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Do women benefit from competitive markets? Product market competition and the gender pay gap in Germany

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Abstract

Using a large linked employer–employee dataset for Germany with a direct plant-level measure of product market competition and controlling for job-cell fixed effects, we investigate whether relative wages of women benefit from strong competition. We find that the unexplained gender pay gap is about 2.4 log points lower in West German plants that face strong product market competition than in those experiencing weak competition, whereas no such link shows up for East Germany.

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1. Introduction

In his seminal contribution, Becker (1971) explains gender wage discrimination in terms of preference-based discriminatory behaviour by employers. According to Becker, employers with discriminatory preferences dislike employing women and therefore offer them lower wages than men, *ceteris paribus*. As a consequence, non-discriminatory employers may gain a competitive advantage over their discriminating competitors by hiring women at wages below their productivity. For this reason, Becker's discrimination theory predicts that discriminatory employers bear some cost when discriminating against women. Hence, wage discrimination in the long run is just possible if employers have discriminatory preferences inducing a willingness to pay for discrimination and also possess some market power on product markets. Along these lines, we expect a negative correlation between the unexplained gender pay gap and the strength of product market competition as competitive forces prevent employers from living out their costly preferences.

While there is a vast literature documenting a significant, persistent gender pay gap, up to now only few studies have examined the link between product market competition and this gap. Almost exclusively, existent studies utilise aggregate, indirect measures of competition, such as the intensity of international trade (Black and Brainerd 2004), the extent of market regulation (Black and Strahan 2001), market structure (Winter-Ebmer 1995), or combinations of these (Heinze and Wolf 2010, Jirjahn and Stephan 2006, Weichselbaumer and Winter-Ebmer 2007, and Zweimüller *et al.* 2008). To the best of our knowledge, Belfield and Heywood (2006) is the only study in the literature using direct information on the competition faced by plants, finding a negative relation between plants' self-assessment on product market competition and the unexplained gender pay gap for the UK.

In this study, we use a large linked employer–employee dataset for Germany that includes plants' self-assessment on product market competition to analyse the impact of competition on the gender pay gap. The dataset combines highly reliable administrative data on employees and detailed survey data on plants. In contrast to most of the previous literature, we are thus able to base our investigation on a direct plant-level measure of product market competition, and we go beyond the literature by adding job-cell specific effects (i.e. fixed effects for any plant–occupation combination) to our wage regressions which allows us to extensively control for segregation effects.

2. Data and Descriptive Evidence

In the following, we use the cross-sectional model of the Linked Employer–Employee Dataset of the Institute for Employment Research (LIAB) of the German Federal Employment Agency for the year 2008 (for details, see Alda *et al.* 2005). The dataset links the IAB Establishment Panel, a representative survey on German plants, with administrative data from the German unemployment insurance on all those individuals who work for these plants and contribute to the social insurance system. Among other things, the dataset contains information on individuals'

gross wage, age, education, sex, tenure, and occupation as well as on plants' workforce composition, industrial relations regime, production technology, industry affiliation, and location. In 2008, the data additionally include a plant-level self-assessment on product market competition which allows us to distinguish between plants facing strong competition ("substantial pressure from competition" in the English translation of the questionnaire) and other plants.

As the dataset contains information on daily wages only and no detailed information on working hours, we have to exclude part-time workers from our sample.[1] Further, we only keep observations from plants that are profit-oriented. Dropping observations with missing values on any of the covariates included in the following analysis, we are left with observations on 586,563 (117,589) men and 149,756 (50,287) women working for 5,594 (3,575) plants in West (East) Germany. 2,589 (1,585) of these plants report that they face strong competition. Distinguishing 333 occupations in the data, we end up with 52,204 (25,225) job cells, i.e. observed plant–occupation combinations, in West (East) Germany.

Turning to our data, the descriptive analysis in Table I yields mixed evidence on the link between product market competition and the gender pay gap: In West Germany, we find an average raw gap of 26.1 log points in plants facing strong competition and 27.1 log points in those facing weak competition. In East Germany, average raw gaps are considerably lower, which is in line with the literature (e.g., Hunt 2002), amounting to 16.0 log points in plants facing strong competition, but just 14.6 log points in those facing weak competition.

3. Econometric Analysis

To test our hypothesis that the unexplained gender pay gap is smaller in plants facing strong competition, we make use of three approaches involving standard wage regressions. Our baseline regression is

$$\ln w_i = \gamma_1 \, female_i + \gamma_2 \, competition_i + \gamma_3 \, female_i \times competition_i + \mathbf{x}_i'\boldsymbol{\beta} + u_i \qquad (1)$$

where $\ln w_i$ is the log daily gross wage, $female_i$ a female dummy, $competition_i$ a dummy variable indicating strong competition, $female_i \times competition_i$ the interaction term of these two dummies, and $\mathbf{x}_i$ a vector of control variables. $\mathbf{x}_i$ includes standard variables capturing the individual's human capital endowment, his or her occupation, and a large number of plant characteristics (for details, see the notes to Table II). To arrive at the unexplained within-job gender pay gap that addresses unobserved plant and job heterogeneity, we next add job-cell fixed effects to our wage regression. Since the strength of competition is likely to affect the impact of other worker characteristics, we eventually fully interact the model with the indicator for strong competition.

Table II presents the key results of the three different wage regressions separately for West and East Germany. In our sample for West Germany, we find an unexplained gender pay gap of 17.6 log points if product market competition is weak. In line with our hypothesis, the

[1] A shortcoming of the data is that wages are censored at the social contribution ceiling which affects 18.3 (7.7) percent of the male and 6.8 (4.9) percent of the female observations from West (East) Germany. To deal with this, we use the standard single imputation procedure proposed by Gartner (2005) which relies on running separate Tobit regressions for each combination of gender and competition in our East and West German samples.

coefficient of the interaction term is positive and statistically significant, indicating that this gap is 2.7 log points smaller in plants facing strong competition. Adding job-cell fixed effects reduces the unexplained gap both in plants facing strong and weak competition, though the difference remains significant at the 5 per cent level and now amounts to 2.4 log points. Fully interacting the model with the strong competition indicator gives virtually the same results.

In contrast to West Germany, the results for our East German sample show no clear relationship between the unexplained gap and the strength of competition. In all three regressions, the gap even seems somewhat larger in plants facing strong competition (by 1.1 or 1.5 log points, respectively), though none of these negative interaction effects are statistically significant. This confirms the stylised fact that even 20 years after German unification the labour market in East Germany still differs in many respects (including lower product market competition and lower gender pay gaps, see Table I) from that in West Germany.

4. Conclusions

Using a direct plant-level measure of product market competition and controlling for job-cell fixed effects, we investigated whether the unexplained gender pay gap is lower in plants facing strong product market competition. While we found that the gap is about 2.4 log points lower in West German plants that face strong competition than in those experiencing weak competition, no such link showed up for East Germany. The results for West Germany are in line with Becker's (1971) classic prediction that competitive forces restrain employers' ability to discriminate against women. Yet, if Becker is right and discriminatory employers actually pay for discrimination, they should face a worse economic outlook and may for this reason be more likely to report strong competitive pressure. In this case, the impact of competition on the gender pay gap is likely to be underestimated, and thus the true impact may even be stronger than indicated by our estimations. While this sort of reversed causality is hard to address in cross-sectional data as ours, it would be interesting to extend our analysis to longitudinal data and to other countries in order to obtain a better understanding of the relationship between product market competition and the gender pay gap.

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Table I: Product market competition and wages by gender and competition in West and East Germany, 2008

	West Germany				East Germany			
	Women		Men		Women		Men	
	Mean	Std. dev.	Mean	Std. dev.	Mean	Std. dev.	Mean	Std. dev.
All workers								
Gross daily wages (in €)	104.57	46.09	134.13	53.15	74.98	36.67	86.21	40.25
Log gross daily wages	4.5560	0.4420	4.8247	0.3890	4.2111	0.4596	4.3638	0.4240
Product market competition (dummy: 1 = strong)	0.6108		0.6514		0.4856		0.4984	
Observations	149,756		586,563		50,287		117,589	
Workers in plants facing weak competition								
Gross daily wages (in €)	98.29	42.67	126.51	50.10	76.51	37.25	87.30	39.84
Log gross daily wages	4.4967	0.4358	4.7676	0.3832	4.2328	0.4562	4.3789	0.4201
Observations	58,284		204,461		25,868		58,987	
Workers in plants facing strong competition								
Gross daily wages (in €)	108.58	47.72	138.21	54.28	73.37	35.97	85.10	40.62
Log gross daily wages	4.5938	0.4418	4.8552	0.3886	4.1882	0.4621	4.3485	0.4273
Observations	91,472		382,102		24,419		58,602	

Source: LIAB cross-sectional model.

Table II: Wage regressions for West and East Germany, 2008

	West Germany		East Germany	
	Coefficient	Standard error	Coefficient	Standard error
Panel A: OLS wage regressions				
Female	–0.1758**	0.0069	–0.1474**	0.0079
Strong product market competition	–0.0059	0.0088	–0.0267*	0.0121
Female × strong product market competition	0.0274**	0.0105	–0.0112	0.0147
Panel B: OLS wage regressions with job-cell fixed effects				
Female	–0.1519**	0.0052	–0.0987**	0.0052
Female × strong product market competition	0.0239*	0.0094	–0.0147	0.0089
Panel C: OLS wage regressions with job-cell fixed effects – fully interacted model				
Female	–0.1511**	0.0053	–0.0986**	0.0052
Female × strong product market competition	0.0225*	0.0095	–0.0147	0.0089
Individuals	736,319		167,876	
Plants	5,594		3,575	
Job cells	52,204		25,225	

Notes: The dependent variable is log gross daily wage. Reported standard errors are clustered at the plant level. **/* denote statistical significance at the 1/5 per cent level. Further controls included are potential experience, potential experience squared, tenure, tenure squared, dummy variables for joining a plant before 1975 (only in West Germany), five levels of education, and non-German nationality. In the estimations not including job-cell fixed effects, we additionally include the shares of female and qualified workers in the plant, dummy variables for the existence of a works council, a collective agreement at firm level, a collective agreement at sector level, exporting activity, new production technology, and plants located in rural areas as well as sets of dummy variables for plant-size, one-digit industry, and three-digit occupation. In Panel C, we additionally include interaction terms of all regressors with the dummy for strong product market competition.