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# Picking from the top or shedding the bottom? Personnel management, worker quality and firm productivity

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# **Our Starting Point**

- Management practices can be a tool for
  - improved efficiency
  - improved rent capture
- Human resource management, pay, and productivity
  - selection and sorting
  - incentives
  - turnover

[ Lazear 1979; Dostie 2005; Daniel and Heywood 2007; Zwick 2011 ]

• We know there is **between-firm variation** in pay and earnings **inequality** 

 $[ \mbox{ Card et al. (2013); Barth et al. (2014); Song et al. (2015); Card et al. (2016), Alvarez, Benguria, Engbom, Moser (2018) ] }$ 

• We explore **heterogeneous application** of management practices as a **channel** 

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[ Abowd et al. (1999; 2006) ]
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# Research agenda overview

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#### Research agenda overview

We have a set of ongoing projects in this research agenda, broadly addressing the following topics:

- Base-level relationship between management and worker outcomes and worker flows;
- 2 Management practices and wage dispersion;
- 3 Relational contracts and the transmission of organizational practices;
- **4** The patterns and cost of **discrimination** in hiring and firing.

To do this, we link three data sources:

- Linked EE data: Relação Anual de Informações Sociais (RAIS) 2003-2013
- Firm management practices: World Management Survey: 2008, 2013
- Firm productivity: Pesquisa Industrial Anual (PIA) 2003-2013

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# Q1: Base-level relationship and worker flows

Main research question: What is the relationship between observed differences in worker outcomes across firms and management quality?

**Motivation:** There is scant evidence thus far on whether personnel management structures actually translate into real differences in pay, hiring and firing practices. Our first paper aims to document these base relationships before turning to deeper questions using the same data.

- We identify managers and production workers using occupation codes, and estimate AKM person effects for each type of worker.
- We rank workers by their AKM person effects and identify the **distribution of the ranked** person effects of workers in poorly- and well-managed firms.
- We document the relationship between management structures and pay, worker selection (production and managers) and productivity.
- We document the **flow** of different worker types across poorly- and well-managed firms.

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# Q2: Management practices and wage dispersion

Main research question: How does management quality contribute to wage dispersion within firm and across firms?

**Motivation:** We know from Song et al (2017) that in the US, virtually all of the rise in earnings dispersion between workers is accounted for by differences between firms, not within firms. Further, wage gaps between top executives and the average employees are also not growing.

Do differences in personnel management help explain pay differentials across firms (controlling for productivity)? How do results for a middle income country like Brazil differ from a high income country like the US?

- Firms choose through managers: level and sequencing of pay, and contract terms (length, termination policy, etc)
- These drive **firm-level differences in**: wage-seniority relationship, and sorting and retention of high/low ability workers and turnover
- We identify the **patterns of wage-setting** across firms and industries hit by productivity shocks over time.

## Q3: Patterns and cost of discrimination in hiring and firing

**Main research question:** What is the relationship between management practices and discrimination?

**Motivation:** Firms with more formal people management structures are better able to select and retain the best workers, and dismiss the worst workers (result from Q1). There is also evidence of discrimination in hiring in Brazil (Gerard et al 2018). In principle, this should leave less room for discrimination if managers are making decisions based on clear and transparent guidelines (in Jensen and Meckling's world, less room for managerial preferences to be taken into account).

- We document the shares of female and visible minority managers and workers across time in Brazilian firms.
- We focus on the **differences in wages** of these workers versus other workers, and such differences between poorly- and well-managed firms.
- We document the movement patterns of "high-ability" workers in each of the categories, and compare such patterns between poorly- and well-managed firms.

## Q4: Relational contracts and transmission of org practices

**Research question:** How do organizational practices get transmitted across firms?

**Motivation:** Movement of personnel, especially managers, is one possible channel behind **spillover and transfer of practices and corporate culture.** We follow workers over time as they move across different firms, and document the result of such moves.

Specifically, we document the organizational changes (if any) after movement of workers and **movement of middle- and high-level managers**. Organizational changes we explore include management practices, hierarchy levels, span of control, and wage dispersion. Some moves we characterize are:

- From poorly- to well-managed firms (and vice-versa)
- From small to large firms (and v.v.)
- From MNE to non-MNE firms (and v.v.)
- From family to non-family firms (and v.v.)
- From government firms to private firms (and v.v.)

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# Literature

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#### Brief and incomplete literature

Bender, Bloom, Card, Reenen and Wolter (2016) use German EE data linked to  $\mathsf{WMS}$ 

• They find better management is associated with higher productivity, higher pay (establishment effect), sorting of high-paid workers to "better" firms

In Q1, we replicate their analysis in Brazil using **more detailed occupation codes** to cleanly distinguish between production workers and managers and find strikingly similar results.

Engbom and Moser (2017); Alvarez, Benguria, Engbom, Moser (2018)

• They find that a decrease in inequality in Brazil is strongly driven by minimum wage, with spillovers and large declines in firm-specific pay. In Q2 we explore the **role of firm management** in pay practices.

Gerard, Lagos, Severnini and Card (2018)

• They find evidence that non-whites are more likely to work at lower-wage establishment, and that this explains about 20% of the white-nonwhite wage gap for both genders. They conclude that assortative matching accounts for about two- thirds of the under-representation gap for both men and women. The remainder reflects an unexplained preference for white workers at higher-paying establishments.

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# Data

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# Dataset I: RAIS: 2003-2013

- Administrative records collected *from employers* to administer a legislated end-of-year bonus ("thirteenth salary")
- Covers the population of formal-sector jobs (pprox50 million per year)
- Includes information on
  - worker characteristics: education, experience, race, gender ....
  - job characteristics: wage, hours, tenure, occupation . . .
  - employer characteristics: industry, "legal structure", size, location ...
  - reason for separation

We use RAIS under an agreement with the Brazilian Ministry of Labor and Employment (MTE).

# RAIS: Sample for Wage Decomposition

• Full time workers (> 30 hours per week), plants with > 4 workers

#### • Final RAIS Sample

- 269,007,340 worker-year observations
- 80,463,643 workers
- 4,195,934 establishments

#### Earnings decomposition

$$y_{it} = \alpha + x_{it}\beta + \theta_i + \psi_{J(i,t)} + \varepsilon_{it}.$$

- $y_{it} \log$  monthly wage of worker i at time t
- $x_{it}$  vector of observed time-varying worker characteristics
- $\theta_i$  worker effect
- $\psi_{J(i,t)}$  firm-specific contribution to pay

#### Correlations in Components of Log Earnings, 2003-2013

				Component Correlations				
Component	Label	Mean	Std. Dev.	Y	$X\hat{\beta}$	$\hat{\theta}$	$\hat{\psi}$	Ê
Y	Log wage	1.336	0.747	1.000				
$X\hat{\beta}$	Observables	110	0.388	0.105	1.000			
$\hat{ heta}$	Worker effect	0.000	0.510	0.828	052	1.000		
$\hat{\psi}$	Firm effect	0.000	0.311	0.658	0.034	0.332	1.000	
Ê	Sample residual	0.000	0.200	0.279	0.000	0.000	0.000	1.000

		RAIS		WMS	
			2003-2005	2006-2009	2010-2013
	$\theta$	0.512	0.581	0.560	0.604
evolutioned shares	$\psi$	0.184	0.105	0.116	0.124
explained shares.	$x\beta$	0.072	0.013	0.016	0.025
	$2 \times (\theta, \psi)$	0.205	0.213	0.208	0.148
	$2 \times (\theta, x\beta)$	-0.045	0.001	0.006	0.000
	$2 \times (\psi, x\beta)$	-0.008	0.000	0.001	003
	residual	0.078	0.097	0.081	0.074

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# Dataset II: World Management Survey: 2008, 2013

- Survey of management practices
  - operations, performance, target-setting practices
  - personnel practices
- 18 indicators with ordinal scores
  - Score of 1: ("little/no formal management practices")
  - Score of 2 ("some informal management practices")
  - Score of 3: ("formal practices with some weaknesses")
  - Score of 4: ("established formal practices")
  - Score of 5: ("best practices, part of the culture of org")

We construct an **overall management** and a **personnel management** index by:

- Standardizing each indicator, taking the average of all 18 topics and 6 personnel topics, then standardizing the average. The standard deviation for the Brazilian management sample is 0.65 points.
- We classify firms based on the methodological cutpoint of score 3, into "informal practices" firms (below 3) and "formal practices" firms (above 3).

Empirical results

# WMS Sample

- Frame: Bureau van Dijk ORBIS Database for Brazil
- Universe:
  - Manufacturing
  - Between 50-5,000 employees
  - Active in 2008 (2013)
- 2008: simple random sample, 2013: stratified 20% 50-100 and 80% 100-5,000
- 763 unique firms
  - 227 surveyed in 2008 only
  - 228 surveyed in 2013 only
  - 308 surveyed in 2008 and 2013
- 745 with valid matching variables (CNPJ)
- 689 matched to 2008 RAIS population

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# Distribution of management quality in Brazilian firms



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# Summary Statistics of WMS-RAIS Merged Firms

	Mean	SD
Firm characteristics		
Number of employees (WMS)	582.85	(786.97)
Management scores		
Overall management score, raw (WMS)	2.67	(0.68)
Operations management score, raw (WMS)	2.36	(1.06)
Monitoring management score, raw (WMS)	3.03	(0.84)
Target management score, raw (WMS)	2.63	(0.82)
People management score, raw (WMS)	2.51	(0.60)
Worker characteristics		
Share of female workers, total (WMS)	0.30	(0.14)
Share of female workers, total (RAIS)	0.28	(0.22)
Weekly hours worked (RAIS)	43.56	(1.32)
Weekly hours worked (WMS)	43.88	(2.47)
Employee tenure, weeks (RAIS)	59.30	(30.25)
Hourly wage, BRL Reais (RAIS)	7.78	(6.71)
Monthly earnings, BRL Reais (RAIS)	1438.59	(1213.45)
Worker education		. ,
Share of employees with university degree (WMS)	0.12	(0.13)
Share of employees with university degree (RAIS)	0.12	(0.16)

N=689

# Dataset III: PIA - Pesquisa Industrial Anual

- Industrial Survey of Manufacturing Establishments
- Design
  - More than 30 Employees: Census
  - 5-30 Employees: Random sample
- Information
  - Longitudinal tracking
  - Balance sheet
  - Other economic variables

Empirical results

## **Descriptive Statistics**

	Mean	25th p	Median	75th p	SD	Ν
Share workers with college degree	0.07	0	0.02	0.07	0.13	19788
Avg share of high school educated workers	0.41	0.2	0.39	0.58	0.26	19788
Avg share of white workers	0.71	0.56	0.82	0.95	0.3	19788
Log of wage mean (RAIS)	1.74	1.39	1.69	2.01	0.5	19788
Separation mean (RAIS)	0.28	0.18	0.26	0.36	0.16	19788
# employees	260.49	60	91	180	1065.05	20056
Log employees	4.76	4.14	4.54	5.23	1.05	19263
Log capital	13.4	12.6	15.02	16.61	5.47	19537
Log materials	15.49	14.04	15.73	16.99	2.32	19272

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# Empirical results: preliminary work

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## Results: a preview of Q1

In Q1 of our research agenda, we explore how personnel management practices relate to actual HR outcomes and productivity. We five key preliminary findings:

- Consistent with the literature, we find that worker and manager fixed effects are **positively correlated with TFP**.
- We find that better managed firms capture a higher share of total employment over time, consistent with a reallocation story.
- We find evidence of **positive recruitment:** better managed firms hire a larger share of their new recruits from the top of the distribution of worker fixed effects.
- We find suggestive evidence of better worker matching and retention from lower separation rates.
- We decompose the variation of personnel management practices and find that promotion and retention practices show the strongest correlation with manager fixed effects.

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#### R1: AKM person effects correlated with TFP



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# R2: Better managed firms capture higher share of total employment



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#### R3: Better managed firms have better paid employees I



Share of the stock of workers in firms with informal vs formal personnel practices, according to the rank of AKM person effects. AKM effects ranked relative to the 10-year sample (annual rankings suggest similar results).



## R3: Better managed firms have better paid employees II



Share of new hires in firms with informal vs formal personnel practices, according to the rank of AKM person effects. AKM effects ranked relative to the 10-year sample (annual rankings suggest similar results)

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## R4: Better managed firms exhibit better matching



There is a strong negative relationship between the probability of being fired and AKM person effects for both managers and production workers. There is a level difference between firms with informal personnel practices and those with formal personnel practices, suggesting there might be a better employer-employee match in firms with formal personnel practices.

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# Conclusions and Future Direction

- We summarized here the research agenda for our project on Brazil, and presented preliminary results from our work on the first question.
- We hope to have further results from the other questions soon.

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