



Institute for  
Fiscal Studies



## Wage regulation and the quality of police officer recruits

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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); Propper and Britton (2012)
  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)

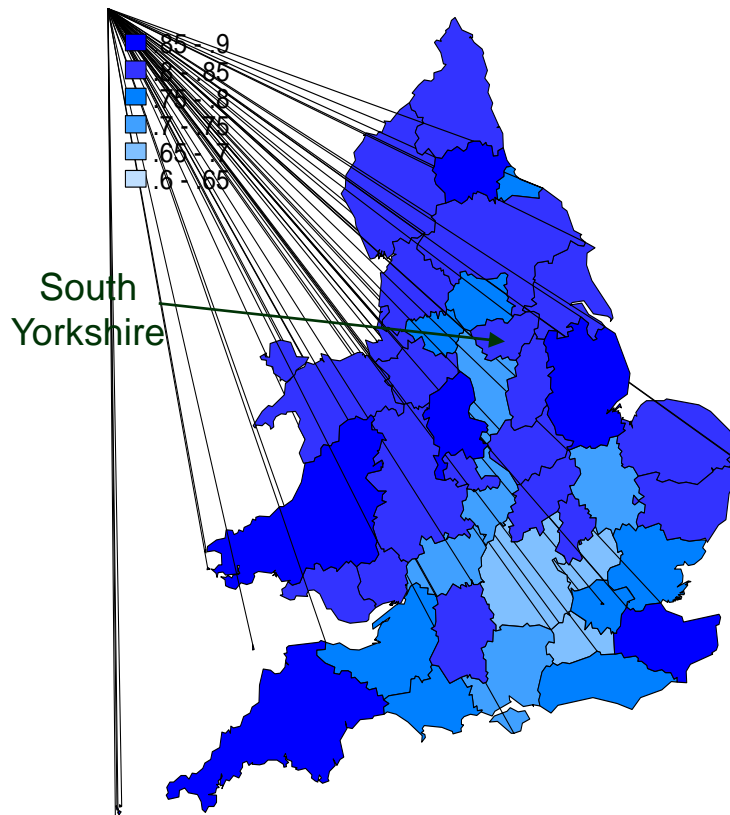
# This paper

- Utilises a unique dataset to analyse the impact of centrally regulated pay on the quality of police recruits 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’

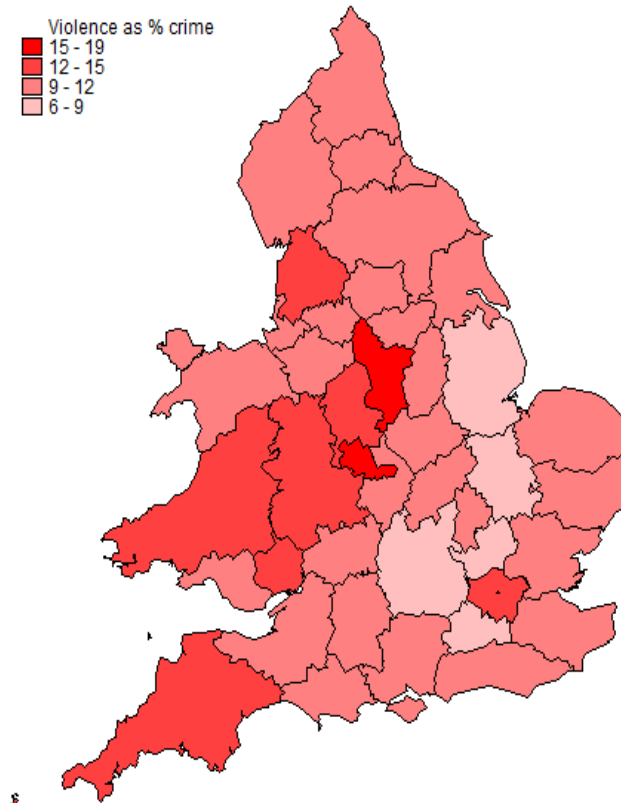
# Context

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

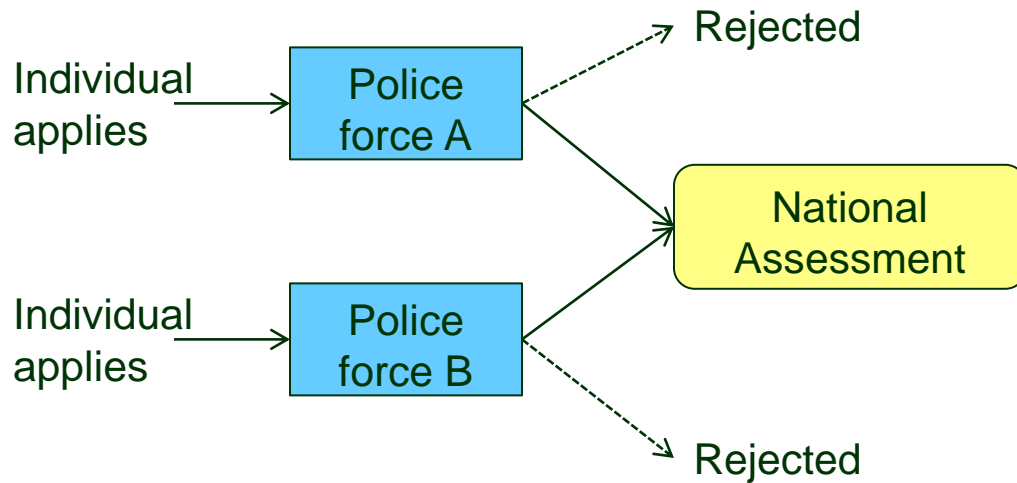
Average percentile of police in local hourly wage distribution:



Proportion of crime that is violence (with or without) injury:



# The police recruitment procedure



# The Police SEARCH<sup>(R)</sup> 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

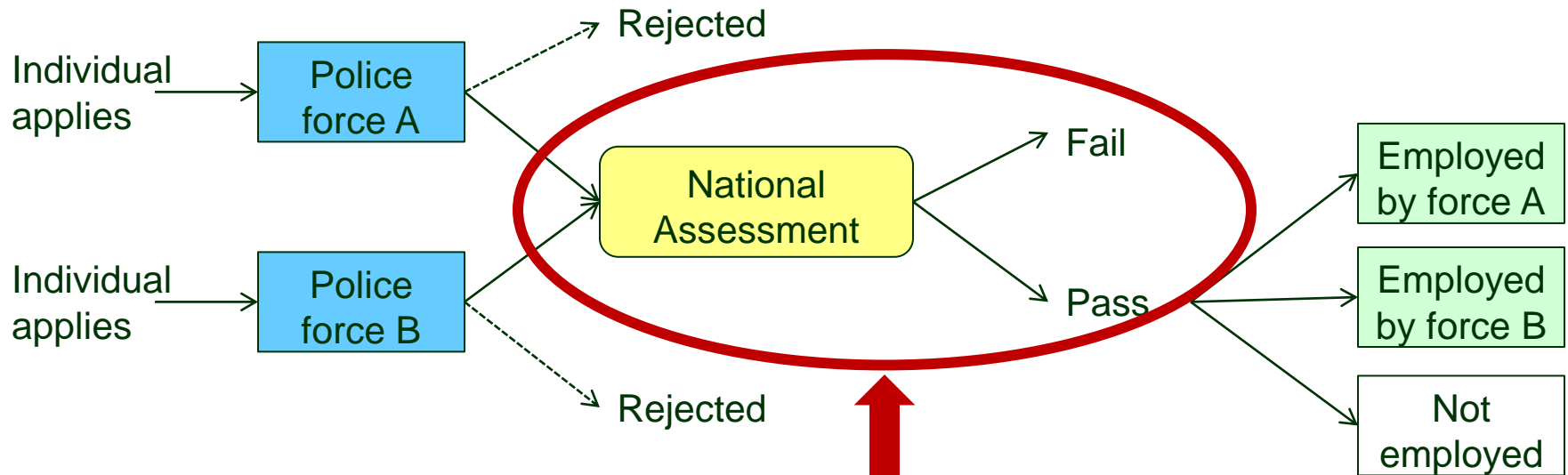
9 exercises

	Interactive				Written		Interview	Psychometric Tests	
	Jones	Levy	Messan	Rubin	Dipping	Protest		Verbal Logical Reasoning	Numerical Reasoning
Community & Customer Focus	✓	✓		✓	✓	✓			
Effective Communication	✓			✓	✓				
Oral Communication	✓	✓	✓	✓			✓		
Written Communication					✓	✓		✓	
Personal Responsibility		✓	✓	✓					
Problem Solving	✓		✓	✓	✓	✓	✓		✓
Resilience		✓	✓				✓		
Respect for Race & Diversity	✓	✓	✓	✓	✓	✓	✓		
Teamworking	✓	✓	✓			✓	✓		

Table 1: Exercise by Competency Matrix

“7”  
competency  
areas

# The police recruitment procedure

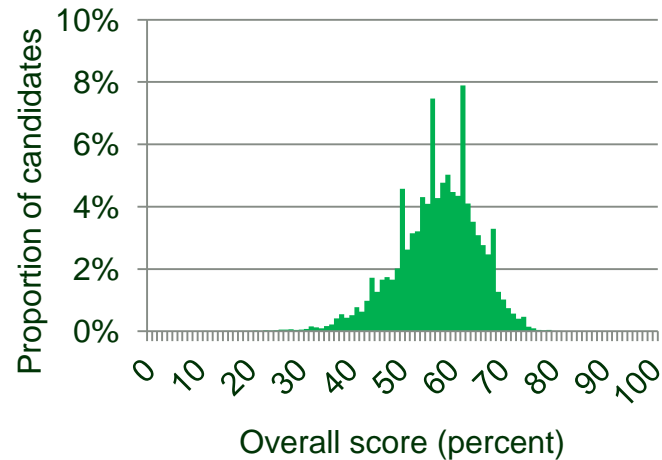
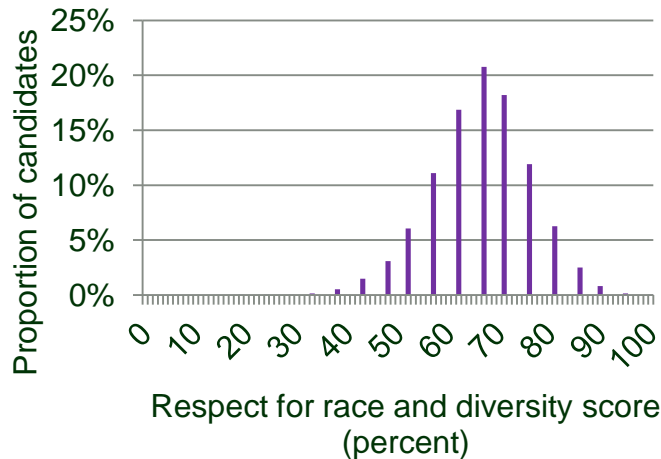
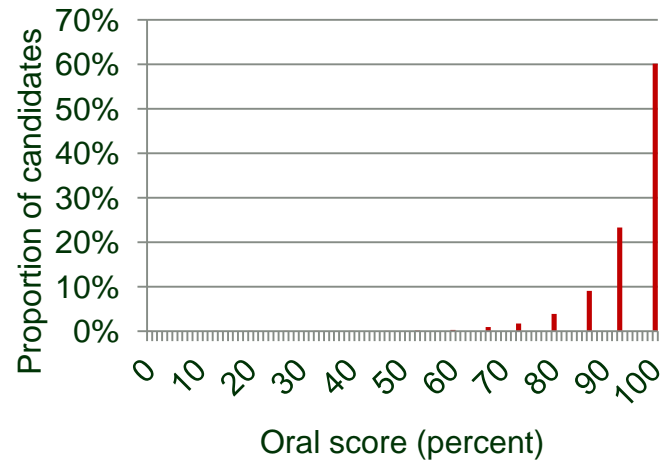
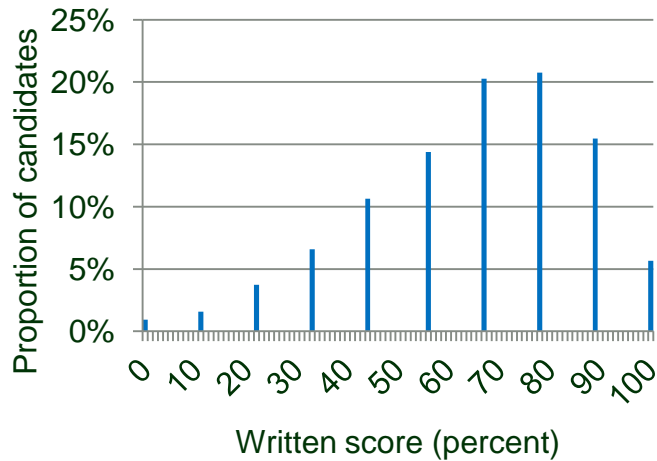


## Our data

Information on 41,000 candidates who took the national assessment in (2007), 2008, 2009, (2010) :

- 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  $\geq$  50%, Written  $\geq$  44%, RFD  $\geq$  50%, Overall  $\geq$  50%  
**(To pass pre-Nov 2007:** Oral  $\geq$  60%, Written  $\geq$  44%, RFD  $\geq$  60%, Overall  $\geq$  60%)



# Candidate characteristics associated with scores

	Written score	Oral score	RFD score	Overall score	Pr(pass)
2008	-3.858**	-0.248	0.433*	-0.635**	-0.036**
2009	-11.381**	1.082**	1.332**	-2.822**	-0.124**
2010	-1.931**	1.576**	-0.171	0.566**	0.010
Age	1.224**	0.558**	1.045**	0.930**	0.038**
Age squared	-0.019**	-0.009**	-0.016**	-0.014**	-0.001**
Male	-2.434**	-1.014**	-2.255**	-1.820**	-0.062**
GCSEs	1.840**	1.082**	0.176	0.371*	0.012
A levels	5.933**	1.736**	1.813**	2.397**	0.098**
Graduate	9.767**	2.381**	3.303**	4.491**	0.168**
Experience: PCSO	2.685**	2.006**	3.902**	4.003**	0.132**
Experience: SC	3.120**	1.473**	2.682**	2.860**	0.092**
Mixed white	-3.395**	-0.161**	0.139	-0.512*	-0.031*
Asian	-15.309**	-2.801**	-2.190**	-3.793**	-0.209**
African	-19.627**	-4.656**	-1.827**	-5.436**	-0.288**
Chinese	-10.194**	-3.974**	-1.614*	-2.433**	-0.103**
Other	-19.962**	-5.271**	-2.486**	-5.903**	-0.269**
Missing	-3.939	-0.702**	-1.012**	-1.126**	-0.053**
Constant	47.661	86.282**	49.329**	42.231**	0.176**

Note: Baseline is 2007, female, <GCSE qualifications, no prior police experience, white ethnicity.  
Sample size: 41,485. \*\*, \* indicates significance at the 1%, 5% level.

# Empirical strategy

$$Q_i = \alpha + \beta \ln(W_r^P / W_r^O) + \rho A_r + X_r \gamma + \tau + \varepsilon_i \quad [1]$$

- $Q_i$  is applicant quality
  - measured using candidate test score at national assessment
- $W_r^P$  is local police wage;  $W_r^O$  is local 'outside' wage
- $A_r$  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
- $X$  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:

$$\ln W_{i,r} = \alpha + X_i\beta + \sum_r \theta_{1,r}F_r + \theta_2P_i + \sum_r \theta_{3,r}P_iF_r + \eta_i \quad [2]$$

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

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

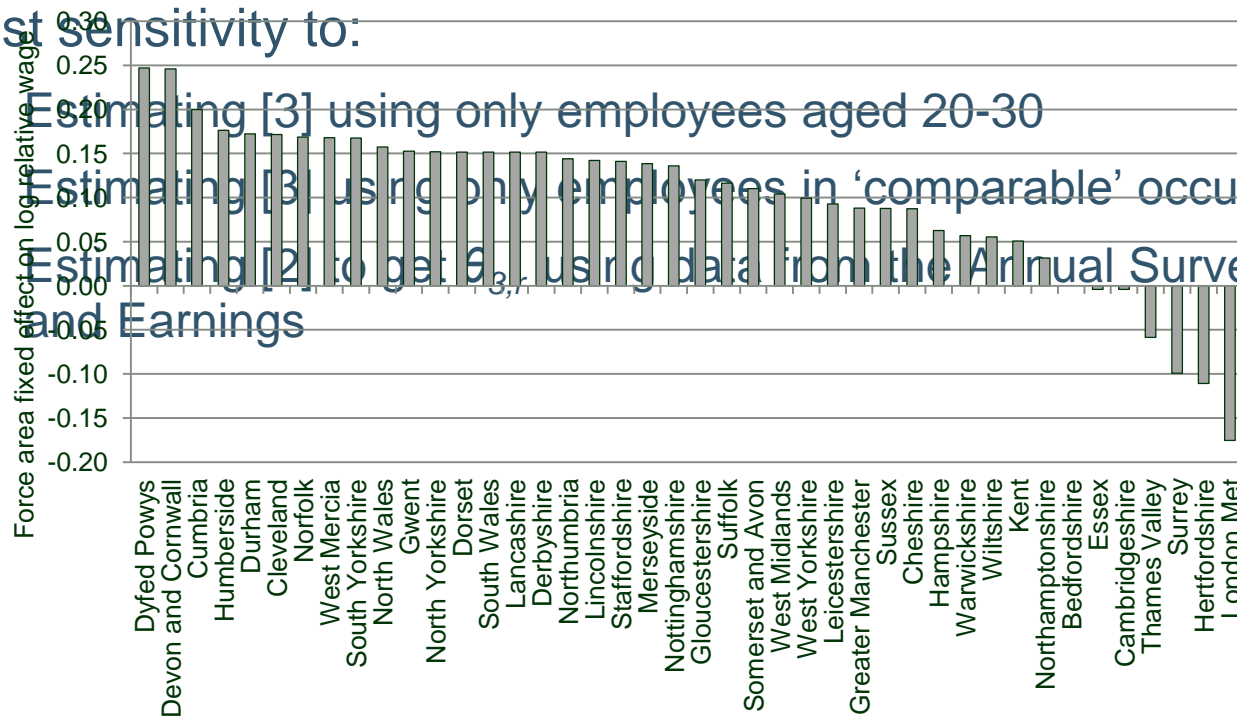
- and use -  $\theta_{1,r}$  for the relative wage in region r

# Measuring the relative wage

- Estimate [3] using data from the Labour Force Survey
  - Pool 2005 to 2010; estimate police forces using local authority areas
  - Sample: all employees aged 20-50
  - X controls: sex, (age, age2 X education), ethnicity, time

- Test sensitivity to:

- Estimating [3] using only employees aged 20-30
- Estimating [3] using only employees in 'comparable' occupations
- Estimating [2] to get  $\theta_{jt}$  using data from the Annual Survey of Hours and Earnings



# Association of outside wage and applicant quality

- Recall:  $Q_i = \alpha + \beta \ln(W_r^P / W_r^O) + \rho A_r + X_r \gamma + \tau + \varepsilon_i$

	Written communication (%)	Oral communication (%)	Respect for Race and Diversity (%)	Overall (%)	Pr.(Pass)
$\ln(W_r^P / W_r^O) = -\theta_{1,r}$	11.104 (2.824)***				
<b>2008</b>	-2.725 (0.446)***				
<b>2009</b>	-10.612 (0.517)***				
<b>2010</b>	-2.495 (0.620)***				
<b>London</b>	-0.663 (0.761)				
<b>% with degree</b>	-0.312 (0.063)***				
<b>% with A-levels</b>	-0.228 (0.120)*				
<b>% with no qualifications</b>	-0.596 (0.076)***				
<b>Unemployment rate</b>	0.297 (0.094)***				
<b>Av. house price (£,000s)</b>	0.028 (0.008)***				

Sample size: 41,485. \*\*, \* indicates significance at the 1%,5% level. OLS (columns 2-4) and LPM (column 5).

# Association of outside wage and applicant quality

- Recall:  $Q_i = \alpha + \beta \ln(W_r^P / W_r^O) + \rho A_r + X_r \gamma + \tau + \varepsilon_i$

	Written communication (%)	Oral communication (%)	Respect for Race and Diversity (%)	Overall (%)	Pr.(Pass)
$\ln(W_r^P / W_r^O) = -\theta_{1,r}$	11.104 (2.824)***	-11.752 (0.924)***	9.087 (1.350)***	9.539 (1.029)***	0.116 (0.060)*
<b>2008</b>	-2.725 (0.446)***	-0.069 (0.159)	0.815 (0.217)***	-0.246 (0.160)	-0.018 (0.009)*
<b>2009</b>	-10.612 (0.517)***	1.185 (0.178)***	1.983 (0.242)***	-2.210 (0.191)***	-0.100 (0.011)***
<b>2010</b>	-2.495 (0.620)***	2.195 (0.201)***	0.327 (0.274)	1.124 (0.228)***	0.038 (0.013)***
<b>London</b>	-0.663 (0.761)	-0.899 (0.249)***	-0.116 (0.338)	-0.877 (0.278)***	-0.018 (0.015)
<b>% with degree</b>	-0.312 (0.063)***	-0.050 (0.018)**	0.076 (0.028)***	0.005 (0.022)	-0.003 (0.001)**
<b>% with A-levels</b>	-0.228 (0.120)*	-0.024 (0.038)	0.123 (0.057)**	0.023 (0.044)	-0.001 (0.003)
<b>% with no qualifications</b>	-0.596 (0.076)***	-0.038 (0.022)	0.011 (0.034)	-0.020 (0.027)	-0.004 (0.002)**
<b>Unemployment rate</b>	0.297 (0.094)***	-0.052 (0.024)	-0.125 (0.038)***	0.017 (0.031)	-0.001 (0.002)
<b>Av. house price (£,000s)</b>	0.028 (0.008)***	-0.012 (0.002)***	0.019 (0.004)***	0.028 (0.003)***	0.001 (0.000)***

Sample size: 41,485. \*\*, \* indicates significance at the 1%,5% level. OLS (columns 2-4) and LPM (column 5).

# Association of disamenity and applicant quality

	Written communication (%)	Oral communication (%)	Respect for Race and Diversity (%)	Overall (%)	Pr.(Pass)
$\ln(W_r^P / W_r^O) = -\theta_{1,r}$	21.294 (3.838)***	-9.388 (1.286)***	18.659 (1.844)***	13.196 (1.409)***	0.310 (0.080)***
<i>Proportion of crime:</i>					
<b>Theft</b>	0.496 (0.167)***	-0.384 (0.057)***	-0.177 (0.079)**	-0.156 (0.060)**	-0.005 (0.003)
<b>Criminal damage</b>	0.429 (0.156)**	-0.399 (0.057)***	-0.234 (0.072)***	-0.149 (0.058)**	-0.006 (0.003)*
<b>Domestic burglary</b>	1.343 (0.245)***	-0.078 (0.074)	0.488 (0.109)***	0.638 (0.089)***	0.026 (0.005)***
<b>Drugs offences</b>	0.090 (0.162)	-0.058 (0.051)	-0.410 (0.072)***	-0.105 (0.060)*	-0.005 (0.003)
<b>Non-dom. burglary</b>	-0.536 (0.287)*	0.248 (0.090)**	-0.361 (0.127)***	0.044 (0.106)	-0.003 (0.006)
<b>Public order offences</b>	-0.116 (0.215)	-0.441 (0.072)***	-0.023 (0.100)	-0.170 (0.078)**	-0.009 (0.004)**
<b>Shoplifting</b>	0.166 (0.231)	-0.400 (0.077)***	-0.177 (0.106)*	0.017 (0.086)	-0.004 (0.005)
<b>Vehicle offences</b>	0.384 (0.151)**	-0.304 (0.051)***	0.172 (0.070)***	0.056 (0.058)	0.004 (0.003)
<b>Violence without injury</b>	0.067 (0.204)	-0.365 (0.070)***	-0.406 (0.094)***	-0.088 (0.075)	-0.008 (0.004)*
<b>Violence with injury</b>	-1.846 (0.356)***	-0.410 (0.120)***	-2.069 (0.165)***	-1.822 (0.128)***	-0.072 (0.008)***
<b>Crime per 1000 head</b>	-0.554 (0.214)**	0.103 (0.068)	-0.435 (0.096)***	-0.394 (0.081)***	-0.023 (0.004)***

Regressions also control for time, London, and local education composition, unemployment rate and house prices. Sample size: 41,485. \*\*, \* indicates significance at the 1%,5% level. OLS (columns 2-4) and LPM (column 5).

# 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) makes relatively little difference to estimated coefficients
  - 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 relatively small
  - Implies 5ppt difference in overall score between Hertfordshire and Dyfed Powys from different relative wage
- Future work required to explore impacts of police officer quality on police productivity