Heterogeneous and Differential Rent-sharing – A Fixed-effect Approach
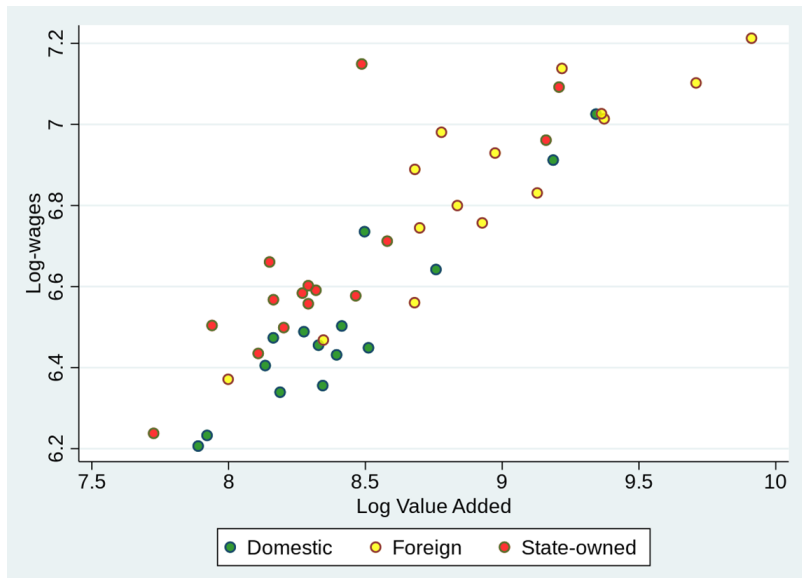
István Boza[1]

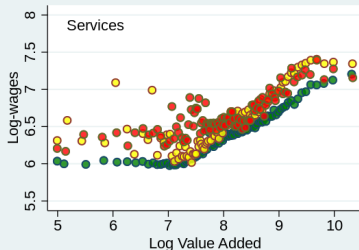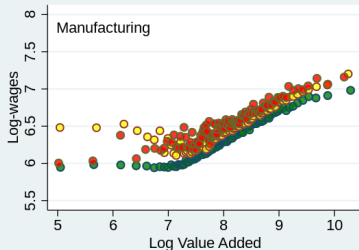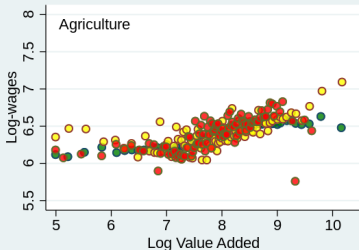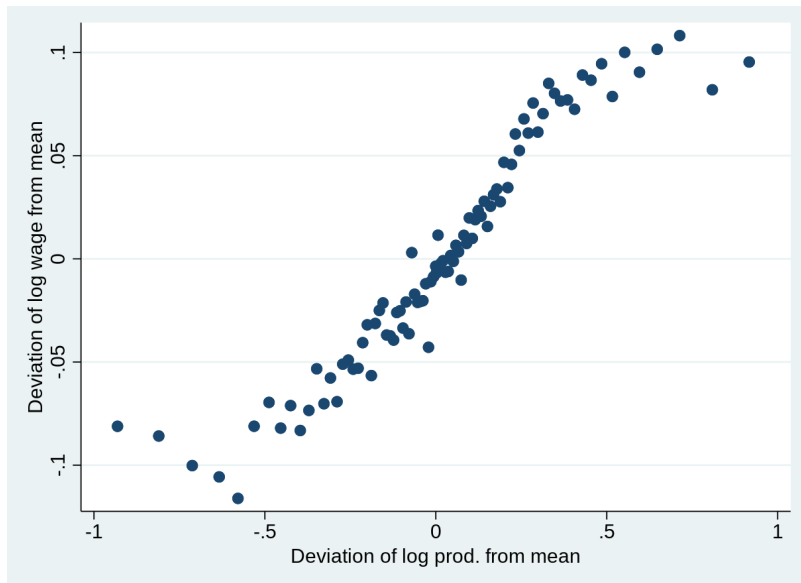[1]Central European University & KRTK KTI

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November 5, 2021

Relation of firm productivity and wages

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Relation of firm productivity and wages - causes

- Upward sloping demand curve (Monopsony models)
  - Due to mobility costs, limited markets, etc.
  - Prod shock $\rightarrow$ increase labor $\rightarrow$ has to offer higher wage
  - But non-discriminating monopsony has to increase all wage!
  - Productivity-wage *pass-through rate* ($\in [0,1]$)
- Bargaining differences (Search models)
  - Due to search costs
  - Firms willing to share productivity rents
  - *Rent-sharing elasticity* ($\in [0,1]$)
- Both interpretation is about the same *empirical* concept
  - the estimation is non-trivial as well $\rightarrow$ this paper

In this paper

- **Survey and nest empirical approaches in a common framework**
- Summarize estimation issues in capturing wage-prod. relation
    - Propose a solution for an issue emerging in advanced models: selectivity
    - Estimate different specifications to illustrate severity of the biases
    - Selectivity turns out to be a second-order issue
- **Second part:**
    - Address the heterogeneity of effects across different firms/ sectors
    - Address within-firm differences in sharing of rents (differential RS)
        - Gender, education, occupation, tenure, age

The goal

We would like to estimate:

$$\ln W_{ijt} = \alpha + \gamma \ln RENT_{jt} + \beta X_{ijt} + \theta_k + \omega_t + \varepsilon_{ijt} \qquad (1)$$

- W is individual or firm level wage measure
- RENT can be:
  - sales per worker
  - value added per worker (sales - costs of production = wage + profit)
- γ measures: P% VA increase leads to γP% wage increase *on average*
- Identifying variation depends on θ_k:
  - sector dummies ('more prod. firms pay more')
  - firm dummies ('given firm pays more, when more prod.')
  - match (job) dummies ('given worker gets more, $\sim$ ')
  - different prod. variation used for identification!

Major threats

- Simultaneity of W and RENT; no exog. variation in RENT (+/-)
  - External IVs: patents, prices, procurement, demand/export shocks
  - Internal IVs: usually based on timing assumptions (past prod shock affects long run wages, only through future prod.)
- But even if only after correlation, there are problems:
- More productive firms may employ better skilled workers (+)
  - Control for observable worker characteristics
  - Within match models $\rightarrow$ only for *stayers* over e.g. 5 years
  - CCK: Use AKM firm effects to remove unobservable skill variation

$$ln\ w_{ijt} = \boldsymbol{X_{ijt}}\boldsymbol{\beta} + \theta_i + \psi_j + \epsilon_{ijt}$$

  - Firm-specific, time-invariant wage premia
    - productivity differences net of worker composition
    - also compensating differentials, efficiency wages, etc.
    - for estimation see Boza (2021)

Minor threats

- More productive firms can have better amenities, pay lower wage (-)
  - Or use compensating differentials for disamenities (+)
  - Using within firm models remove this (Assuming no change over t)
- Measurement error in RENT, especially in longitudinal design (-)
  - Internal IVs should help in this (as well)
- Selection bias if method relies only on subset of individuals (-/+)
  - If rents are shared with long-term and short-term workers differently
  - Within-stayers vs. AKM identified from movers
  - In the paper a proposed solution for this (TV-AKM firm-year effects)

Conventional and novel approaches I.

- Traditional cross-section

$$\ln W_{ijt} = \alpha + \gamma \ln VA_{jt} + \beta X_{ijt} + \lambda_{s(j)} + \omega_t + \varepsilon_{ijt} \qquad (2)$$

- Stayer models (in FE formulation)

$$\ln W_{ijt} = \alpha + \gamma \ln VA_{jt} + \beta X_{ijt} + \mu_{ij} + \omega_t + \varepsilon_{ijt} \qquad (3)$$

- CCK(2016) and CCHK(2018) AKM apporach

$$\ln \psi_j = \alpha + \gamma \ln VA_{jt} + \beta X_{ijt} + \lambda_{s(j)} + \omega_t + \varepsilon_{ijt} \qquad (4)$$

- Own proposition

$$\ln \psi_{jt} = \alpha + \gamma \ln VA_{jt} + \beta X_{ijt} + \widetilde{\psi}_j + \omega_t + \varepsilon_{ijt} \qquad (5)$$

Data

- Admin3 (published 2020), covers 2003-2017
- 50% sample of individuals, quarterly observations used
- wages, employer ID, occupations, working hours from register data
- education is only proxied based on occupational requirements (SO)
- balance sheet data for firms

Inference and sample issues

- Focus on non-zero surplus region (no rent, no share) Illustration
- Individual level outcome vs firm-year level control
  - Within spell: individual data + two-way cluster
  - Collapse to firm-year; weight by number of ind.; (firm+year) clustering
- Instruments used (against measurement error)
  - Winsorized sales per worker
  - Lag of productivity
  - latter only affects wage over persistent prod. change
- Limited mobility bias in AKM (Bonhomme et al., 2021)
  - Projection on the fixed effects: standard errors are not correct
 - KSS (2020) provides correction for this (in OLS setting)

Results I. - Previous methods, OLS

	(1) trad.CS	(2)	(3) CC(H)K	(4) trad.L	(5)	(6) Stayer	(7)
Within:	sector	sector	sector	firm	firm	match	match
Outcome:	lnW	ψ_{jt}	ψ_j	lnW	ψ_{jt}	lnW	ψ_{jt}
LnProd	0.346		0.153	0.072		0.048	
	(0.010)		(0.005)	(0.006)		(0.004)	
Obs. (K)	395		363	368		41,688	
R^2	0.618		0.525	0.950		0.897	
#units	45		44	61751		3415K	

Cluster-robust standard errors in parentheses. All parameters significant at p<0.001.

- (1) → (3) Going AKM: lower role of skill composition
- (1)→(4)→(6): Going within firm/match
  - lower role of other wage elements and skill composition
  - more transitory reactions / measurement error / selection
- (3) vs (6): composition, m. error, selection, amenities, transitory

Results II. - With IV
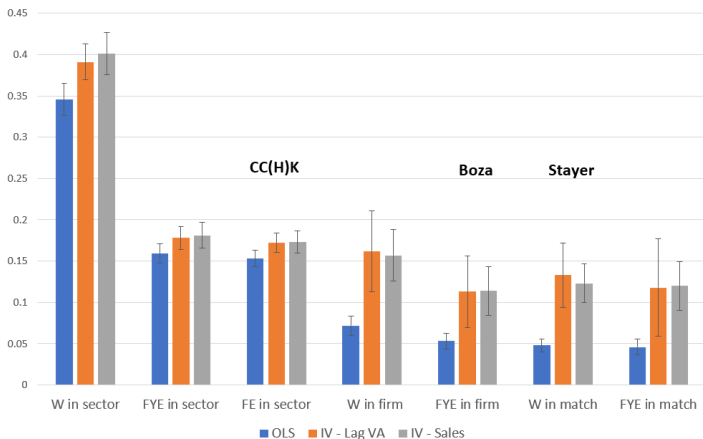
- (3) vs (5) IV: composition, m. error, selection, amenities, transitory
- (5) vs (6) IV: composition, m. error, selection, amenities, transitory
- Composition, m.e., is important, selection may be second-order issue

Heterogeneous and differential settings

$$\ln W_{ih(j)jt} = \alpha + \sum_{h \in H} \gamma_h I_{h(j)} \ln \text{RENT}_{jt} + \beta X_{ijt} + \theta_{hk} + \varepsilon_{ijt} \qquad (6)$$

- *I* represents: Ownership, industry or size
- Focus on three models (with log sales IV)
  - The AKM based model of CCHK "FE in sector"
  - The 'stayers' design "W in match"
  - *The proposed combination "FYE in firm"*

Heterogeneous - Ownership, Industry
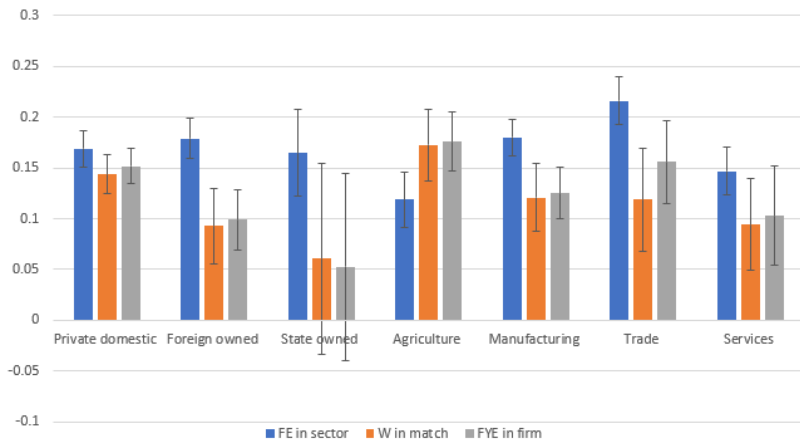
- Different models imply different rankings!
- Heterogeneity across local labor markets with different tightness, number of firms, mobility could be assessed (Criscuolo et al. (2021))

Differential settings

$$\ln W_{g(it)ijt} = \alpha + \sum_{g \in G} \gamma_g I_{g(it)} \ln RENT_{jt} + \beta X_{ijt} + \theta_{gk} + \varepsilon_{ijt} \qquad (7)$$

- W can be individual wage or firm-*group* AKM effect

$$ln \ w_{ijtg} = \boldsymbol{X_{ijtg}}\boldsymbol{\beta} + \theta_i + \Psi_{jg} + \lambda_{k(ij)} + \varepsilon_{ijtg} \qquad (8)$$

- *I* stands for group membership based on e.g. gender, education
- Use model of CCK and CCHK, with an **extra step**
  - Regress firm-group FEs on firm productivity (X group dummy)
  - Still the member of different group can select into differently 'generous' firms → Check the difference within the firm as well
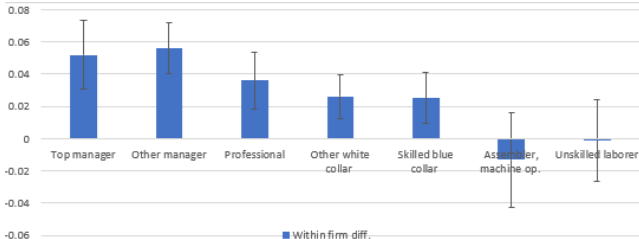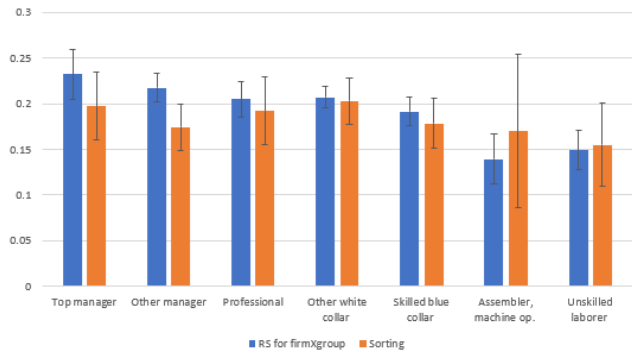
Grouped-AKM approach

Rescaled according to CCK(2016), plotted against prod. percentiles
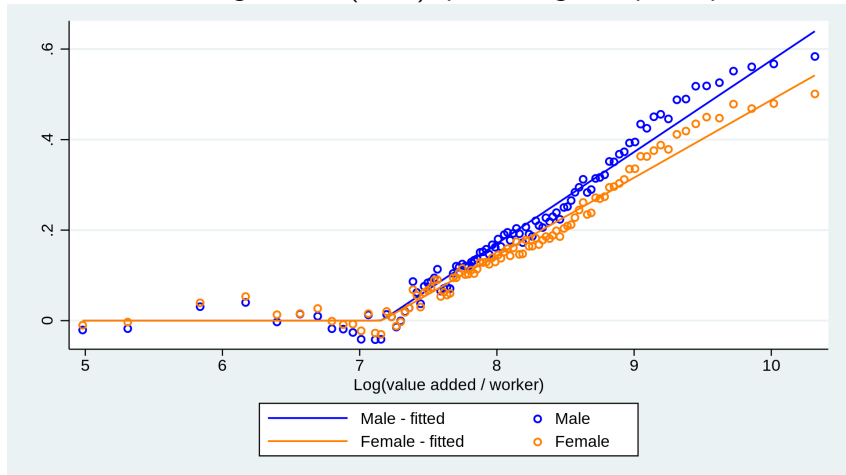
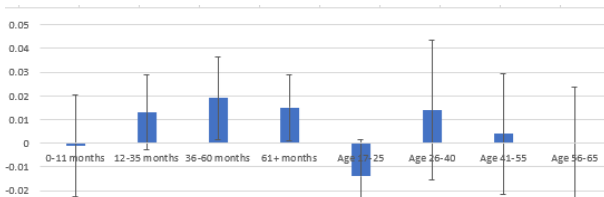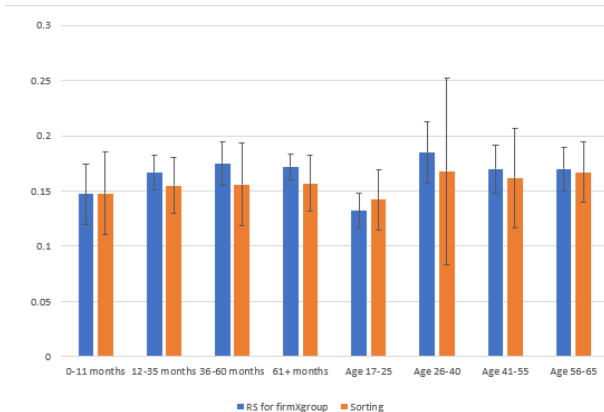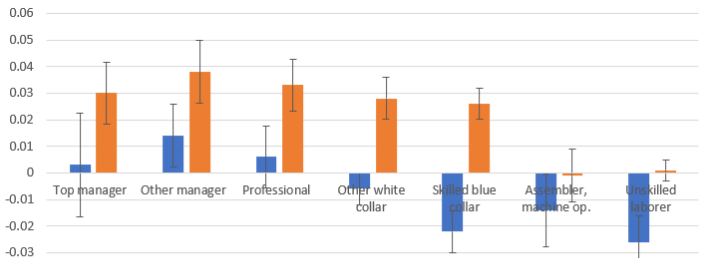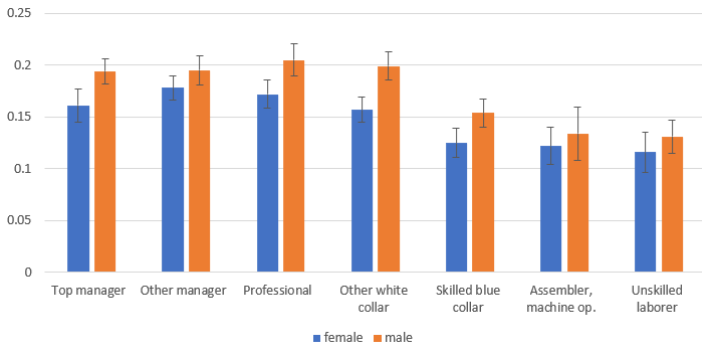# Differential - Gender, Education
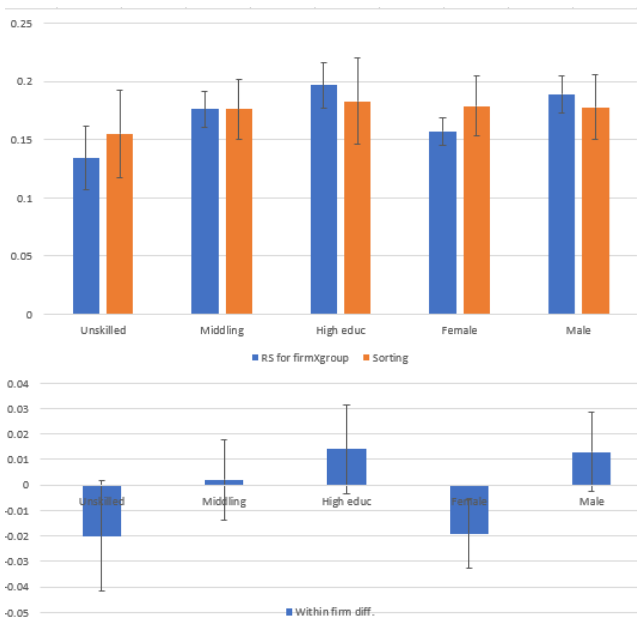
Differential - Occupation

Diff RS w.r.t tenure and age

Gender across jobs
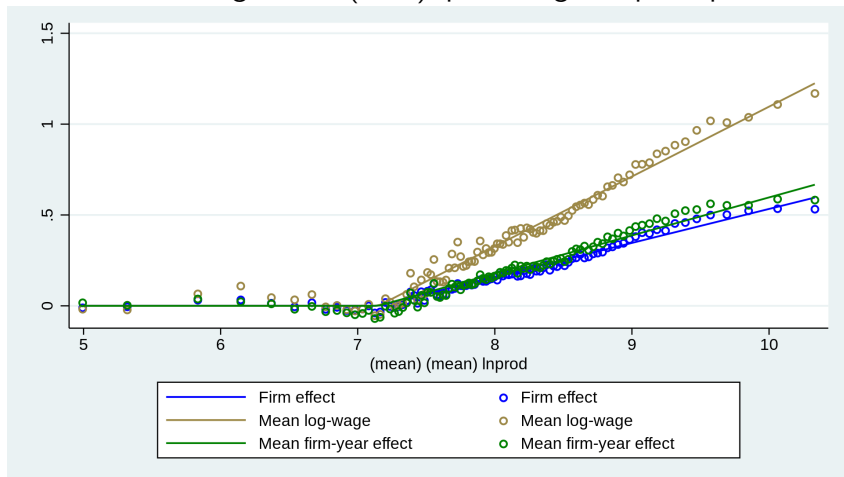
Thank you for your attention!

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Wage-prod relation of firms

Rescaled according to CCK(2016), plotted against prod. percentiles