

Global Competition, UK Labour Market Adjustment and the Brexit Vote

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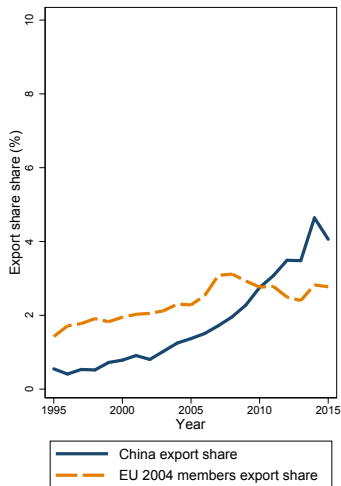
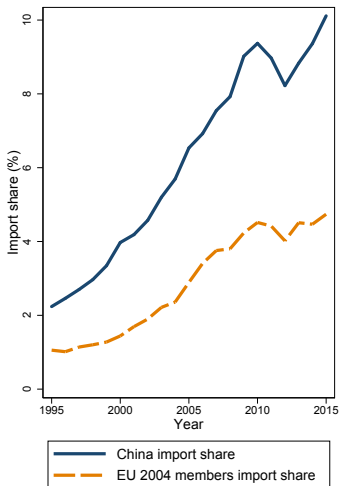
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Motivations

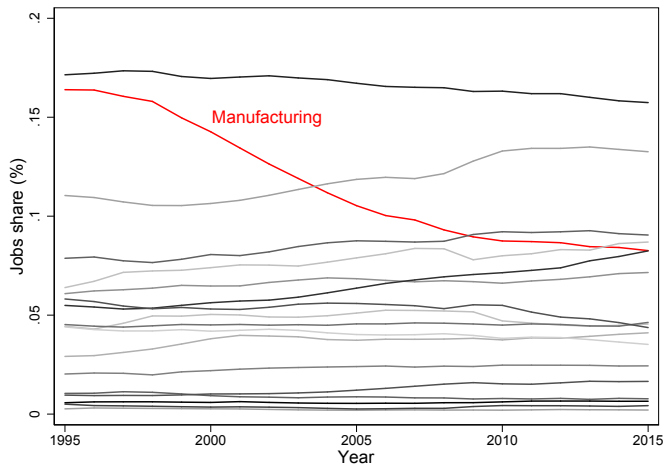
- The way labour markets in different countries have adjusted to changes in international trade differed according to institutional settings and economic structure
- Understanding the mechanisms through which in the UK local labour markets adjust to structural changes is important as Brexit may bring such changes

UK trade with China and A8 countries (1995-2015)



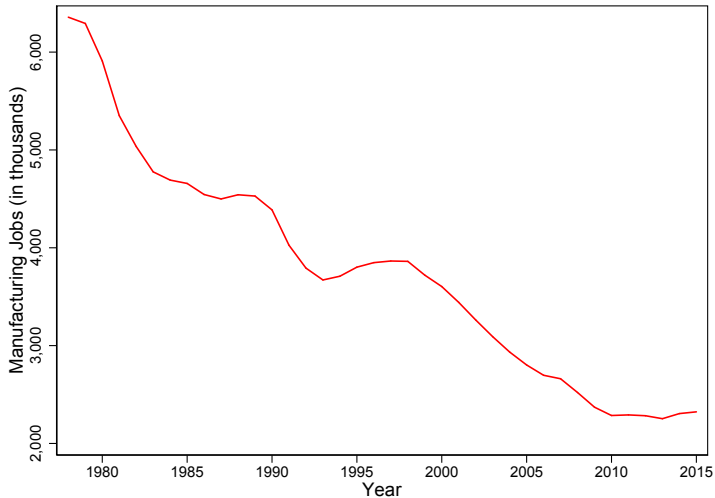
Source: OECD Structural Analysis Database and EUKLEMS.

1995-2015 Share of jobs by industry (Sections A to R, SIC 2007)



Note: calculations using ONS data on Employee jobs by industry (JOBS03) for all available SIC 2007 sections.

Long-term trend in manufacturing jobs (1978-2018)



Note: calculations using ONS data on Employee jobs by industry (JOBS03).

Questions

- Did China+A8 trade shock affect the UK manufacturing sector in the long-term?
- How did local labour markets adjust over time?
- Did the increase in trade exposure of local labour markets affect the rise in the populist vote and the vote to leave the EU?

This paper

- We focus on the period 2000-2015 (China joins the WTO in 2001; Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Slovakia, and Slovenia join the EU in 2004)
- Local labour markets=Travel to Work Areas (TTWAs)
- We define a measure of *change* in local import penetration following Autor et al. (2013)
- We estimate the effects of import exposure on local labour market outcomes for the long-term by accounting for the possible endogeneity of trade shocks Autor et al. (2013).
- We investigate the influence of trade shocks on the share of Leave vote across local areas and the rise in the UKIP vote.

Preview of the results

The rise in import competition 2000-2015 from countries with relatively low pay resulted in:

- a third of the decline in total manufacturing jobs 2000-2015;
- workers moved out of manufacturing into low-skilled low-paid non-manufacturing jobs. This change was associated with a decrease in mean (and median) weekly earnings in non-manufacturing sectors, particularly in low-skilled occupations;
- increased skills polarization across different areas of the UK.

In addition we observe:

- relatively little effect on the rise in the UKIP vote and the Leave vote, once we account for longstanding regional disparities.

Our contribution

- We provide a comprehensive study of the effect of increased trade exposure on local labour market outcomes in the UK.
- We explore the effect of import penetration on internal migration and local area populations.
- We link these changes to recent election results.

Literature

- Studies that evaluate the effect of differential exposure to trade shocks: Autor et al. (2013); Autor et al. (2014); Greenland et al. (2019); Balsvik et al. (2015); Dauth et al. (2014); Costa et al. (2016); Donoso et al. (2015).
- Studies that examine the mechanisms behind the long-term adjustments in response to trade shocks: Bloom et al. (2016); Bloom et al. (2019).
- Studies that evaluate the effect of trade shocks on voting patterns: Colantone and Stanig (2018); Dippel et al. (2015); Autor et al. (2017).
- UK evidence: Brulhart et al. (2014); Pessoa (2014).

Methodology

Pioneering methodology of Autor, Dorn and Hanson (2013):

- Where in the country did the UK produce *before* the trade shocks the goods that it now imports from China and the A8?
- What has happened in those parts of the country relative to other parts of the country *since* the steep increase in trade exposure?

Focus on China and A8 is attractive because change in trade is in part a result of political and legislative changes that boosted productivity in these countries rather than economic circumstances in the UK.

Measures of import exposure

Domestic import exposure per worker

$$\Delta Imp_{i,t+1} = \frac{1}{L_{i,t}} \sum_j \frac{L_{ij,t}}{L_{j,t}} \Delta M_{UK,j,t+1}^{Ch+A8}$$

Where:

- * $\frac{L_{ij,t}}{L_{j,t}}$ is the share of local market i in UK employment in industry j at the start of the period;
 - * $\Delta M_{UK,j,t+1}$ is the observed change in UK imports from China and A8 between t and $t+1$;
 - * $\frac{1}{L_{i,t}}$ is the local market i 's employment.
- We also considered 2 additional measures of trade exposure: domestic and international import competition; net imports. Results are consistent across the three measures.

Model

- Labour market outcomes

$$\Delta y_{i,t+1} = \alpha + \beta \Delta IMP_{i,t+1} + \mathbf{X}_i' \phi + \epsilon_{i,t+1}$$

- Share of Leave voters

$$Leave_{i,2016} = \alpha + \beta \Delta IMP_{i,t+1} + \mathbf{X}_i' \gamma + \epsilon_{i,t+1}$$

X_i = includes: the start of period ratio of manufacturing jobs per head, share of jobs in agriculture, share of population with degrees, share of employees in low-skill occupations, share of workers paid at or below the National Minimum Wage, share of foreign born and the change in the share of foreign born.

Identification strategy

- Identification of β implies that local labour markets more exposed to import penetration would have changed similarly to the other markets if China and A8 had not increased their productivity and ability to export \rightarrow *supply shock*
- However it is possible that other factors could determine a change in the demand for both, imported and domestic goods \rightarrow *domestic demand shock*
- IV strategy to identify the supply driven component of trade exposure:

$$\Delta Imp_{i,t+1}^{Instr} = \frac{1}{L_{i,t}} \sum_j \frac{L_{ij,t-1}}{L_{j,t-1}} \Delta M_{Oth,j,t+1}^{Ch+A8}$$

Data sources

- Business Structure Database:
 - * UK plant level information on employment, postcode, and detailed industry.
- COMTRADE through WITS:
 - * Bilateral trade flows, 125 manufacturing goods (ISIC Rev 3, 4 digit).
- Labour Force Survey:
 - * Household survey including information on individuals' labour market status, qualifications, country of birth, as well as wards.
- Annual Survey of Hours and Earnings:
 - * 1% sample of employees providing employer reported pay, workplace postcode and industry.
- Electoral Commission data

Final datasets

- Analysis of labour market outcomes
 - * Changes in trade exposure and labour market variables for 232 Travel to Work Areas since 2000/01.
 - * Changes in trade exposure and labour market variables over 2000-2015
- Analysis of UKIP/Brexit vote
 - * Changes in trade exposure for 232 TTWAs/167 NUTS3 areas since 2000/01.
 - * Change in share of UKIP vote for 232 TTWAs (2004-2014)/Share of Leave votes for 167 NUTS3 (in 2016)

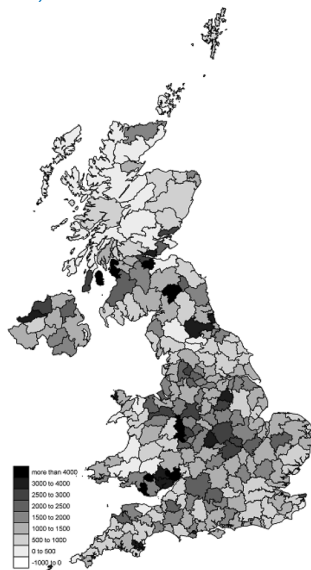
Descriptive stats

Table 1: Descriptive statistics (232 Travel-to-Work Areas)

	<i>Unweighted</i>			<i>Weighted</i>		
	Mean	Median	SD	Mean	Median	SD
Change in Imports (£1000 per job)	1.433	1.164	0.98	1.408	1.199	0.818
Change in Domestic and Int. Imports	1.871	1.541	1.385	1.856	1.599	1.132
Change in Net Imports	1.494	1.138	1.325	1.403	1.176	1.055

Unit of observation is the travel-to-work-area (2001 definition). Northern Ireland excluded. 232 observations. COMTRADE, BSD, LFS and ASHE data. Levels measured at 2000/01. Changes measured between 2000/01 and 2014/15. Weighted numbers are weighted by start of period population of working age.

Map: Change in import exposure to China and the A8 (2000/01 to 2014/15)



Manufacturing jobs (2SLS)

	Mnf jobs per head	Mnf jobs	Non-Mnf jobs per head	Non-Mnf jobs	All jobs per head	All jobs
To 2014/2015						
Imports	-0.010*** (0.002)	-0.125*** (0.029)	0.004 (0.007)	-0.002 (0.011)	-0.006 (0.009)	-0.026** (0.012)
Domestic and International Imports	-0.007*** (0.002)	-0.088*** (0.023)	0.002 (0.005)	-0.003 (0.008)	-0.005 (0.006)	-0.019** (0.009)
Net Imports	-0.007*** (0.002)	-0.091*** (0.025)	0.005 (0.006)	0.001 (0.010)	-0.002 (0.007)	-0.016 (0.010)

Unit of observation is the travel-to-work-area (2001 definition). Northern Ireland excluded. Each regression includes 232 observations. COMTRADE, BSD, LFS and ASHE data. Robust standard errors in parentheses. *** 1%, ** 5%, *10% significance. Link to first step results: [▶ first](#)

Median weekly earnings (2SLS)

	Median weekly earnings			
	Mnf	Non-mnf.	Low-skilled Non-mnf.	All
To 2014/2015				
Imports	0.039** (0.015)	-0.015 (0.011)	-0.024* (0.013)	-0.026*** (0.010)
Domestic and International Imports	0.026** (0.010)	-0.011 (0.007)	-0.017** (0.008)	-0.019*** (0.007)
Net Imports	0.021 (0.013)	-0.009 (0.007)	-0.017** (0.009)	-0.014** (0.006)

Unit of observation is the travel-to-work-area (2001 definition). Northern Ireland excluded. Each regression includes 232 observations. COMTRADE, BSD, LFS and ASHE data. Robust standard errors in parentheses. *** 1%, ** 5%, *10% significance.

Labour Market Status (2SLS)

	Labour market status		
	Unempl. rate	Inactivity rate	Empl. rate
To 2014/2015			
Imports	0.001 (0.001)	0.010 (0.006)	-0.011* (0.006)
Domestic and International Imports	0.001 (0.001)	0.007 (0.004)	-0.008* (0.004)
Net Imports	-0.000 (0.001)	0.005 (0.004)	-0.005 (0.004)

Unit of observation is the travel-to-work-area (2001 definition). Northern Ireland excluded. Each regression includes 232 observations. COMTRADE, BSD, LFS and ASHE data. Robust standard errors in parentheses. *** 1%, ** 5%, *10% significance.

Population (2SLS)

	Qualification levels			Share of working age pop. with degrees
	All	Degree level	Other	
To 2014/2015				
Imports	-0.017 (0.013)	-0.055** (0.027)	-0.007 (0.012)	-0.008* (0.005)
Domestic and International Imports	-0.012 (0.009)	-0.039** (0.018)	-0.004 (0.009)	-0.006* (0.003)
Net Imports	-0.013 (0.009)	-0.028 (0.019)	-0.006 (0.007)	-0.005 (0.004)

Unit of observation is the travel-to-work-area (2001 definition). Northern Ireland excluded. Each regression includes 232 observations. COMTRADE, BSD, LFS and ASHE data. Robust standard errors in parentheses. *** 1%, ** 5%, *10% significance.

Additional analysis at individual level: domestic migration (2SLS)

	by Occupation			by Person Fixed Effect Quartile			
	All	Low skilled	Other	Q1	Q2	Q3	Q4
To 2010/2011							
Imports	0.026** (0.013)	0.012 (0.010)	0.036** (0.016)	0.016 (0.012)	0.020* (0.012)	0.028** (0.013)	0.044** (0.019)
Domestic and International Imports	0.022** (0.010)	0.010 (0.008)	0.030** (0.013)	0.014 (0.009)	0.017* (0.009)	0.023** (0.010)	0.036** (0.016)
Net Imports	0.020* (0.011)	0.012 (0.008)	0.026* (0.014)	0.016 (0.010)	0.016 (0.010)	0.019* (0.011)	0.032* (0.017)
Observations:	95568	35079	60489	23892	23892	23892	23892
Rate of migration:	0.337	0.318	0.348	0.355	0.338	0.320	0.336

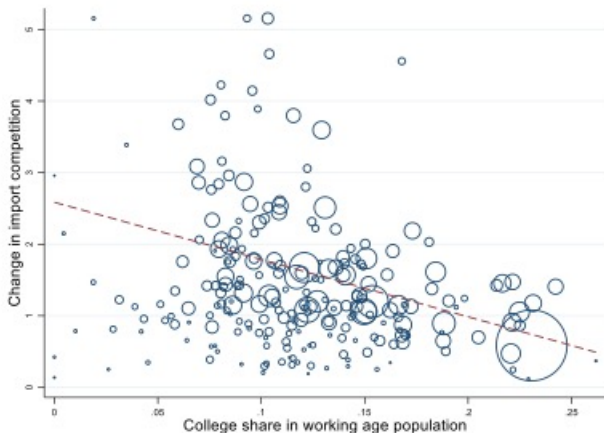
Sample includes individuals present in the ASHE sample in 2000 or 2001 and again in the later period. Northern Ireland excluded. COMTRADE, BSD, LFS and ASHE data. Robust standard errors in parentheses, clustered by Travel-to-Work Area. *** 1%, ** 5%, *10% significance.

College share 2000/2001 and change in college share



Note: Travel-to-Work Areas (TTWA). Change in college share 2000/2001 to 2014/2015. Circles indicate population of working age in the TTWA. Red dashed line is the population weighted regression line.

College share 2000/2001 and change in import competition



Note: Travel-to-Work Areas (TTWA). Change in college share 2000/2001 to 2014/2015. Circles indicate population of working age in the TTWA. Red dashed line is the population weighted regression line.

UKIP votes in the European Parliamentary elections (2SLS)

	Model 1	Model 2	Model 3	Model 4
Imports	0.023** (0.011)	0.011 (0.007)	0.002 (0.007)	-0.007 (0.010)
Domestic and International Imports	0.016** (0.008)	0.008 (0.005)	0.002 (0.005)	-0.005 (0.007)
Net Imports		0.008 (0.010)	0.001 (0.007)	-0.006 (0.007)
				-0.011 (0.008)

Unit of observation is the travel-to-work-area (2001 definition). Northern Ireland excluded. *** 1%, ** 5%, *10% significance.

Model 1: No controls

Model 2: Foreign born and low pay

Model 3: Full controls

Model 4: Full controls and change in labour market outcomes

UKIP votes in the European Parliamentary elections (2SLS)

	Change in % of UKIP votes in EP elections 2003-2015 (2SLS)		
Imports	-0.007 (0.010)		
Domestic and International Imports		-0.005 (0.007)	
Net Imports			-0.011 (0.008)
Foreign born share of working age population 2000/01	-0.176** (0.072)	-0.180*** (0.070)	-0.189*** (0.069)
Change in foreign born	0.230 (0.194)	0.227 (0.198)	0.204 (0.188)
Share of workers paid at or below the National Minimum Wage 2000/01	0.670* (0.369)	0.662* (0.367)	0.525 (0.377)
Manufacturing jobs per head 2000/01	0.031 (0.150)	0.023 (0.141)	0.082 (0.118)
Agricultural community, historically	-0.470** (0.194)	-0.467** (0.195)	-0.501** (0.200)
Share of working age population with degrees	-0.550*** (0.079)	-0.546*** (0.075)	-0.543*** (0.076)
Share of employees in low-skill occupations	-0.113 (0.081)	-0.116 (0.082)	-0.081 (0.081)
Share of working age population that are female	-0.476** (0.220)	-0.479** (0.220)	-0.472** (0.211)
Share of population above working age	0.110 (0.165)	0.108 (0.164)	0.088 (0.152)
Change in population with degrees	-0.014* (0.008)	-0.014* (0.008)	-0.014* (0.008)
Change in median earnings	-0.258*** (0.061)	-0.257*** (0.059)	-0.259*** (0.059)
Change in employment rate	-0.075 (0.115)	-0.074 (0.113)	-0.068 (0.113)
Adjusted R squared	0.439	0.439	0.452

Unit of observation is the travel-to-work-area (2001 definition). Northern Ireland excluded. *** 1%, **

Leave votes in the EU referendum 2016 (2SLS)

	Model 1	Model 2	Model 3	Model 4	
Imports	0.059*** (0.020)	0.037*** (0.008)	0.005 (0.010)	-0.007 (0.010)	
Domestic and International Imports	0.041*** (0.015)	0.026*** (0.005)	0.004 (0.006)	-0.004 (0.006)	
Net Imports		0.026 (0.017)	0.017* (0.010)	-0.001 (0.008)	-0.009 (0.007)

Unit of observation is the NUTS 3 regions. Northern Ireland excluded. *** 1%, ** 5%, *10% significance.

Model 1: No controls

Model 2: Foreign born share of working age population 2000/01, change in foreign born and share of workers paid at or below the National Minimum Wage 2000/01

Model 3: Full controls

Model 4: Full controls and change in labour market outcomes

Leave votes in the EU referendum 2016 (2SLS)

	Change in % of Leave votes in EP elections 2003-2015 (2SLS)		
Imports	-0.007 (0.010)		
Domestic and International Imports		-0.004 (0.006)	
Net Imports			-0.009 (0.007)
Foreign born share of working age population 2000/01	0.023 (0.107)	0.021 (0.106)	0.013 (0.104)
Change in foreign born	0.306** (0.143)	0.310** (0.143)	0.267** (0.129)
Share of workers paid at or below the National Minimum Wage 2000/01	0.714 (0.566)	0.730 (0.568)	0.684 (0.584)
Manufacturing jobs per head 2000/01	0.320* (0.175)	0.297* (0.160)	0.331** (0.157)
Agricultural community, historically	-0.195 (0.603)	-0.179 (0.610)	-0.181 (0.618)
Share of working age population with degrees	-0.994*** (0.139)	-0.991*** (0.139)	-0.993*** (0.140)
Share of employees in low-skill occupations	0.212* (0.115)	0.201* (0.115)	0.210* (0.116)
Share of working age population that are female	-1.320*** (0.451)	-1.331*** (0.455)	-1.261*** (0.432)
Share of population above working age	0.607* (0.332)	0.611* (0.333)	0.574* (0.320)
Change in population with degrees	-0.045 (0.028)	-0.046* (0.028)	-0.045* (0.027)
Change in median earnings	-0.201* (0.112)	-0.196* (0.110)	-0.209** (0.100)
Change in employment rate	-0.507** (0.207)	-0.508** (0.208)	-0.503** (0.199)
Adjusted R squared	0.715	0.715	0.725

Unit of observation is the NUTS 3 regions. Northern Ireland excluded. *** 1%, ** 5%, *10% significance.

Tests for the plausibility of the identification strategy

- Goldsmith-Pinkham et al. (2018) show the instrument's identification as coming from the shares of local employment. Numerical equivalence: $2SLS = GMM$ with shares as instruments weighted by a weight matrix constructed from the growth in trade.
- Higher weights tell how sensitive the over-specified parameter β is to the endogeneity of the specific instrument (share). We test whether employments shares with higher weights are correlated with the other covariates in the model. (Test 1)
- We estimate an additional specification where we add changes in local employment in manufacturing sectors between 1981 and 1991 as control (Test 2).
- We estimate the model on the change in the manufacturing share between 1981 and 1991 (Test 3).

Summary I (Labour market outcomes)

- Structural consequences of trade liberalisation with low wage countries:
 - * Has contributed to manufacturing decline since the 2000s. Uneven experiences across sectors and across the UK.
- Labour market adjustment to de-industrialisation associated with import competition:
 - * Short-term increases in unemployment rates.
 - * De-skilling of areas relatively more affected by import competition.
 - * Evidence of lower pay, particularly in low-skilled services industry.
 - * Low skilled employment may have been partially protected by downward wage flexibility and the creation of low-skilled services jobs.

Summary II (Voting patterns)

- An increase in import exposure is associated with higher share of leave vote and change in UKIP vote.
- Controlling for historical circumstances this association largely disappears.

Conclusions

- We study the effect of trade shocks on the UK labour market.
- The longer-term consequences for unemployment were mitigated as lower-skilled workers moved to non-manufacturing sectors and took lower pay.
- Higher-skilled workers moved away from more exposed areas.
- This last result partly explains the correlation between import exposure and the Leave vote.

Thank you very much!

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First Step Results

	Change in import competition from 2000/2001 to 2006/2007			Change in import competition from 2000/2001 to 2014/2015	
	Imp.	Domestic and Int. Imp.	Net Imp.	Domestic and Int. Imp.	Net Imp.
EU country import measure	0.101*** (3.83)	0.113*** (3.71)	0.124** (3.10)	0.110** (3.10)	0.118** (2.82)
Manufacturing jobs per head 2000/01	2.730 (1.89)	2.973 (1.48)	4.598** (3.16)	5.731 (1.31)	7.401* (2.49)
Agricultural community, historically	-2.196** (-2.69)	-2.451* (-2.56)	-3.268** (-2.71)	-3.941** (-2.98)	-3.662* (-2.25)
Share of working age population with degrees	-0.262 (-0.47)	0.0942 (0.13)	-0.753 (-1.23)	0.479 (0.33)	-0.205 (-0.14)
Share of employees in low-skill occupations	1.615** (3.12)	1.954*** (3.36)	1.554* (2.53)	3.222*** (3.40)	3.648** (3.10)
Share of working age population that are female	3.270 (1.79)	3.784 (1.62)	3.503 (1.45)	6.489 (1.78)	3.769 (1.25)
Share of population above working age	-0.0194 (-0.03)	-0.221 (-0.32)	-0.286 (-0.41)	-0.421 (-0.21)	-0.678 (-0.26)
Foreign born share of working age population 2000/01	0.744 (1.61)	0.567 (0.88)	0.720 (1.39)	0.745 (0.53)	0.482 (0.32)
Share of workers paid at or below the NMW 2000/01	-0.814 (-0.57)	-2.056 (-1.12)	-2.079 (-1.01)	-5.239 (-1.55)	-9.047* (-2.52)
Change in foreign born	-0.214 (-0.18)	-0.547 (-0.28)	-1.820 (-1.08)	-1.418 (-0.50)	-2.935 (-1.31)
Constant	-2.229* (-2.08)	-2.565* (-2.06)	-2.104 (-1.55)	-4.323* (-2.49)	-2.693 (-1.91)
Observations	232	232	232	232	232
Weak identification test. Ho: equation is weakly identified					
Kleibergen-Paap Wald rk F statistic	14.64	13.77	9.60	9.62	7.95

Unit of observation is the travel-to-work-area (2001 definition). Northern Ireland excluded. Each regression includes 232 observations. COMTRADE, BSD, LFS and ASHE data. Robust standard errors in parentheses. *** 1%, ** 5%, *10% significance.