Wage regulation and the quality of police applicants

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Workshop on workforce quality in the public sector
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Motivation

• Pay rates for public sector workers often set nationally

1. Implies spatial variation in public sector pay differentials relative to private sector outside options
   – Might expect worker quality to be lower where relative pay is lower
   – Existing literature: Borjas (2002); Dal Bo, Finan and Rossi (2013); Hoxby and Leigh (2004); Propper and Van Reenan (2010); Britton and Propper (2016)

2. Implies wages cannot adjust to compensate for spatial variation in the disamenity of working in the public sector
   – Might expect worker quality to be lower where disamenity is higher
   – Existing literature: Rosen (1986); Roback (1982, 1988); Di Tommaso, Strom, Saether (2009)
This paper

- Utilises a unique dataset to analyse the impact of centrally regulated pay on the quality of police applicants in England and Wales
- Contributions:
  - Consider both channels: spatial variation in outside labour market options and spatial variation in the disamenity of policing
  - Novel data (individual test scores from the national assessment taken by applicants to the police) provides direct measure of ‘quality’
Context

- 43 police forces operating at the county or metropolitan level
- Pay scales set at the national level (small adjustment in London)

Average percentile of police in local hourly wage distribution:

Proportion of crime that is violence (with or without) injury:
The police recruitment procedure

Individual applies

- Police force A
  - National Assessment
    - Rejected

Individual applies

- Police force B
  - National Assessment
    - Rejected
The Police SEARCH\(^{(R)}\) Assessment Centre
(Structured Entrance Assessment for Recruiting Constables Holistically)

- Made compulsory across forces in 2004 to introduce a level of consistency in recruitment across England and Wales

<table>
<thead>
<tr>
<th>Competency Areas</th>
<th>Interactive</th>
<th>Written</th>
<th>Psychometric Tests</th>
</tr>
</thead>
<tbody>
<tr>
<td>Community &amp; Customer Focus</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Effective Communication</td>
<td>✓</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Oral Communication</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Written Communication</td>
<td></td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Personal Responsibility</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Problem Solving</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Resilience</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Respect for Race &amp; Diversity</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Teamworking</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>

Table 1: Exercise by Competency Matrix
The police recruitment procedure

Our data
- Submitting force
- Pass/Fail and test scores
- Characteristics (age, sex, ethnicity, prior police experience (e.g. PCSO), other work experience)
Distribution of candidate test scores (2008)

To pass post-Nov 2007: Oral>=50%, Written >=44%, RFD>=50%, Overall>=50%
(To pass pre-Nov 2007: Oral>=60%, Written>=44%, RFD>=60%, Overall>=60%)
Candidate characteristics associated with scores

<table>
<thead>
<tr>
<th></th>
<th>Probability of passing</th>
<th>Overall score (%)</th>
<th>Written score (%)</th>
<th>Oral score (%)</th>
<th>RFD score (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>3.8**</td>
<td>0.930**</td>
<td>1.224**</td>
<td>0.558**</td>
<td>1.045**</td>
</tr>
<tr>
<td>Age squared</td>
<td>-0.1**</td>
<td>-0.014**</td>
<td>-0.019**</td>
<td>-0.009**</td>
<td>-0.016**</td>
</tr>
<tr>
<td>Male</td>
<td>-6.2**</td>
<td>-1.820**</td>
<td>-2.434**</td>
<td>-1.014**</td>
<td>-2.255**</td>
</tr>
<tr>
<td>GCSEs</td>
<td>1.2</td>
<td>0.371*</td>
<td>1.840**</td>
<td>1.082**</td>
<td>0.176</td>
</tr>
<tr>
<td>A levels</td>
<td>9.8**</td>
<td>2.397**</td>
<td>5.933**</td>
<td>1.736**</td>
<td>1.813**</td>
</tr>
<tr>
<td>Graduate</td>
<td>16.8**</td>
<td>4.491**</td>
<td>9.767**</td>
<td>2.381**</td>
<td>3.303**</td>
</tr>
<tr>
<td>Experience: PCSO</td>
<td>13.2**</td>
<td>4.003**</td>
<td>2.685**</td>
<td>2.006**</td>
<td>3.902**</td>
</tr>
<tr>
<td>Experience: SC</td>
<td>9.2**</td>
<td>2.860**</td>
<td>3.120**</td>
<td>1.473**</td>
<td>2.682**</td>
</tr>
<tr>
<td>Mixed white</td>
<td>-3.1*</td>
<td>-0.512*</td>
<td>-3.395**</td>
<td>-0.161**</td>
<td>0.139</td>
</tr>
<tr>
<td>Chinese</td>
<td>-10.3**</td>
<td>-2.433**</td>
<td>-10.194**</td>
<td>-3.974**</td>
<td>-1.614*</td>
</tr>
<tr>
<td>Other</td>
<td>-26.9**</td>
<td>-5.903**</td>
<td>-19.962**</td>
<td>-5.271**</td>
<td>-2.486**</td>
</tr>
<tr>
<td>Missing</td>
<td>-5.3**</td>
<td>-1.126**</td>
<td>-3.939</td>
<td>-0.702**</td>
<td>-1.012**</td>
</tr>
<tr>
<td>Constant</td>
<td>17.6**</td>
<td>42.231**</td>
<td>47.661</td>
<td>86.282**</td>
<td>49.329**</td>
</tr>
</tbody>
</table>

Note: Baseline is 2007, female, <GCSE qualifications, no prior police experience, white ethnicity. Sample size: 41,485. **,* indicates significance at the 1%,5% level.
Methodology for estimating impact of national wages on quality

\[ Q_i = \alpha + \beta \ln (W_r^P / W_r^O) + \rho A_r + X_r \gamma + \tau + \varepsilon_i \]  

1. \( Q_i \) is applicant quality
2. measured using candidate test score at national assessment
Methodology for estimating impact of national wages on quality

\[ Q_i = \alpha + \beta \ln\left(\frac{W^p_r}{W^o_r}\right) + \rho A_r + X_r \gamma + \tau + \varepsilon_i \quad [1] \]

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2. \( W^P_r \) is local police wage; \( W^O_r \) is local ‘outside’ wage
3. \( A_r \) are measures of the local disamenity of policing
   - Crimes per 1000 population, proportion of crime accounted for by: theft, criminal damage, dom. burglary, non-dom burglary, public order offences, drugs, shoplifting, vehicle crime, violence without injury, violence with injury
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- \( X \) are local area characteristics
  - Educational composition of population, unemployment rate, house prices
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- \( X \) are local area characteristics
  - Educational composition of population, unemployment rate, house prices
- \( \tau \) are time dummies
Measuring the relative wage

• What is $\ln(W_r^P / W_r^O)$?

• Assume applicants motivated by how police wages compare to average wages across all employees in their local area.

• Ideally estimate:

$$\ln W_{i,r} = \alpha + X_i \beta + \sum_r \theta_{1,r} F_r + \theta_2 P_i + \sum_r \theta_{3,r} P_i F_r + \eta_i$$  \[2\]

and use estimated $\theta_{3,r}$ for the relative wage $\ln(W_r^P / W_r^O)$ in region r.

• Difficult to find a dataset with sufficient sample size at local level.

• If police wage genuinely national, $\theta_{3,r} = \theta_{1,r}$ and can simply estimate

$$\ln W_{i,r} = \alpha + X_i \beta + \sum_r \theta_{1,r} F_r + \eta_i$$  \[3\]

• and use - $\theta_{1,r}$ for the relative wage in region r.
Measuring the relative wage

  - Pool 2005 to 2010; estimate police forces using local authority areas
  - Sample: all employees aged 20-50
  - Control for: sex, age, education, age*education, ethnicity, time
Headline results (1/2)

- Relationship between applicant quality and relative wage [controlling for area characteristics and time]:
  - 10% increase in relative wage associated with:
    - ~ 0.9 percentage point higher overall score
    - ~ 1.2 percentage point higher probability of passing
    - ~ 2.1 ppt higher written communication score, 1.8 ppt higher respect for race and diversity score, 0.9 ppt lower oral score
Headline results (2/2)

• Relationship between applicant quality and relative wage AND disamenity of policing [controlling for area characteristics, time]:
  – 10% increase in relative wage associated with:
    ~ 1.3 percentage point higher overall score
    ~ 3.1 percentage point higher probability of passing
  – Additional reported crime per 1000 population associated with:
    ~ 3.9 percentage point lower overall score
  – 1% increase in proportion of crime that violence involving injury:
    ~ 1.8 percentage point lower overall score

• For comparability:
  – 1 standard deviation ↑ in rel. wage ~ 1.1 ppt ↑ in overall score
  – 1 standard deviation ↑ in crime rate ~ 0.7 ppt ↓ in overall score
  – 1 standard deviation ↑ in proportion crime that violence with injury
    ~ 1.6 ↓ in overall score
Impact on the composition of applicants

• To what extent does the impact on quality manifest itself through observable characteristics of candidates?

• Controlling for applicant characteristics (age, sex, education, ethnicity):
  – Reduces associations slightly (e.g. impact of 10% increase in relative wages falls from 1.3ppt to 1.0ppt)
  – Suggests most of the impact is coming from unobservable quality

• Association with applicant characteristics:
  – Higher outside wage associated with lower average age of applicants, and smaller proportion who are female or white
  – Higher proportion of crime being violent associated with smaller proportion of applicants who are white or have A-levels or above
Conclusions

- National police pay scales do result in geographical variation in the quality of police applicants
  - Higher relative wage associated with higher quality candidates
  - Greater disamenity of policing is associated with lower quality candidates
- Both effects are important
  - In this case offsetting: effect of higher relative wage partially offsets effect of lower attractiveness of policing in some areas
- Largely manifested through unobservable characteristics
- However, magnitude of effects is relatively small
  - E.g. Relative wage differences imply a 5ppt difference in overall score between Hertfordshire and Dyfed Powys
- There remains the important question of the impact of police officer quality on police force productivity