Online Appendix: Labor Market Polarization, Job Tasks and Monopsony Power

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In this Online Appendix, we provide a derivation of Equation (4) in the article, additional robustness checks, and supplementary results.

B Appendix

B.1 Derivation of Equation 4

In order to get from Equation (3) to Equation (4), we need to replace ϵ_R^e and ϵ_R^n from Equation (3). First, we show how to express ϵ_R^n in terms of ϵ_R^e and ϵ_{θ^R}. Starting with the definition of the share of recruits coming from employment, θ_R, it follows:

$$
\begin{aligned}
\theta^R &= \frac{R^e}{R^e + R^n} \\
\theta^R(R^e + R^n) &= R^e \\
R^n &= \frac{R^e}{\theta^R} - R^e \\
R^n &= \frac{1-\theta^R}{\theta^R} R^e
\end{aligned}
$$

Taking logs and differentiating with respect to w yields[1]

$$
\begin{aligned}
logR^n &= log\frac{1-\theta^R}{\theta^R} + logR^e \\
\frac{R^{n\prime}}{R^n} &= \frac{\theta^R}{1-\theta^R}\left(\frac{-\theta^{R\prime}\theta^R - \theta^{R\prime}(1-\theta^R)}{(\theta^R)^2}\right) + \frac{R^{e\prime}}{R^e} \\
\frac{R^{n\prime}}{R^n} &= \frac{R^{e\prime}}{R^e} - \frac{1}{1-\theta^R}\left(\frac{\theta^{R\prime}}{\theta^R}\right)
\end{aligned}
$$

[1] Note that R^e, R^n and θ depend on w.

From the definition of a wage elasticity ($\epsilon_x = \frac{x'}{x} / \frac{w'}{w} = w\frac{x'}{x}$), we have

$$\begin{aligned}
\frac{1}{w}\epsilon_R^n &= \frac{1}{w}\epsilon_R^e - \frac{1}{1-\theta^R}\left(\frac{\theta^{R\prime}}{\theta^R}\right) \\
\epsilon_R^n &= \epsilon_R^e - w\frac{1}{1-\theta^R}\left(\frac{\theta^{R\prime}}{\theta^R}\right) \\
\epsilon_R^n &= \epsilon_R^e - \frac{1}{1-\theta^R}\epsilon_{\theta^R} \qquad (1)
\end{aligned}$$

Second, we show how to express ϵ_R^e in terms of ϵ_S^e and θ_R, i.e. $\epsilon_R^e = \frac{-\theta_S \epsilon_S^e}{\theta_R}$. In doing so, we follow Hirsch (2010).

Let $\varphi(x/w)$ be the probability that an employed worker who currently receives wage w accepts a job which offers wage x, and let $F(x)$ be the distribution of wage offers. The separation rate to employment of a firm paying wage w can then be expressed as

$$s^e(w) = \lambda^e \int_{\underline{w}}^{\overline{w}} \varphi(x/w)\ dF(x)$$

with derivative

$$\frac{ds^e\,(w)}{dw} = -\lambda^e \int_{\underline{w}}^{\overline{w}} \frac{\varphi'(x/w)x}{w^2}\ dF(x).$$

The firm's number of recruits from employment is

$$R^e(w) = \lambda^e \int_{\underline{w}}^{\overline{w}} \varphi(x/w)\, L(x)\, dF(x)$$

with derivative

$$\frac{dR^e(w)}{dw} = \lambda^e \int_{\underline{w}}^{\overline{w}} \frac{\varphi'(x/w)\, L(x)}{x}\, dF(x).$$

Using this result, the separations-weighted separation elasticity can be written as follows:

$$\begin{aligned}
\int_{\underline{w}}^{\overline{w}} \varepsilon^e_{sw}(x)\, s^e(x)\, L(x)\, dF(x) &= \int_{\underline{w}}^{\overline{w}} \frac{ds^e(x)}{dx}\frac{x}{s^e(x)} s^e(x)\, L(x)\, dF(x) \\
&= \int_{\underline{w}}^{\overline{w}} \left(-\lambda^e \int_x^{\overline{w}} \frac{\varphi'(z/x)\, z}{x^2}\, dF(z) \right) x\, L(x)\, dF(x) \\
&= -\lambda^e \int_{\underline{w}}^{\overline{w}} \int_x^{\overline{w}} \frac{\varphi'(z/x) z L(x)}{x} dF(z) dF(x) \\
&= -\int_{\underline{w}}^{\overline{w}} \frac{dR^e(x)}{dx} x\, dF(x) \\
\int_{\underline{w}}^{\overline{w}} \varepsilon^e_{sw}(x)\, s^e(x)\, L(x)\, dF(x) &= -\int_{\underline{w}}^{\overline{w}} \varepsilon^e_{Rw}(x)\, R^e(x)\, dF(x). \qquad (2)
\end{aligned}$$

Note that in steady state, for the aggregate economy it holds that $s^e(x)L(x) = \theta_s S(x)$ for separations to employment and $R^e(x) = \theta_R R(x)$ for hirings from employment. It follows for Equation 2:

$$\begin{aligned}
\int_{\underline{w}}^{\overline{w}} \varepsilon^e_{sw}(x)\, s^e(x)\, L(x)\, dF(x) &= -\int_{\underline{w}}^{\overline{w}} \varepsilon^e_{Rw}(x)\, R^e(x)\, dF(x) \\
\int_{\underline{w}}^{\overline{w}} \varepsilon^e_{sw}(x)\, \theta_s S(x)\, dF(x) &= -\int_{\underline{w}}^{\overline{w}} \varepsilon^e_{Rw}(x)\, \theta_R R(x)\, dF(x) \\
\int_{\underline{w}}^{\overline{w}} \varepsilon^e_{Rw}(x)\, R(x)\, dF(x) &= -\frac{\theta_s}{\theta_R} \int_{\underline{w}}^{\overline{w}} \varepsilon^e_{sw}(x)\, S(x)\, dF(x)
\end{aligned}$$

which can be written as $\epsilon^e_R = -\frac{\theta_s}{\theta_R}\epsilon^e_s$.

Substituting ϵ^n_R (from Equation 1) and ϵ^e_R into Equation 3 in the article yields the following:

$$\begin{aligned}
\epsilon_{Lw} &= \theta_R \epsilon^e_R + (1-\theta_R)\epsilon^n_R - \theta_s \epsilon^e_s - (1-\theta_s)\epsilon^n_s \\
&= \theta_R \left(\frac{-\theta_s \epsilon^e_s}{\theta_R} \right) + (1-\theta_R) \left[\epsilon^e_R - \frac{w\theta'_R}{\theta_R(1-\theta_R)} \right] - \theta_s \epsilon^e_s - (1-\theta_s)\epsilon^n_s \\
&= -2\theta_s \epsilon^e_s - (1-\theta_R)\frac{\theta_s \epsilon^e_s}{\theta_R} - (1-\theta_R)\frac{w\theta'_R}{\theta_R(1-\theta_R)} - (1-\theta_s)\epsilon^n_s
\end{aligned}$$

Note that in steady state, $\theta_R = \theta_s$. It follows:

$$\begin{aligned}
\epsilon_{Lw} &= -2\theta\epsilon^e_s - (1-\theta)\epsilon^e_s - \frac{w\theta'}{\theta} - (1-\theta)\epsilon^n_s \\
&= -(1+\theta)\epsilon^e_s - (1-\theta)\epsilon^n_s - \frac{w\theta'}{\theta} \\
&= -(1+\theta)\epsilon^e_s - (1-\theta)\epsilon^n_s - \epsilon_\theta
\end{aligned}$$

where the last equality follows from the definition of the wage elasticity of θ: $\epsilon_\theta = \frac{w\theta'}{\theta}$, and we have shown that Equation 3 follows from Equation 4.

B.2 Imputation of Wages

To examine whether the high incidence of censoring for NRC jobs affects our main results, we implement robustness checks by keeping all censored spells in the sample and imputing the daily wage of these censored spells. In doing so, we use the procedure outlined in Gartner et al. (2005); Dustmann, Ludsteck, and Schönberg (2009), and Card, Heining, and Kline (2013). In the following we use the notation of Card, Heining, and Kline (2013). We assume that the error term in the wage regression is normally distributed with a variance which differs by year, education and age group. Then we draw a random value of y (i.e. ln(wage)) from a normal distribution $\mathcal{N}(x'\hat{\beta},\, \sigma^2)$. In other words, we add an error term with the standard deviation σ to the expected wage. We use the σ from the Tobit estimation

$$y_i = x_i'\hat{\beta} + \eta_i. \tag{3}$$

In order to draw the imputed wage so that it is above the social security contribution limit, we draw from a truncated distribution. Let c be the censoring point. We use $k = \Phi[(c - x_i'\hat{\beta})/\sigma]$, where Φ represents the standard normal density. Also, let $u \sim U[0, 1]$ represent a uniform random variable. Then we impute an uncensored value for y as

$$y_i = x_i'\hat{\beta} + \sigma\Phi^{-1}[k + u \times (1 - k)]. \tag{4}$$

We fit a series of Tobit models to log daily wages separately by year for the years 1985-2014, age group (years 18-25, 26-35, 36-45, 46-55) and education group (without vocational and school degree lower than Abitur, with vocational training or Abitur or with a university degree) and impute an uncensored value for each censored observation using the estimated parameters from the model and a random draw from the associated (left-censored) distribution (Card, Heining, and Kline, 2013). As in Card, Heining, and Kline (2013) we include the following variables in the Tobit estimations: age, mean log wage in other years, fraction of censored wages in other years, number of full time male employees at the current firm and its square, dummy for 11 or more employees in the firm, fraction of university graduates at the current firm, dummy for individuals observed only 1 year between 1985 and 2014, dummy for employees of 1-worker firm. Thus, as in Card, Heining, and Kline (2013), we replace each censored wage value with a random draw from the upper tail of the appropriate conditional wage distribution. We display the results in Tables B1 and B2.

Comparing these results with the baseline specification excluding jobs spells with censored wages (displayed in Tables 2 and 4) shows that the results are similar with respect to the differences between task groups. The labor supply elasticities are smaller in size when including imputed wages, mainly because of the additional idiosyncratic variation in wages introduced by the imputation procedure.

Table B1: The Labor Supply Elasticity to the Firm by Task Group with Imputed Wages

	Routine	*NRM*	*NRC*
Separation rate to employment			
log wage (ϵ^{e}_{sw})	-1.153***	-1.140***	-0.640***
	(0.012)	(0.018)	(0.015)
Observations	1,866,139	510,170	1,053,137
Separation rate to non-employment			
log wage (ϵ^{n}_{sw})	-1.523***	-1.555***	-1.097***
	(0.008)	(0.013)	(0.013)
Observations	3,554,950	954,905	1,753,047
Hiring probability from employment			
log wage ($\frac{\epsilon_{\theta w}}{1-\theta}$)	1.578***	1.443***	1.585***
	(0.011)	(0.019)	(0.015)
$\epsilon_{\theta w}$	0.953	0.965	0.804
Observations	593,383	202,110	264,820
Share of hires from employment (θ)	0.396	0.331	0.493
Firm-level labor supply elasticity (ϵ_{Lw})	1.576	1.592	0.708

Notes: Cox model. Clustered standard errors at the person level in parentheses. Same control variables as in Table 2. ***, ** and * indicate statistical significance at the 1%, 5% and 10% level respectively.
Source: SIAB and BHP, 1985-2014. Authors' calculations.

Table B2: The Labor Supply Elasticity to the Firm by Task Intensities (TI) with Imputed Wages

	RTI	*NRMTI*	*NRCTI*
Separation rate to employment			
log wage (ϵ_{sw}^{e} mean TI)	-1.110***	-1.028***	-1.106***
	(0.008)	(0.008)	(0.009)
log wage × TI	-0.353***	-0.281***	0.428***
	(0.006)	(0.007)	(0.006)
ϵ_{sw}^{e} (high TI)	-1.463	-1.309	-0.678
ϵ_{sw}^{e} (low TI)	-0.757	-0.747	-1.534
Observations	3,429,446	3,429,446	3,429,446
Separation rate to non-employment			
log wage (ϵ_{sw}^{n} mean TI)	-1.474***	-1.421***	-1.442***
	(0.006)	(0.006)	(0.006)
log wage × TI	-0.264***	-0.150***	0.295***
	(0.005)	(0.005)	(0.005)
ϵ_{sw}^{n} (high TI)	-1.738	-1.571	-1.147
ϵ_{sw}^{n} (low TI)	-1.210	-1.271	-1.737
Observations	6,262,902	6,262,902	6,262,902
Hiring probability from employment			
log wage ($\frac{\epsilon_{\theta w}}{1-\theta}$)	1.565***	1.556***	1.549***
	(0.008)	(0.008)	(0.008)
log wage × TI	-0.053***	-0.087***	0.097***
	(0.007)	(0.007)	(0.007)
$\epsilon_{\theta w}$ (high TI)	0.984	0.956	0.811
$\epsilon_{\theta w}$ (mean TI)	0.937	0.946	0.959
$\epsilon_{\theta w}$ (low TI)	0.838	0.812	0.971
Observations	1,060,314	1,060,314	1,060,314
Share of hires from employment (θ)			
with high TI	0.349	0.349	0.507
with mean TI	0.401	0.392	0.381
with low TI	0.482	0.506	0.331
Firm-level labor supply elasticity (ϵ_{Lw})			
with high TI	2.121	1.832	0.776
with mean TI	1.501	1.349	1.461
with low TI	0.911	0.941	2.232

Notes: Cox model. Clustered standard errors at the person level in parentheses. RTI, NRMTI and NRCTI are standardized with mean zero and standard deviation one. Thus, e.g. workers with low RTI are workers with RTI one standard deviation below the mean, and workers with high RTI are workers with RTI one standard deviation above the mean. Same control variables as in Table 2. ***, ** and * indicate statistical significance at the 1%, 5% and 10% level respectively.
Source: SIAB and BHP, 1985-2014. Authors' calculations.

B.3 Supplementary Tables and Figures

Table B3: Routine Task Intensity (RTI) and its Influence on the Separation Rate Elasticities and the Wage Elasticity of the Share of Recruits Hired from Employment

	Separation rate to employment	*Separation rate to non-employment*	*Hiring probability from employment*
log wage	-1.273***	-1.612***	1.725***
	(0.009)	(0.006)	(0.010)
RTI	1.228***	0.908***	0.443***
	(0.032)	(0.021)	(0.034)
log wage × RTI	-0.315***	-0.227***	-0.114***
	(0.007)	(0.005)	(0.008)
Skill group			
Upper secondary school leaving certificate or vocational training	0.468***	0.206***	0.251***
	(0.011)	(0.007)	(0.009)
University degree or university of applied sciences degree	1.168***	0.743***	-0.233***
	(0.017)	(0.014)	(0.015)
Age group			
26-35	-0.610***	-0.742***	0.650***
	(0.006)	(0.005)	(0.006)
36-45	-1.037***	-1.208***	0.626***
	(0.008)	(0.007)	(0.008)
46-55	-0.921***	-0.856***	0.456***
	(0.010)	(0.006)	(0.009)
Firm size			
Medium (20-250)	-0.001	-0.094***	0.067***
	(0.007)	(0.005)	(0.006)
Large (250-999)	-0.297***	-0.344***	0.066***
	(0.009)	(0.007)	(0.008)
Very large (1000+)	-0.709***	-0.548***	-0.155***
	(0.011)	(0.008)	(0.010)
Foreign	0.078***	0.218***	-0.128***
	(0.010)	(0.007)	(0.009)
Share of high skill workers in firm	-0.170***	-0.166***	-0.236***
	(0.025)	(0.021)	(0.022)
Share of low skill workers in firm	-0.240***	-0.213***	-0.165***
	(0.021)	(0.015)	(0.018)
Share of foreign workers in firm	0.945***	0.691***	-0.048***
	(0.024)	(0.016)	(0.018)
Share of female workers in firm	0.276***	0.257***	0.061***
	(0.017)	(0.012)	(0.014)
Share of part-time workers in firm	-0.312***	-0.267***	0.054**
	(0.027)	(0.020)	(0.024)
Mean age of workers in firm	-0.016***	-0.012***	0.004***
	(0.001)	(0.000)	(0.001)
Unemployment rate	-0.003	0.010***	-0.015***
	(0.003)	(0.002)	(0.004)
Industry dummies	yes	yes	yes
Occupation dummies	yes	yes	yes
Year dummies	yes	yes	yes
Federal state dummies	yes	yes	yes
Observations	2,998,063	5,460,312	979,514

Notes: Clustered standard errors at the person level in parentheses. RTI is standardized with mean zero and standard deviation one. ***, ** and * indicate statistical significance at the 1%, 5% and 10% level respectively.
Source: SIAB and BHP, 1985-2014. Authors' calculations.

Table B4: The Labor Supply Elasticity to the Firm by RTI and Collective Bargaining Coverage

	High coverage	Low coverage	Baseline
Separation rate to employment			
log wage (ϵ^e_{sw} mean RTI)	-1.331***	-0.876***	-1.273***
	(0.022)	(0.016)	(0.009)
log wage × RTI	-0.190***	-0.225***	-0.315***
	(0.022)	(0.015)	(0.007)
ϵ^e_{sw} (high RTI)	-1.521	-1.101	-1.588
ϵ^e_{sw} (low RTI)	-1.141	-0.651	-0.958
Observations	519,173	730,598	2,998,063
Separation rate to non-employment			
log wage (ϵ^n_{sw} mean RTI)	-1.635***	-1.294***	-1.612***
	(0.015)	(0.012)	(0.006)
log wage × RTI	-0.059***	-0.178***	-0.227***
	(0.017)	(0.011)	(0.005)
ϵ^n_{sw} (high RTI)	-1.694	-1.472	-1.839
ϵ^n_{sw} (low RTI)	-1.576	-1.116	-1.385
Observations	1,029,019	1,274,113	5,460,312
Hiring probability from employment			
log wage ($\frac{\epsilon_{\theta w}}{1-\theta}$)	2.053***	1.750***	1.725***
	(0.027)	(0.019)	(0.010)
log wage × RTI	-0.305***	0.002	-0.114***
	(0.031)	(0.018)	(0.008)
$\epsilon_{\theta w}$ (high RTI)	1.145	1.044	1.052
$\epsilon_{\theta w}$ (mean RTI)	1.347	1.026	1.066
$\epsilon_{\theta w}$ (low RTI)	1.099	1.019	1.059
Observations	186,490	270,115	979,514
Share of hires from employment (θ)			
with high RTI	0.345	0.404	0.347
with mean RTI	0.344	0.414	0.382
with low RTI	0.534	0.417	0.424
Firm-level labor supply elasticity (ϵ_{Lw})			
with high RTI	2.010	1.379	2.287
with mean RTI	1.515	0.971	1.690
with low RTI	1.386	0.554	1.103

Notes: Clustered standard errors at the person level in parentheses. RTI is standardized with mean zero and standard deviation one. Thus, workers with low RTI are workers with RTI one standard deviation below the mean, and workers with high RTI are workers with RTI one standard deviation above the mean. Same control variables as in Table 2. ***, ** and * indicate statistical significance at the 1%, 5% and 10% level respectively.
Source: SIAB and BHP, 1985-2014. Authors' calculations.

Table B5: The Labor Supply Elasticity to the Firm by NRMTI and Collective Bargaining Coverage

	High coverage	Low coverage	Baseline
Separation rate to employment			
log wage (ϵ^e_{sw} mean NRMTI)	-1.234***	-0.770***	-1.199***
	(0.021)	(0.015)	(0.009)
log wage × NRMTI	-0.083***	-0.266***	-0.181***
	(0.014)	(0.013)	(0.007)
ϵ^e_{sw} (high NRMTI)	-1.317	-1.036	-1.380
ϵ^e_{sw} (low NRMTI)	-1.151	-0.504	-1.018
Observations	519,173	730,598	2,998,063
Separation rate to non-employment			
log wage (ϵ^n_{sw} mean NRMTI)	-1.650***	-1.219***	-1.570***
	(0.016)	(0.011)	(0.006)
log wage × NRMTI	0.047***	-0.126***	-0.075***
	(0.011)	(0.009)	(0.005)
ϵ^n_{sw} (high NRMTI)	-1.603	-1.345	-1.645
ϵ^n_{sw} (low NRMTI)	-1.697	-1.093	-1.495
Observations	1,029,019	1,274,113	5,460,312
Hiring probability from employment			
log wage ($\frac{\epsilon_{\theta w}}{1-\theta}$)	2.214***	1.742***	1.724***
	(0.028)	(0.018)	(0.010)
log wage × NRMTI	-0.283***	-0.142***	-0.098***
	(0.021)	(0.016)	(0.008)
$\epsilon_{\theta w}$ (high NRMTI)	1.319	1.035	1.085
$\epsilon_{\theta w}$ (mean NRMTI)	1.393	1.038	1.069
$\epsilon_{\theta w}$ (low NRMTI)	1.331	0.999	1.028
Observations	186,490	270,115	979,514
Share of hires from employment (θ)			
with high NRMTI	0.317	0.353	0.333
with mean NRMTI	0.371	0.404	0.380
with low NRMTI	0.467	0.470	0.436
Firm-level labor supply elasticity (ϵ_{Lw})			
with high NRMTI	1.510	1.237	1.852
with mean NRMTI	1.337	0.769	1.559
with low NRMTI	1.262	0.322	1.277

Notes: Clustered standard errors at the person level in parentheses. NRMTI is standardized with mean zero and standard deviation one. Thus, workers with low NRMTI are workers with NRMTI one standard deviation below the mean, and workers with high NRMTI are workers with NRMTI one standard deviation above the mean. Same control variables as in Table 2. ***, ** and * indicate statistical significance at the 1%, 5% and 10% level respectively.
Source: SIAB and BHP, 1985-2014. Authors' calculations.

Table B6: The Labor Supply Elasticity to the Firm by NRCTI and Collective Bargaining Coverage

	High coverage	Low coverage	Baseline
Separation rate to employment			
log wage (ϵ^e_{sw} mean NRCTI)	-1.229***	-0.846***	-1.241***
	(0.020)	(0.016)	(0.009)
log wage × NRCTI	0.209***	0.304***	0.359***
	(0.016)	(0.013)	(0.007)
ϵ^e_{sw} (high NRCTI)	-1.020	-0.542	-0.882
ϵ^e_{sw} (low NRCTI)	-1.438	-1.150	-1.600
Observations	519,173	730,598	2,998,063
Separation rate to non-employment			
log wage (ϵ^n_{sw} mean NRCTI)	-1.629***	-1.257***	-1.582***
	(0.015)	(0.011)	(0.006)
log wage × NRCTI	-0.019	0.189***	0.222***
	(0.013)	(0.009)	(0.005)
ϵ^n_{sw} (high NRCTI)	-1.648	-1.068	-1.360
ϵ^n_{sw} (low NRCTI)	-1.610	-1.446	-1.804
Observations	1,029,019	1,274,113	5,460,312
Hiring probability from employment			
log wage ($\frac{\epsilon_{\theta w}}{1-\theta}$)	2.170***	1.726***	1.717***
	(0.027)	(0.018)	(0.010)
log wage × NRCTI	0.422***	0.096***	0.160***
	(0.025)	(0.016)	(0.009)
$\epsilon_{\theta w}$ (high NRCTI)	1.314	0.980	1.045
$\epsilon_{\theta w}$ (mean NRCTI)	1.437	1.032	1.082
$\epsilon_{\theta w}$ (low NRCTI)	1.176	1.214	1.104
Observations	186,490	270,115	979,514
Share of hires from employment (θ)			
with high NRCTI	0.493	0.462	0.443
with mean NRCTI	0.338	0.402	0.370
with low NRCTI	0.327	0.255	0.291
Firm-level labor supply elasticity (ϵ_{Lw})			
with high NRCTI	1.044	0.387	0.985
with mean NRCTI	1.286	0.906	1.615
with low NRCTI	1.815	1.306	2.241

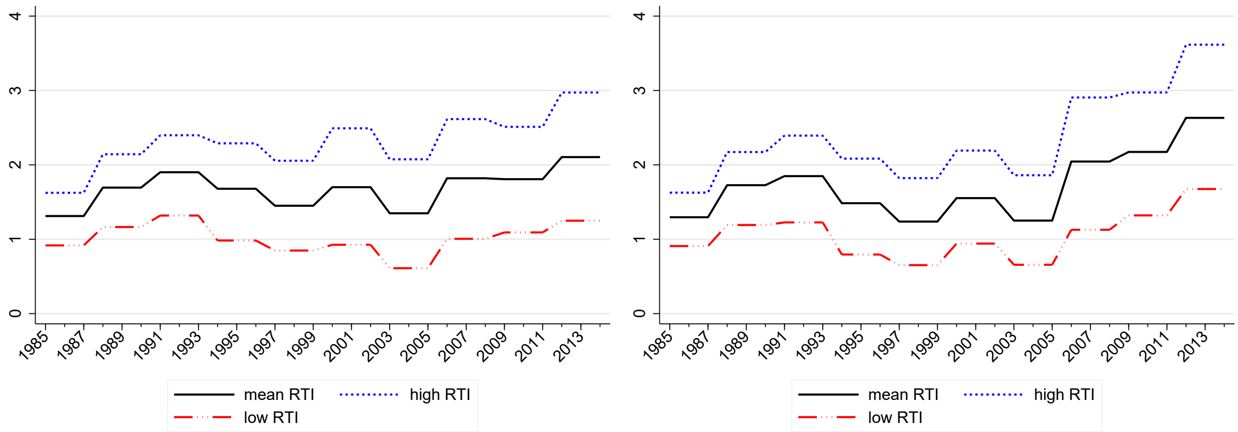
Notes: Clustered standard errors at the person level in parentheses. NRCTI is standardized with mean zero and standard deviation one. Thus, workers with low NRCTI are workers with NRCTI one standard deviation below the mean, and workers with high NRCTI are workers with NRCTI one standard deviation above the mean. Same control variables as in Table 2. ***, ** and * indicate statistical significance at the 1%, 5% and 10% level respectively.
Source: SIAB and BHP, 1985-2014. Authors' calculations.

Table B7: Separation Rate Elasticities by Task Intensities and Tenure Brackets

	RTI	NRMTI	NRCTI
Separation rate elasticity to employment (ϵ^e_{sw})			
Job Tenure: 0-3 years			
log wage	-0.814***	-0.756***	-0.783***
	(0.008)	(0.007)	(0.008)
log wage × TI	-0.251***	-0.135***	0.278***
	(0.006)	(0.006)	(0.006)
Observations	1,359,344	1,359,344	1,359,344
Job Tenure: 3-10 years			
log wage	-0.612***	-0.553***	-0.626***
	(0.015)	(0.015)	(0.016)
log wage × TI	-0.303***	-0.229***	0.333***
	(0.013)	(0.013)	(0.013)
Observations	1,028,293	1,028,293	1,028,293
Job Tenure: 10+ years			
log wage	-0.478***	-0.479***	-0.499***
	(0.029)	(0.029)	(0.029)
log wage × TI	-0.220***	-0.199***	0.308***
	(0.024)	(0.026)	(0.026)
Observations	610,426	610,426	610,426
Separation rate elasticity to non-employment (ϵ^n_{sw})			
Job Tenure: 0-3 years			
log wage	-1.249***	-1.222***	-1.222***
	(0.006)	(0.006)	(0.006)
log wage × TI	-0.196***	-0.031***	0.164***
	(0.005)	(0.005)	(0.005)
Observations	2,504,538	2,504,538	2,504,538
Job Tenure: 3-10 years			
log wage	-1.035***	-0.989***	-1.031***
	(0.013)	(0.012)	(0.013)
log wage × TI	-0.216***	-0.143***	0.228***
	(0.011)	(0.011)	(0.010)
Observations	1,683,269	1,683,269	1,683,269
Job Tenure: 10+ years			
log wage	-0.905***	-0.906***	-0.917***
	(0.017)	(0.017)	(0.016)
log wage × TI	-0.187***	-0.100***	0.212***
	(0.014)	(0.015)	(0.015)
Observations	1,272,505	1,272,505	1,272,505

Notes: Clustered standard errors at the person level in parentheses. We use exponential models for this table. The table shows coefficients of the estimation of separation rate elasticities for high RTI, high NRMTI and high NRCTI workers. RTI, NRMTI and NRCTI are standardized with mean zero and standard deviation one. Thus, e.g. workers with low RTI are workers with RTI one standard deviation below the mean, and workers with high RTI are workers with RTI one standard deviation above the mean. Same control variables as in Table 2. ***, ** and * indicate statistical significance at the 1%, 5% and 10% level respectively.
Source: SIAB and BHP, 1985-2014. Authors' calculations.

Figure B.1: Labor Supply Elasticities for Workers with Different RTI over 3-Year-Intervals

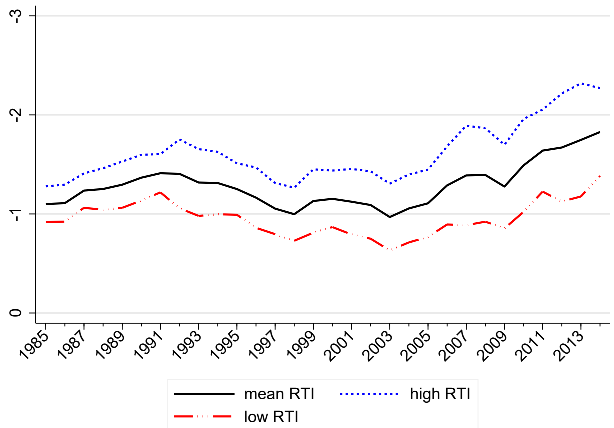


(a) Using subsamples

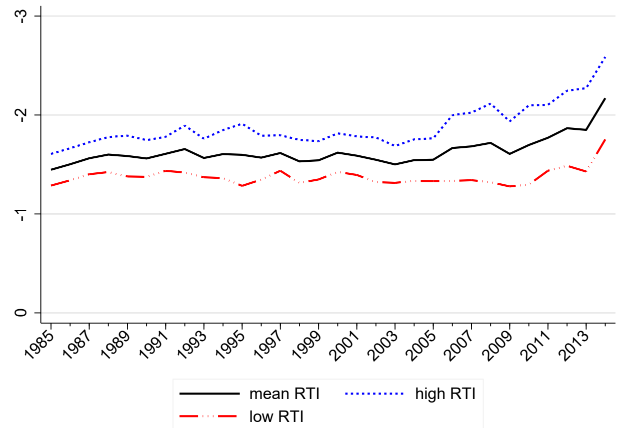
(b) Baseline

Notes: The estimates are derived from the same specification as in Table 4 of the paper. Further, in panel (a) we estimate the main specification separately for 3-year sub-samples. Panel (b) is a pure reproduction of Figure A.1. That is, in panel (b) a three-way interaction with year dummies is added to analyze the development over time, i.e. log wages, RTI and year dummies are interacted. The plotted lines correspond to the sum of the relevant coefficients for workers with mean RTI as well as workers with RTI one standard deviation below ("low RTI") and above ("high RTI") the mean.
Source: Authors' calculations based on SIAB 1985-2014, for West Germany.

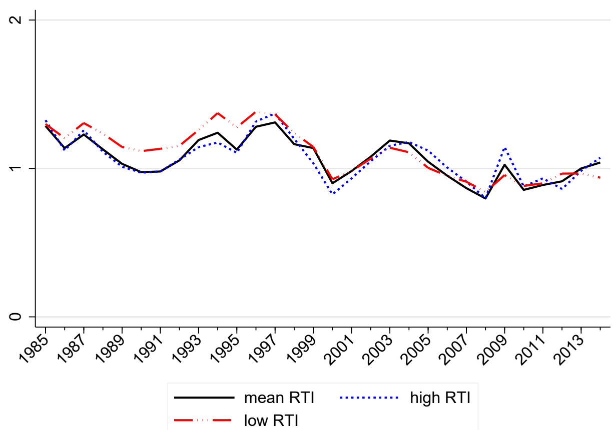
Figure B.2: Components of the Labor Supply Elasticity to the Firm over Time



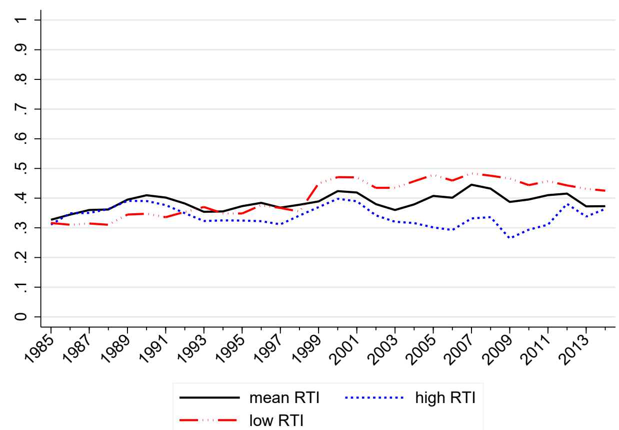
(a) Separation rate elasticity to employment



(b) Separation rate elasticity to non-employment



(c) Elasticity of the share of recruitments from employment



(d) Share of recruitments from employment

Notes: The estimates are derived from the same specification as in Table 4. Further, a three-way interaction with year dummies is added to analyze the development over time, i.e. log wages, RTI and year dummies are interacted. The plotted lines correspond to the sum of the relevant coefficients for workers with mean RTI as well as workers with RTI one standard deviation below ("low RTI") and above ("high RTI") the mean.
Source: Authors' calculations based on SIAB 1985-2014, for West Germany.

B.4 Further Robustness Checks

In the following, we provide additional tests of the robustness of our results. In contrast to the main paper, we use exponential models for these robustness tests for two reasons. First, we show in Table A1 of the paper that the main results do not change qualitatively when using exponential models. Workers with high NRCTI still have a distinctively smaller labor supply elasticity to the firm than workers with high RTI or high NRMTI. The main difference between the two models is that the exponential model does not control for tenure. This increases all estimated elasticities, but does not change the results qualitatively as just described. Second, exponential model are much more feasible in terms of computation times. Cox models need a substantially higher amount of computation time to estimate the same specification.

B.4.1 Full-Interaction Model

It might be a concern that the task-specific features of our control variables, e.g. the age/education profile of workers in different task groups, could bias our estimated elasticities in Table 4. By interacting our TI measures only with the log wage, we do not account for task-specific features of the covariates, such as e.g. the age/education profile of separations. To circumvent this concern, we repeat our main analysis with a full interaction model. In addition to the variables of the baseline model, the full-interaction model includes the interaction of the task intensities (RTI, NRMTI and NRCTI) with every control variable. Therefore, this model accounts for task-specific features of the control variables such as e.g. the age/education profile of separations. Also, as this model fully interacts the task intensity measures with every other variable, it is equivalent to estimating separate regressions by task group. We display the result in Table B8. Our main results hold: Workers with high NRCTI have a distinctively lower firm-level labor supply elasticity and therefore are exposed to a higher degree of monopsony power than workers with high RTI and high NRMTI.

Table B8: The Labor Supply Elasticity to the Firm by Task Intensities (TI). Full-Interaction Model

	RTI	*NRMTI*	*NRCTI*
Separation rate to employment			
log wage (ϵ^e_{sw} mean TI)	-1.436***	-1.376***	-1.406***
	(0.011)	(0.011)	(0.011)
log wage × TI	-0.288***	-0.160***	0.303***
	(0.011)	(0.011)	(0.010)
ϵ^e_{sw} (high TI)	-1.724	-1.536	-1.103
ϵ^e_{sw} (low TI)	-1.148	-1.216	-1.709
Observations	2,998,063	2,998,063	2,998,063
Separation rate to non-employment			
log wage (ϵ^n_{sw} mean TI)	-1.848***	-1.813***	-1.819***
	(0.008)	(0.008)	(0.008)
log wage × TI	-0.253***	-0.071***	0.219***
	(0.008)	(0.008)	(0.008)
ϵ^n_{sw} (high TI)	-2.101	-1.884	-1.600
ϵ^n_{sw} (low TI)	-1.595	-1.742	-2.038
Observations	5,460,312	5,460,312	5,460,312
Hiring probability from employment			
log wage ($\frac{\epsilon_{\theta w}}{1-\theta}$)	1.733***	1.715***	1.710***
	(0.010)	(0.010)	(0.010)
log wage × TI	-0.106***	-0.094***	0.135***
	(0.009)	(0.009)	(0.010)
$\epsilon_{\theta w}$ (high TI)	1.062	1.081	1.028
$\epsilon_{\theta w}$ (mean TI)	1.071	1.063	1.077
$\epsilon_{\theta w}$ (low TI)	1.059	1.020	1.117
Observations	979,514	979,514	979,514
Share of hires from employment (θ)			
with high TI	0.347	0.333	0.443
with mean TI	0.382	0.380	0.370
with low TI	0.424	0.436	0.291
Firm-level labor supply elasticity (ϵ_{Lw})			
with high TI	2.632	2.223	1.455
with mean TI	2.056	1.960	1.995
with low TI	1.494	1.708	2.535

Notes: We use exponential models in this table. Clustered standard errors at the person level in parentheses. RTI, NRMTI and NRCTI are standardized with mean zero and standard deviation one. Thus, e.g. workers with low RTI are workers with RTI one standard deviation below the mean, and workers with high RTI are workers with RTI one standard deviation above the mean. Covariates included in the estimations are education, age, immigrant worker, occupation, sector, year and federal state of the plant controls. Further, we include the shares of low-skilled, high-skilled, female, part-time and immigrant workers in the plant's workforce, dummy variables for plant size, the average age of its workforce and the unemployment rate by year and federal state. We interact RTI, NRMTI and NRCTI with every control variable. ***, ** and * indicate statistical significance at the 1%, 5% and 10% level respectively.
Source: SIAB and BHP, 1985-2014. Authors' calculations.

B.4.2 Sector-Year Fixed Effects

We check for the robustness of our results by including interacted sector-year fixed effects, so that identification comes from variation in wages within sector-year cells, rather than between them. We display the results in Table B9 and find that our main results hold. Namely, workers with high NRCTI face a higher degree of monopsony power than workers with high RTI and high NRMTI.

Table B9: The Labor Supply Elasticity to the Firm by Task Intensities (TI) with Sector-Year Fixed Effects

	RTI	*NRMTI*	*NRCTI*
Separation rate to employment			
log wage (ϵ^e_{sw} mean TI)	-1.445***	-1.368***	-1.413***
	(0.011)	(0.011)	(0.011)
log wage × TI	-0.324***	-0.199***	0.370***
	(0.009)	(0.009)	(0.009)
ϵ^e_{sw} (high TI)	-1.769	-1.567	-1.043
ϵ^e_{sw} (low TI)	-1.121	-1.169	-1.783
Observations	2,998,063	2,998,063	2,998,063
Separation rate to non-employment			
log wage (ϵ^n_{sw} mean TI)	-1.851***	-1.804***	-1.818***
	(0.008)	(0.008)	(0.008)
log wage × TI	-0.255***	-0.107***	0.267***
	(0.007)	(0.007)	(0.007)
ϵ^n_{sw} (high TI)	-2.106	-1.911	-1.551
ϵ^n_{sw} (low TI)	-1.596	-1.697	-2.085
Observations	5,460,312	5,460,312	5,460,312
Hiring probability from employment			
log wage ($\frac{\epsilon_{\theta w}}{1-\theta}$)	1.728***	1.727***	1.720***
	(0.010)	(0.010)	(0.010)
log wage × TI	-0.109***	-0.104***	0.157***
	(0.008)	(0.008)	(0.009)
$\epsilon_{\theta w}$ (high TI)	1.057	1.083	1.045
$\epsilon_{\theta w}$ (mean TI)	1.068	1.071	1.084
$\epsilon_{\theta w}$ (low TI)	1.058	1.033	1.108
Observations	979,495	979,495	979,495
Share of hires from employment (θ)			
with high TI	0.347	0.333	0.443
with mean TI	0.382	0.380	0.370
with low TI	0.424	0.436	0.291
Firm-level labor supply elasticity (ϵ_{Lw})			
with high TI	2.701	2.281	1.323
with mean TI	2.073	1.936	1.998
with low TI	1.457	1.603	2.672

Notes: We use exponential models in this table. Clustered standard errors at the person level in parentheses. RTI, NRMTI and NRCTI are standardized with mean zero and standard deviation one. Thus, e.g. workers with low RTI are workers with RTI one standard deviation below the mean, and workers with high RTI are workers with RTI one standard deviation above the mean. Covariates included in the estimations are education, age, immigrant worker, occupation, sector-year, federal state of the plant controls. Further, we include the shares of low-skilled, high-skilled, female, part-time and immigrant workers in the plant's workforce, dummy variables for plant size, the average age of its workforce and the unemployment rate by year and federal state. ***, ** and * indicate statistical significance at the 1%, 5% and 10% level respectively.
Source: SIAB and BHP, 1985-2014. Authors' calculations.

B.4.3 Analysis by Wage Brackets

To alleviate the concern that our main results are simply driven by the different location of task groups in the wage distribution, we perform different analyses separately by wage brackets. Specifically, we include six 20-Euro wage brackets for (deflated) daily wages (this would amount to 400 Euro monthly wages, given a month of 20 working days): 10-30 Euros, 30-50 Euros, 50-70 Euros, 70-90 Euros, 90-110 Euros and 110-130 Euros. We choose the wage brackets such that they are large enough to include a sufficiently high number of observations and distinct enough so that an estimation by separate wage brackets is meaningful.

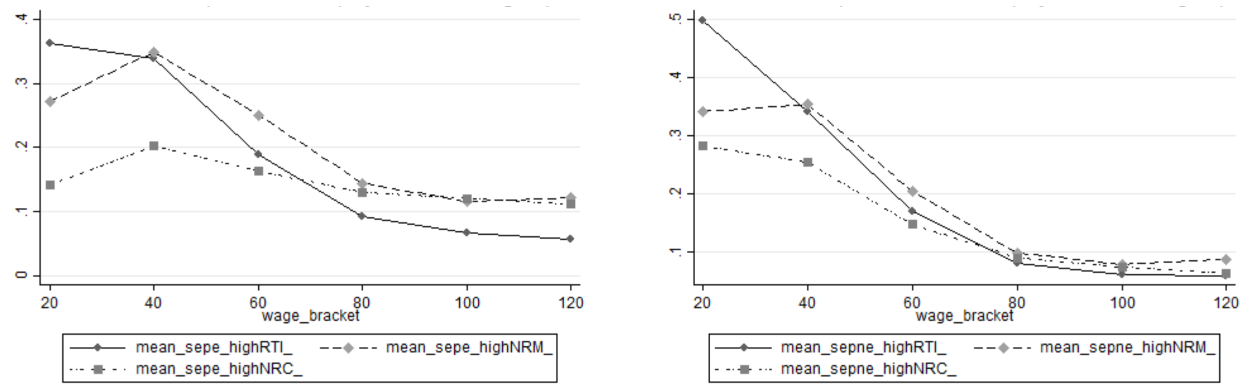
Table B10 shows the number of observations together with the row and column percentages by wage bracket and task intensity. The row percentages display the proportions of each task intensity group within a wage bracket, while the column percentages show the proportion in different wage brackets within task intensity groups. As expected, we find that workers with high NRCTI are much more likely in the upper wage brackets in terms of row and column percentages. Workers with high RTI and high NRMTI are more likely in the middle wage brackets.

Table B10: Number of Observations and Row/Column Percentages by Wage Brackets and Task Intensities

Daily Wage Bracket	High RTI	High NRMTI	High NRCTI	Total
10-30	17,182	27,989	27,494	72,665
row percentage	23.65	38.52	37.84	100
column percentage	1.93	2.14	2.59	2.23
30-50	67,492	102,158	69,846	239,496
row percentage	28.18	42.66	29.16	100
column percentage	7.56	7.82	6.57	7.34
50-70	205,288	396,823	173,233	775,344
row percentage	26.48	51.18	22.34	100
column percentage	23	30.38	16.3	23.77
70-90	345,582	514,595	259,338	1,119,515
row percentage	30.87	45.97	23.17	100
column percentage	38.72	39.39	24.41	34.33
90-110	191,561	208,996	282,070	682,627
row percentage	28.06	30.62	41.32	100
column percentage	21.47	16	26.55	20.93
110-130	65,313	55,816	250,600	371,729
row percentage	17.57	15.02	67.41	100
column percentage	7.32	4.27	23.58	11.4
Total	892,418	1,306,377	1,062,581	3,261,376
row percentage	27.36	40.06	32.58	100
column percentage	100	100	100	100

Notes: RTI, NRMTI and NRCTI are standardized with mean zero and standard deviation one. Thus, e.g. workers with low RTI are workers with RTI one standard deviation below the mean, and workers with high RTI are workers with RTI one standard deviation above the mean.
Source: SIAB and BHP, 1985-2014. Authors' calculations.

Figure B.3: Fitted Values of Separation Rates by Wage Brackets and Task Intensities



(a) Separation to employment

(b) Separation to non-employment

We proceed by illustrating mean separation rates by wage brackets for workers with different task intensities. Specifically, for each wage bracket and worker type (high RTI, high NRMTI, high NRCTI), we estimate the fitted values of separations to employment and separations to non-employment using the covariates of our baseline estimations. We then estimate the mean separation rate for each wage bracket and task intensity. We plot the results in Figure B.3.

In Figure B.3a we observe that the mean separation rate to employment of high RTI workers is relatively high in the lower wage brackets, but decreases strongly for higher wage brackets. In contrast, workers with high NRCTI have relatively low separation rates to employment in the lower wage brackets and do have a relatively smaller decline in the separation rate to employment for the higher wage brackets. Thus, while workers with high RTI have a much higher separation rate to employment than workers with high NRCTI for the lower wage brackets, this relation reverses for the higher wage brackets as workers with high NRCTI have a slightly higher separations to employment. Workers with high NRMTI show similar separation rates as workers with high RTI in low wage brackets, but the decline in separation rates is less strong. Figure B.3b show similar plots as before, but here we use the separation rate to non-employment. Again, workers with high RTI and high NRMTI have a relatively higher separation rate to non-employment for the lower wage brackets than workers with high NRCTI. However, the mean separation rates to non-employment become similar for the different task intensities in the higher wage brackets.

Overall we can conclude from this exercise that separation rates generally decline for workers in higher wage brackets. The level differences between workers with different task intensities in the mean separation rates are relatively high for the lower to middle wage brackets and equalize for higher wage brackets. Therefore, we cannot exclude that composition effects with respect to wage brackets influence our results for the labor supply elasticity to the firm.

To further analyze whether composition effects with respect to wage brackets influence our results, we estimate the labor supply elasticity for workers with different task intensities who are in the same position of the wage distribution. That is, we re-estimate our baseline specification by wage brackets. This exercise shows whether the heterogeneity in high versus low RTI jobs is simply reflecting the different location of workers in the wage distribution or whether it is also present within the same wage bracket. [2] Specifically, we perform our baseline estimations of Table 4 in the paper for the 6 wage brackets defined above (by daily wages: 10-30 Euro, 30-50 Euro, 50-70 Euro, 70-90 Euro, 90-110 Euro and 110-130 Euro).

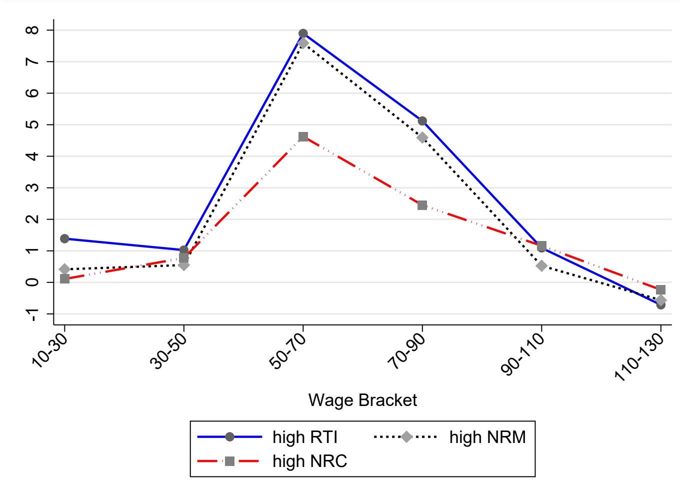
We summarize the estimation results by wage brackets in Figure B.4. It becomes apparent that the labor supply elasticity is increasing from the lowest wage brackets to the middle and then is declining again for the higher wage brackets. Thus, we observe an inverted U-shape for the labor supply elasticity to the firm in wages and the labor supply elasticity is indeed falling in wages (at least for the higher wage brackets) as the Burdett and Mortensen (1998) model suggests. More importantly, we find that high RTI and high NRMTI workers have higher labor supply elasticities for half of the wage brackets and almost equal labor supply elasticities in the other wage brackets. Specifically, the labor supply elasticities of high RTI and high NRMTI workers are higher than the labor supply elasticity of high NRCTI workers for the 10-30 Euro, 50-70 Euro and 70-90 Euro wage brackets. The labor supply elasticities by wage brackets and task intensities are almost equal in the 30-50 Euro, 90-110 Euro and 110-130 Euro wage brackets.

Table B10 shows that almost 45% of high NRCTI workers are located in wage brackets, where we indeed observe lower labor supply elasticities for this group of workers. At the same time, 50% of high NRCTI workers receive daily wages exceeding 90 Euros, corresponding to wage brackets where the labor supply elasticities are generally low and we do not observe differences between workers with different task intensities. Therefore, the workers' location in the wage distribution may indeed overstate the estimated differences in the degree of monopsony the workers face to a certain extent, but they are not pronounced enough to explain these differences completely.

Overall, we thus conclude that workers in occupations with high NRCTI have lower labor supply elasticities to the firm compared to workers with high RTI or high NRMTI even when we compare workers in the same position of the wage distribution. Thus, the heterogeneity in the labor supply elasticity of workers with different task intensities is not just simply reflecting the different location in the wage distribution.

[2] Note that Table B10 shows that this analysis is feasible in terms of observation numbers as workers with different task intensities are sufficiently represented in all wage brackets.

Figure B.4: Labor Supply Elasticities by Wage Brackets



Notes: The estimates are derived from the same specification as in Table 4 of the paper separately by (daily) wage brackets (in Euro). We use exponential models here.
Source: Authors' calculations based on SIAB 1985-2014, for West Germany.

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