2011), except Pikos and Straub (forthcoming)

Heterogeneity over the life cycle?

- some aspects of personality develop during adolescence and are stable over the working life (e.g. Fehr et al., 2013; Cobb-Clark and Schurer, 2012)
- little evidence in gender literature (except Czibor et al., 2019)

  women are more risk averse in traditionally male environments but no significant age effects (15 to 80)

contribution:

less male-dominated environment with one-against-one competition & cross-country comparison
Data
Ninepin Bowling

Data quality
1. mixed-gender leagues at county level → direct competition
2. non-professional sport → “intrinsic” motivation to win
3. panel dimension (2006/07-2018/19) → ability controls

Game features
- 4-6 players per team
- 30 to 50 bowls per lane: higher score → point
- 1 to 4 lanes, 1 to 4 set points → winner receives team point
Baseline estimation

\[ y_{ijk} = \beta_0 + \beta_1 \cdot \text{female}_i + \beta_2 \cdot \text{opp\_gender}_{ij} + \beta_3 \cdot \text{female}_i \cdot \text{opp\_gender}_{ij} + z'_k \gamma + \text{ability'}_{ij} \delta + \epsilon_{ijk} \]

- \( y_{ijk} \): performance measures of player \( i \) against the opponent \( j \) in the environment \( k \)
- \( \text{female}_i, \text{opp\_gender}_{ij}, \) and \( \text{female}_i \cdot \text{opp\_gender}_{ij} \): gender, playing against the opposite gender, and the interaction term
- \( z'_k \gamma \): vector of “environmental” characteristics \( k \) containing dummy variables for pairing, set, and playing at home
- \( \text{ability'}_{ij} \): vector of player \( i \)’s, opponent \( j \)’s and teams’ ability measures
- \( \epsilon_{ijk} \): is the error term clustered at players’ level
Results
## Own and opponent gender

<table>
<thead>
<tr>
<th>own gender</th>
<th>male No.</th>
<th>male %</th>
<th>female No.</th>
<th>female %</th>
<th>Total No.</th>
<th>Total %</th>
</tr>
</thead>
<tbody>
<tr>
<td>male</td>
<td>2,104,786</td>
<td>77.7</td>
<td>98,769</td>
<td>3.6</td>
<td>2,203,555</td>
<td>81.3</td>
</tr>
<tr>
<td>female</td>
<td>98,769</td>
<td>3.6</td>
<td>406,880</td>
<td>15.0</td>
<td>505,649</td>
<td>18.7</td>
</tr>
<tr>
<td>Total</td>
<td>2,203,555</td>
<td>81.3</td>
<td>505,649</td>
<td>18.7</td>
<td>2,709,204</td>
<td>100.0</td>
</tr>
</tbody>
</table>

5,500 unique players per country (one fifth are women)

winning probability for men 51%, for women 46.7%
Distribution of outcomes

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Age distribution of observations

Czech Republic

Austria
## Fixed effects - mixed games sample

<table>
<thead>
<tr>
<th></th>
<th>pins</th>
<th></th>
<th>points</th>
<th></th>
<th>mistakes</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>aut</td>
<td>cz</td>
<td>aut</td>
<td>cz</td>
<td>aut</td>
<td>cz</td>
</tr>
<tr>
<td>opp. gender</td>
<td>-0.005**</td>
<td>0.007***</td>
<td>-0.005*</td>
<td>0.016***</td>
<td>0.001***</td>
<td>0.000</td>
</tr>
<tr>
<td></td>
<td>(0.002)</td>
<td>(0.002)</td>
<td>(0.003)</td>
<td>(0.003)</td>
<td>(0.000)</td>
<td>(0.000)</td>
</tr>
<tr>
<td>female × opp. gender</td>
<td>0.023***</td>
<td>-0.021***</td>
<td>0.004</td>
<td>-0.028***</td>
<td>-0.003***</td>
<td>0.001</td>
</tr>
<tr>
<td></td>
<td>(0.006)</td>
<td>(0.004)</td>
<td>(0.007)</td>
<td>(0.006)</td>
<td>(0.001)</td>
<td>(0.000)</td>
</tr>
<tr>
<td>Observations</td>
<td>257564</td>
<td>249686</td>
<td>257564</td>
<td>249686</td>
<td>64414</td>
<td>249680</td>
</tr>
<tr>
<td>Adj. $R^2$</td>
<td>0.218</td>
<td>0.314</td>
<td>0.105</td>
<td>0.109</td>
<td>0.382</td>
<td>0.433</td>
</tr>
</tbody>
</table>
First stage IV

Results

Men

Women

Probability to play against the opposite gender

% women in opponent team

mean 95% CI

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## Second stage IV estimates for the Czech Republic

<table>
<thead>
<tr>
<th></th>
<th>pins</th>
<th></th>
<th>points</th>
<th></th>
<th>mistakes</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>women</td>
<td>men</td>
<td>women</td>
<td>men</td>
<td>women</td>
<td>men</td>
</tr>
<tr>
<td>opp. gender</td>
<td>-0.042***</td>
<td>0.064***</td>
<td>-0.019**</td>
<td>0.029***</td>
<td>-0.003**</td>
<td>0.002*</td>
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<tr>
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<td>(0.010)</td>
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<td>(0.009)</td>
<td>(0.006)</td>
<td>(0.001)</td>
<td>(0.001)</td>
</tr>
<tr>
<td>Observations</td>
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<td>188168</td>
<td>61518</td>
<td>188168</td>
<td>61518</td>
<td>188162</td>
</tr>
<tr>
<td>Adj. $R^2$</td>
<td>0.344</td>
<td>0.250</td>
<td>0.104</td>
<td>0.091</td>
<td>0.405</td>
<td>0.288</td>
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</table>
Second stage IV estimates for Austria

<table>
<thead>
<tr>
<th>pins</th>
<th>points</th>
<th>mistakes</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>women</td>
<td>men</td>
</tr>
<tr>
<td>opp. gender</td>
<td>0.045***</td>
<td>-0.002</td>
</tr>
<tr>
<td></td>
<td>(0.013)</td>
<td>(0.007)</td>
</tr>
<tr>
<td>Observations</td>
<td>54723</td>
<td>202841</td>
</tr>
<tr>
<td>Adj. $R^2$</td>
<td>0.213</td>
<td>0.171</td>
</tr>
</tbody>
</table>
Age effects

separate regressions for age groups - no significant differences

Czech men perform better at all ages, Austrian men do not

full sample: ability difference to opponent

Do men and women differ in their probability to win depending on the ability difference?

Does this vary over age?

Is the pattern different for both countries?
Age effects for the Czech Republic by ability

Average Marginal Effects of 1.female with 95% CIs

- over 2 s.d. worse
- between 1 & 2 s.d. worse
- between 0.5 & 1 s.d. worse
- between 0.125 & 0.5 s.d. worse
Age effects for the Austria by ability

Average Marginal Effects of 1.female with 95% CIs

Results

Effects on Linear Prediction

ability difference:
- over 2 s.d. worse
- between 1 & 2 s.d. worse
- between 0.5 & 1 s.d. worse
- between 0.125 & 0.5 s.d. worse

Average Marginal Effects of 1.female with 95% CIs

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Conclusion

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In the Future

▶ culture as explanation for country differences?
  ▶ female role changes in the Czech Republic (LFP, childcare)
  ▶ performance under pressure (tight situations)

▶ team effects?
  ▶ team leader’s gender
  ▶ referee’s gender
Bibliography I


Backup
Age effects for the Czech Republic

Czech Republic

Austria

Kernel density

Birth year

Men

Women

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Age effects for the Czech Republic

Panel A (pins): Opposite gender dummy for Czech women

Panel B (pins): Opposite gender dummy for Czech men
Age effects for the Czech Republic II

Panel C (points): Opposite gender dummy for Czech women

Panel D (points): Opposite gender dummy for Czech men

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Age effects for the Czech Republic III

Panel E (mistakes): Opposite gender dummy for Czech women

Panel F (mistakes): Opposite gender dummy for Czech men

Back
Age effects for Austria

Panel A (pins): Opposite gender dummy for Austrian women

Panel B (pins): Opposite gender dummy for Austrian men
Age effects for Austria II

Panel C (points): Opposite gender dummy for Austrian women

Panel D (points): Opposite gender dummy for Austrian men
Age effects for Austria III

Panel E (mistakes): Opposite gender dummy for Austrian women

Panel F (mistakes): Opposite gender dummy for Austrian men

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Age effects for the Czech Republic by ability - pins

Average Marginal Effects of 1.female with 95% CIs

Effects on Linear Prediction

ability difference:
- over 2 s.d. worse
- between 1 & 2 s.d. worse
- between 0.5 & 1 s.d. worse
- between 0.125 & 0.5 s.d. worse

Average Marginal Effects of 1.female with 95% CIs
Age effects for the Austria by ability - pins

Average Marginal Effects of 1.female with 95% CIs

Effects on Linear Prediction

- between 0.125 & 0.5 s.d. worse
- between 0.5 & 1 s.d. worse
- between 1 & 2 s.d. worse
- over 2 s.d. worse

ability difference:

- =ability
- ++
- +++
- ++++
- ++++

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