

# **Automation and Inequality: How Robots Shift Income Between Workers and Owners by Galassi & MacKenzie**

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CIDE, Mexico City

BIS/Banxico Research Conference on Labor Markets, 2025

# Summary of the paper

- Impact of robot adoption on firms, and the distribution of pay between firm owners and workers.
- DiD design + event study where robot imports measure robot adoption.
- Superb data (!): matched firm/employer-employee tax records with the ability to identify firm owners and their income sources.
- Summary of results: Robot adoption leads to:

Scale outcomes	Productivity outcomes	Distribution outcomes
↑ revenues	↑ payroll p.w.	↑ labor share
↑ value added	∅ value added p.w.	∅ owner income share
↑ employment	∅ revenues p.w.	∅ dividend share
↑ payroll		∅ owner payout share
↑ owner income		

## More on the paper

- Results are robust to binary vs. continuous treatment.
- Two crucial aspects of the data:
  - ① Worker-only payroll measure.
  - ② The data include small firms (with fewer than 10 workers).
- Separation of owners' employment payment from payroll drives the labor share effect and some of the productivity results. Otherwise, there is a null effect on the labor share and a positive effect on value added p.w., and revenues p.w..
- Small firms seem to drive the effect on owner income, labor share, and owner income share. Excluding small firms renders the effects null.
- Many potentially interesting results pending release approval from Statistics Canada.

## Comments: Design and measurement

- The authors should implement a staggered DiD design (Callaway & Santa'Anna 2021), and a stacked event study design (Sun & Abraham 2021).
- Show pre-trends for all outcomes.
- You can also use a placebo test using future robot adoption.
- The relative price of robots may have decreased over time. Since the stock measure leverages both import value and quantities, a decrease in the relative price of robots may attenuate the effect of robot adoption when using the continuous treatment.
- The stock measure (aka continuous treatment) uses a 12-year depreciation rate. Did you try different depreciation definitions?

## Comments: Interpretation of labor share rise

- The result of an  $\uparrow$  in labor share and a  $\downarrow$  in owner share hinges on netting out owners' wages.
- Is adoption rising non-owner workers' wages or mainly a reduction in relative owners' wages vs. workers' wages?
- Include non-owner workers' wages as an additional outcome to cleanly identify the source of changes in the labor share.
- Also, use retained earnings as an additional outcome to capture all dimensions of total owners' income.
- How do we interpret these results within the Acemoglu-Restrepo tasks framework? Robots do not seem to be labor/cost-saving in Canada: employment, payroll, and payroll per worker go up, but there are no other productivity gains.
- Explore within-firm wage redistribution. Do you have additional data on workers' characteristics, such as education or occupation codes?

# Comments: Value added accounting and shares I

- Currently, value added (VA) = before-tax net income + payroll to workers + owners' employment income + depreciation
- Hence:

$$\text{Labor share} = \frac{\text{Payroll} - \text{Owners' employment income}}{\text{VA}}$$

and

$$\text{Owner's share} = \frac{\text{Total owners' income}}{\text{VA}},$$

where Total owners' income = dividends +  $\Delta$  retained earnings + owners' employment income

- Subtracting owners' employment income from the numerator in the labor share may create mechanical effects.

## Comments: Value added accounting and shares II

- Try alternative VA and total owners' income without owner's employment income. That way, numerators and denominators are free of owners' employment earnings.
- Check for robustness of VA definition: negative VA is set to missing. Try trimming bottom values instead: trim 1st percentile, 2nd percentile, etc.
- Alternatively, use revenues instead of value added in the denominator.
- Another alternative: use total payout instead of VA, where  $\text{Total payout} = \text{dividends} + \text{owners' employment payment} + \text{workers' earnings}$ .

# Comments: Heterogeneity

- Intensive vs. extensive margin of robot adoption may lead to different results. You may test for heterogeneity by separating first-time adopters from repeat robot buyers.
- The “labor-share  $\uparrow$ ” pattern seems concentrated among smaller employers; among 10-employee firms, the shift weakens. You could check for heterogeneity using firm-size bins.
- Also check for heterogeneity in capital intensity, union presence, baseline labor share, export status, and industry task content.



# Wrapping up...

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- Very nice paper!
- I'm looking forward to the release of spillover effects and workers' mobility across adopting and non-adopting firms (hurry up, Statistics Canada!)