Ownership Networks and Labor Income a

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Mounu Prem  EIEF

aThe views and opinions expressed are those of the authors alone and do not necessarily reflect those of the Financial Markets Commission of Chile (CMF) or the Central Bank of Chile.
Firms in business groups represent a large share of public firms in emerging and developed markets.

Evidence that firm value, financing policies, investment, etc, related to business-group affiliation.

**Our goal:** How does business groups affect labor income?

- Business groups as a source of variation in corporate ownership.
- Business group $\Rightarrow$ Legally independent firms, often in different industries, but controlled by same ultimate shareholder.
- Case study: Chile $\Rightarrow$ High inequality and high relevance of business groups.
- Side effect: Better understand why groups exists, costs and benefits.
What is a Business Group (BG)?

PARENT LEVEL INFORMATION

- AntarChile
  - Market Cap: April 30, 2018
    - $105.19 million
  - 60,82%
  - 9,58%

- IGMar
  - Market Cap: April 30, 2018
    - $697.3 million
  - 81,93%

- Empresas Copec
  - Market Cap: April 30, 2018
    - $1,094.9 million
  - 59,98%
  - 99,99%
  - 99,13%
  - 99,83%

- Colbún
  - Market Cap: April 30, 2018
    - $1,054.3 million
  - 99,83%

- Grouco
  - 39,75%

- COPEC
  - 35,94%

- Terpel
  - 99,86%

- AGEFA
  - 50,00%
What We Do

- **Data**
  - Matched employer-employee from Unemployment Insurance (2004-2016)
  - Ownership structure of business groups

- **Empirical Strategy**
  - Look at relationship between business group affiliation and labor income
  - We focus on earnings that are received by labor (not owners)
  - Exploit cross-sectional and time-series variation in ownership networks (i.e., business groups)
  - Use AKM (1999) to account for unobserved worker skills
  - Combine with matching procedure given that business group affiliation is not random
Preview of Findings

1. BGs affiliation is related to higher earnings and higher within firm inequality
   - True in the cross-section, and panel, exploiting transitions of firms and workers

2. Both effects are driven by the increase in wages of top workers

3. Two-thirds of the higher earnings result is driven by increase in average skills

4. Mechanisms:
   4.1 Insurance: Not relevant
   4.2 Rent-sharing: Not relevant
   4.3 Hierarchies (Garicano & Rossi-Hansberg, 2015): Relevant
1. **Business Groups**

2. **Common Ownership and Labor/CEOs**

3. **Firms and Earnings Inequality**
   Mueller, Ouimet, and Simintzi (2017), Alvarez et al. (2018), Song et al. (2019), Lamadon et al. (2019)
1 Business Groups and Inequality: Basic Descriptives

2 What Happens When a Firm and Workers Join a BG?

3 Mechanisms
Business Groups and Inequality: Basic Descriptives
35,410 firms: 383 business-group firms; 35,027 stand-alone firms
2,436,441 workers: 99,996 in group firms; 2,336,445 in stand-alone firms

No relevant changes in earnings inequality decomposition between 2004 and 2016.
Empirical Strategy: Panel Regression

\[ \bar{y}_{jts} = \beta BG_{jt} + \gamma LogEmployment_{jt} + \delta comp_{jt} + \psi_{ts} + \epsilon_{jts} \]

- \( j, t, \) and \( s \) are firm, year, and sector
- \( \bar{y}_{jts} \) is average log wage or log wage standard deviation
- \( BG_{jt} \) is a dummy for firms that belong to a BG in year \( t \)
- \( LogEmployment_{jt} \) and \( comp_{jt} \) control for firm size and workforce composition
BGs Pay More on Average, in Particular to Top Workers

<table>
<thead>
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<td>0.323*** (0.025)</td>
<td>0.349*** (0.026)</td>
<td>0.374*** (0.027)</td>
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<td>0.071*** (0.002)</td>
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<td>Top-bottom</td>
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<td>0.241</td>
<td>0.233</td>
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</table>

Observations: 258,322
R-squared: 0.228
Sector-Year FE: Yes

Notes: *** p < 0.01, ** p < 0.05, * p < 0.1
### Higher Within-Firm Inequality in BG Firms

<table>
<thead>
<tr>
<th></th>
<th>(1) Std Deviation of Log Earnings</th>
<th>(2)</th>
<th>(3)</th>
<th>(4) Inter-decile range</th>
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<th>(6)</th>
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<td>0.056***</td>
<td>0.637***</td>
<td>0.065</td>
<td>0.176***</td>
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<td>(0.006)</td>
<td>(0.006)</td>
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<td>0.135</td>
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<td>Yes</td>
<td>Yes</td>
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<td>0.412</td>
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<td>1.492</td>
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**BG Premium Robust to Skill Composition: On Average but not Dispersion**

\[ y_{i,j,t} = \theta_i + \phi_j + X_{i,t}'\Omega + \tau_t + \epsilon_{i,j,t} \]

<table>
<thead>
<tr>
<th></th>
<th>(1) Log average earnings</th>
<th>(2) Std Deviation of Log Earnings</th>
<th>(3) Inter-decile range: 90-10</th>
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<tbody>
<tr>
<td></td>
<td>Baseline</td>
<td>AKM</td>
<td>Matching</td>
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<tr>
<td>Business Group</td>
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<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.427***</td>
<td>0.115***</td>
<td>0.158***</td>
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<td>(0.025)</td>
<td>(0.009)</td>
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<td>79,393</td>
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<td>R-squared</td>
<td>0.236</td>
<td>0.800</td>
<td>0.574</td>
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<td>Sector-Year FE</td>
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<td>Yes</td>
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<td>Baseline controls</td>
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<td>Yes</td>
<td>Yes</td>
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<tr>
<td>Matching-cell FE</td>
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<tr>
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<td>6.805</td>
<td>7.043</td>
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<td>SD DV</td>
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<td>0.520</td>
<td>0.506</td>
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What Happens When a Firm and Workers Join a BG?
Preferred Research Design: Matching Difference-in-Difference

- **Treated firms**: Firms that join business groups (105)

- **Control firms**: Selected with matching using coarsened exact matching (Iacus et al., 2012)

- **Matching on**: Industrial sector, deciles for the number of workers and total payroll, and whether the firm is publicly listed or not, in two rounds

- We matched 104 out of the 105 firms, we present results with all the potential controls but weighted by the number of control firms available in each match

- **Main specification**:

\[
\bar{y}_{jrt} = \beta(Entry_j \times Post_{jt}) + \alpha_j + \alpha_{rt} + \epsilon_{jrt}
\]
### Business Group Transitions ⇒ Increase in Earnings Dispersion

<table>
<thead>
<tr>
<th></th>
<th>(1) Log average earnings</th>
<th>(2) Log average earnings</th>
<th>(3) Std Deviation of Log Earnings</th>
<th>(4) Std Deviation of Log Earnings</th>
<th>(5) Std Deviation of Log Earnings</th>
<th>(6) Std Deviation of Log Earnings</th>
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<td>Firm Fixed Effects</td>
<td>Matching-DID</td>
<td>Firm Fixed Effects</td>
<td>Matching-DID</td>
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<td>Matching-DID</td>
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<td>0.037**</td>
<td>0.013*</td>
<td>0.016***</td>
<td>0.014**</td>
<td>0.019***</td>
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</tr>
<tr>
<td></td>
<td>(0.015)</td>
<td>(0.007)</td>
<td>(0.006)</td>
<td>(0.006)</td>
<td>(0.007)</td>
<td></td>
</tr>
<tr>
<td>Post × Entering Group</td>
<td>0.022</td>
<td>0.019***</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.018)</td>
<td></td>
<td></td>
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<tr>
<td>Observations</td>
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<td>258,015</td>
<td>8629</td>
<td>258,017</td>
<td>258,015</td>
<td>8629</td>
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<tr>
<td>R-squared</td>
<td>0.950</td>
<td>0.973</td>
<td>0.964</td>
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<td>Yes</td>
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<td>Sector-Year FE</td>
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<td>No</td>
<td>Yes</td>
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Business Group Transitions: Effect on Dispersion, not Average

(c) Log Average Earnings

(d) Log Earnings Dispersion
Business Group Transitions $\Rightarrow$ Increase in Earnings at the Top

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<tr>
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<th>(5)</th>
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<td>20-30</td>
<td>30-40</td>
<td>40-50</td>
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<td>70-80</td>
<td>80-90</td>
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**Panel A: Firm Fixed Effects**

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<th>0.035*</th>
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<th>0.039**</th>
<th>0.045**</th>
<th>0.053***</th>
<th>0.054***</th>
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<td>(0.015)</td>
<td>(0.018)</td>
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Observations: 258,017
R-squared: 0.855
Sector-Year FE: Yes
Firm FE: Yes

**Panel B: Matching-DID**

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<th>-0.006</th>
<th>0.001</th>
<th>0.006</th>
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<th>0.012</th>
<th>0.028</th>
<th>0.040*</th>
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<td>(0.020)</td>
<td>(0.020)</td>
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<td>(0.021)</td>
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<td>(0.024)</td>
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Observations: 8629
R-squared: 0.921
Firm FE: Yes
Year FE: Yes
Cell-Year FE: Yes
## Worker Transitions ⇒ Higher Earnings

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<td>2,510,300</td>
<td>2,489,486</td>
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<td>Yes</td>
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<td>Yes</td>
<td>No</td>
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<td>AKM Worker FE</td>
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<td>Yes</td>
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<td>No</td>
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<td>0.572</td>
<td>0.579</td>
<td>0.544</td>
</tr>
</tbody>
</table>
Mechanisms
Mechanisms: Exploiting Heterogeneity Analysis

1. Incentives: Unemployment insurance within BGs (Cestone et al., 2017)
   - Should imply negative BG premium, counterfactual with our results
   - Alternative incentive story: Tournaments $\Rightarrow$ $\uparrow$ teams, $\uparrow$ competition, $\uparrow$ dispersion
   - Alternative incentive story: Comparisons between firms within BGs

2. Rent-Sharing: Family ownership $\Rightarrow$ Labor relations $\Rightarrow$ Rent sharing (Muller and Philippon, 2010)
   - Interaction with family owned BG
   - Alternative rent-sharing story of nepotism and agency problems appears counterfactual

3. Organizational Advantage: More complex organization $\Rightarrow$ $\uparrow$ Value of workers (Garicano & Rossi-Hansberg, 2006)
   - By increasing the returns to knowledge
   - Interaction with proxies of business group complexity, e.g., number of layers, number of sectors, size of firm at the top
## Heterogeneity Analysis: Testing the Mechanisms

<table>
<thead>
<tr>
<th>(1) Group # Firms</th>
<th>(2) Group # Employees</th>
<th>(3) Group # Sectors</th>
<th>(4) # of ownership layers</th>
<th>(5) Employment firm at the top</th>
<th>(6) Firm at the top</th>
<th>(7) Largest firm</th>
<th>(8) Family group</th>
</tr>
</thead>
<tbody>
<tr>
<td>Panel A: Log avg earnings</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Business group × Z</td>
<td>0.002*</td>
<td>0.012</td>
<td>0.013**</td>
<td>0.034**</td>
<td>0.011*</td>
<td>-0.064</td>
<td>-0.178***</td>
</tr>
<tr>
<td></td>
<td>(0.001)</td>
<td>(0.015)</td>
<td>(0.005)</td>
<td>(0.014)</td>
<td>(0.006)</td>
<td>(0.048)</td>
<td>(0.065)</td>
</tr>
<tr>
<td>Business Group</td>
<td>0.243***</td>
<td>0.234***</td>
<td>0.289***</td>
<td>0.290***</td>
<td>0.289***</td>
<td>0.346***</td>
<td>0.302***</td>
</tr>
<tr>
<td></td>
<td>(0.032)</td>
<td>(0.072)</td>
<td>(0.017)</td>
<td>(0.017)</td>
<td>(0.017)</td>
<td>(0.045)</td>
<td>(0.018)</td>
</tr>
<tr>
<td>Panel B: Top decile</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Business group × Z</td>
<td>0.001</td>
<td>-0.007</td>
<td>0.006</td>
<td>0.028*</td>
<td>0.015**</td>
<td>-0.039</td>
<td>-0.183**</td>
</tr>
<tr>
<td></td>
<td>(0.001)</td>
<td>(0.017)</td>
<td>(0.006)</td>
<td>(0.017)</td>
<td>(0.007)</td>
<td>(0.053)</td>
<td>(0.075)</td>
</tr>
<tr>
<td>Business Group</td>
<td>0.329***</td>
<td>0.390***</td>
<td>0.359***</td>
<td>0.360***</td>
<td>0.359***</td>
<td>0.394***</td>
<td>0.373***</td>
</tr>
<tr>
<td></td>
<td>(0.039)</td>
<td>(0.082)</td>
<td>(0.020)</td>
<td>(0.020)</td>
<td>(0.020)</td>
<td>(0.051)</td>
<td>(0.020)</td>
</tr>
<tr>
<td>Panel C: Inter-decile range 90-10</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Business group × Z</td>
<td>-0.001</td>
<td>-0.027*</td>
<td>-0.013**</td>
<td>-0.013</td>
<td>0.007</td>
<td>0.009</td>
<td>-0.049</td>
</tr>
<tr>
<td></td>
<td>(0.001)</td>
<td>(0.016)</td>
<td>(0.006)</td>
<td>(0.016)</td>
<td>(0.008)</td>
<td>(0.056)</td>
<td>(0.054)</td>
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<tr>
<td>Business Group</td>
<td>0.188***</td>
<td>0.291***</td>
<td>0.168***</td>
<td>0.168***</td>
<td>0.168***</td>
<td>0.160***</td>
<td>0.171***</td>
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<tr>
<td></td>
<td>(0.034)</td>
<td>(0.076)</td>
<td>(0.018)</td>
<td>(0.018)</td>
<td>(0.018)</td>
<td>(0.053)</td>
<td>(0.019)</td>
</tr>
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<td>Observations</td>
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<td>258,320</td>
<td>258,320</td>
<td>258,320</td>
<td>258,320</td>
<td>258,320</td>
<td>258,320</td>
</tr>
<tr>
<td>Sector-Year FE</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>AKM controls</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
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<td>Yes</td>
<td>Yes</td>
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</tbody>
</table>

Observations 258,320
Conclusions

- **Robust Fact:** Ownership networks increases the wages of top workers, relative to bottom

- Results are robust to sorting of skills and sorting of firms to business groups

- One mechanism consistent with the data: Organizational advantage of business groups
  - Allows for higher returns to knowledge ⇒ Match effect between high-skill workers and BGs
Backup Slides
## Summary Statistics

<table>
<thead>
<tr>
<th></th>
<th>(1) Business-group</th>
<th>(2) Stand-alone</th>
<th>(3) Difference</th>
<th>p-value</th>
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<tbody>
<tr>
<td>Number of firms</td>
<td>383</td>
<td>35,027</td>
<td></td>
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<tr>
<td>Total workers</td>
<td>465,858</td>
<td>9,130,398</td>
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<tr>
<td>Firm employment</td>
<td>435.45</td>
<td>118.97</td>
<td>316.48</td>
<td>(942.87)</td>
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<tr>
<td>Log Average earnings at the firm</td>
<td>7.41</td>
<td>6.80</td>
<td>0.60</td>
<td>(0.48)</td>
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<tr>
<td>Log 25th percentile of earnings at the firm</td>
<td>6.87</td>
<td>6.36</td>
<td>0.51</td>
<td>(0.51)</td>
</tr>
<tr>
<td>Log 50th percentile of earnings at the firm</td>
<td>7.17</td>
<td>6.60</td>
<td>0.57</td>
<td>(0.56)</td>
</tr>
<tr>
<td>Log 75th percentile of earnings at the firm</td>
<td>7.49</td>
<td>6.84</td>
<td>0.57</td>
<td>(0.57)</td>
</tr>
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<td>Firm std dev of earnings</td>
<td>0.48</td>
<td>0.41</td>
<td>0.07</td>
<td>(0.11)</td>
</tr>
<tr>
<td>Workers tenure</td>
<td>2.92</td>
<td>2.60</td>
<td>0.32</td>
<td>(2.37)</td>
</tr>
<tr>
<td>Workers age</td>
<td>37.30</td>
<td>37.91</td>
<td>-0.61</td>
<td>(3.68)</td>
</tr>
<tr>
<td>Female workers</td>
<td>0.24</td>
<td>0.34</td>
<td>-0.10</td>
<td>(0.24)</td>
</tr>
</tbody>
</table>
No Relevant Changes in Earnings Inequality Between 2004 and 2016

\[
\text{Overall Dispersion} = \text{Between-Firm Dispersion} + \sum \omega_{jt} \times \text{Within-Firm Dispersion}.
\]

\[
\text{var}(y_{ijt}) = \text{var}(\bar{y}_{jt}) + \sum \omega_{jt} \times \text{var}(y_{ijt} | i \in j).
\]
<table>
<thead>
<tr>
<th></th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
<th>(5)</th>
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<tr>
<td></td>
<td>Log Average Earnings</td>
<td></td>
<td>Std Deviation of Log Earnings</td>
<td></td>
<td></td>
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<tr>
<td>Business Group</td>
<td>0.418***</td>
<td>0.426***</td>
<td>0.032*</td>
<td>0.067***</td>
<td>0.070***</td>
<td>0.015**</td>
</tr>
<tr>
<td></td>
<td>(0.027)</td>
<td>(0.026)</td>
<td>(0.017)</td>
<td>(0.006)</td>
<td>(0.006)</td>
<td>(0.006)</td>
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<tr>
<td>Log employment</td>
<td>0.063***</td>
<td></td>
<td>0.021***</td>
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<tr>
<td></td>
<td>(0.003)</td>
<td></td>
<td>(0.001)</td>
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<td>Observations</td>
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<td>258,322</td>
<td>258,017</td>
<td>258,322</td>
<td>258,322</td>
<td>258,017</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.239</td>
<td>0.242</td>
<td>0.949</td>
<td>0.136</td>
<td>0.139</td>
<td>0.833</td>
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<tr>
<td>Sector-Year FE</td>
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<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
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<tr>
<td>Employment centiles FE</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
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<tr>
<td>Firm FE</td>
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<td>No</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
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<tr>
<td>Mean DV</td>
<td>6.704</td>
<td>6.704</td>
<td>6.704</td>
<td>0.417</td>
<td>0.417</td>
<td>0.417</td>
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<tr>
<td>SD DV</td>
<td>0.497</td>
<td>0.497</td>
<td>0.497</td>
<td>0.164</td>
<td>0.164</td>
<td>0.164</td>
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### Earnings Variance Decomposition

<table>
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<tr>
<th></th>
<th>Baseline</th>
<th>Adds group effects</th>
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<tbody>
<tr>
<td><strong>Variance of worker effects</strong></td>
<td>0.21 (0.51)</td>
<td>0.21 (0.51)</td>
</tr>
<tr>
<td><strong>Variance of avg worker effects</strong></td>
<td>0.07 (0.17)</td>
<td>0.07 (0.17)</td>
</tr>
<tr>
<td><strong>Variance of demean worker effects</strong></td>
<td>0.14 (0.34)</td>
<td>0.14 (0.34)</td>
</tr>
<tr>
<td><strong>Variance of firm effects</strong></td>
<td>0.07 (0.18) 0.07 (0.18)</td>
<td>0.07 (0.18)</td>
</tr>
<tr>
<td><strong>Variance of avg firm effects</strong></td>
<td></td>
<td>0.00 (0.00)</td>
</tr>
<tr>
<td><strong>Variance of demean firm effects</strong></td>
<td></td>
<td>0.07 (0.18)</td>
</tr>
<tr>
<td><strong>2 × Covariance worker-firm effects</strong></td>
<td>0.08 (0.19) 0.08 (0.19)</td>
<td>0.08 (0.19) 0.08 (0.19)</td>
</tr>
<tr>
<td><strong>Variance of residuals</strong></td>
<td>0.05 (0.12) 0.05 (0.12)</td>
<td>0.05 (0.12) 0.05 (0.12)</td>
</tr>
<tr>
<td><strong>Variance of group effects</strong></td>
<td></td>
<td>0.00 (0.00)</td>
</tr>
<tr>
<td><strong>2 × Covariance group-firm effects</strong></td>
<td></td>
<td>0.00 (0.00)</td>
</tr>
<tr>
<td><strong>2 × Covariance group-worker effects</strong></td>
<td></td>
<td>0.00 (0.00)</td>
</tr>
</tbody>
</table>
### Summary Statistics for Firms Transitioning to Business Groups

<table>
<thead>
<tr>
<th></th>
<th>(1) Mean</th>
<th>(2) Standard deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Firm employment</td>
<td>364.52</td>
<td>955.86</td>
</tr>
<tr>
<td>Log Average earnings at the firm</td>
<td>7.24</td>
<td>0.50</td>
</tr>
<tr>
<td>Log 25th percentile of earnings at the firm</td>
<td>6.75</td>
<td>0.49</td>
</tr>
<tr>
<td>Log 50th percentile of earnings at the firm</td>
<td>7.07</td>
<td>0.53</td>
</tr>
<tr>
<td>Log 75th percentile of earnings at the firm</td>
<td>7.72</td>
<td>0.50</td>
</tr>
<tr>
<td>Firm std dev of earnings</td>
<td>0.49</td>
<td>0.12</td>
</tr>
<tr>
<td>Workers tenure</td>
<td>1.96</td>
<td>1.43</td>
</tr>
<tr>
<td>Workers age</td>
<td>35.99</td>
<td>8.83</td>
</tr>
<tr>
<td>Female workers</td>
<td>0.25</td>
<td>0.20</td>
</tr>
</tbody>
</table>