# Robots For Economic Development by Massimiliano Calì and Giorgio Presidente

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Discussion: Robots For Economic Development

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### Contributions

- Expand literature on employment effects of robotization to developing countries, with a case study of Indonesia.
- In contrast to the available micro evidence in other countries, the analysis documents a positive manufacturing employment effect of robot adoption across Indonesian local labor markets.
- This is explained as diminishing returns from automation and modeled in a task-based framework building on Acemoglu and Restrepo (2018): large productivity effect might be offsetting the labor displacement effect in Indonesia.

## Identification Strategy

Local labor markets (2SLS):

- Bartik-style measure: interacting baseline industry shares in a local labor market with industry-specific robot imports (as Acemoglu and Restrepo, 2020).
- Instrument for robot imports: *automation possibilities* using industry-specific robot penetration in countries ahead of Indonesia in terms of robot adoption (as Dauth et al., 2019).

Plant-level:

 plant-level exposure to robots based on Graetz and Michaels' (2018) replaceability: interacting yearly imports of robots by 2-digit industry with plants' share of secondary education workers in base year.

Contributions	
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#### Results

- Positive manufacturing employment effect of robot adoption across Indonesian local labor markets.
- Within Indonesia most plants benefited from large productivity and employment effects of automation. Only the top decile of the base-year distribution of robots deviates.
- Present suggestive evidence for negative correlation between robot penetration and employment for OECD countries (higher robot penetration) and positive for non-OECD countries. → diminishing returns to automation.

#### Strengths and challenges

- excellently written
- new empirical findings
- combines analysis on local labor market level and plant-level
- extensive robustness checks (e.g. reduced form, two-way clustering and bootstrapping, testing exogeneity of the shift-share instrument and the potential impact of non-robot technologies)
- very transparent data treatment
- challenge: no direct measure of robot use
- potential extension: alternative explanations for the positive results?

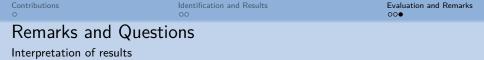


- Robot adoption on plant-level is very rare, even in industrialized economies (in Germany in 2018 less than 2% of all establishments). Similar in France etc.
- Also robots are highly concentrated among few plants, e.g. in Germany the top 5% own 50% of the robot stock in 2018 (Deng et al., 2021).

If this would also be the case in Indonesia, would your average results be biased?

 High correlation of the specific education level with investments in machinery could also be investments in other high-tech machines, not necessarily robots. Possibly the constructed plant level measure is a bit noisy?

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- Alternative explanations to diminishing returns to robotization? Competition and market structures?
  e.g. positive employment effects for robot adopters at the expense of competitors as in France? spill-overs?
- Are there country specific characteristics that could explain the positive employment effects? e.g. large informal sector, geographic feature (islands limiting mobility across local labor markets)
- is robot adoption among a select set of plants a mere reflection of broader industrialization that formalizes the large informal sector in a developing country?