Artificial Intelligence and Governments:

the Good, the Bad, and the Ugly

Martin Beraja (MIT)

AEA Continuing Education, January 2023

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- Has brought opportunities and challenges, raising questions about **the role of gov'ts**

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   "*Inefficient automation*" (with Zorzi)
3. **The Ugly:** AI is a surveillance technology. Gov't misuse for repression and social control?
   "*AI-tocracy*" (with Kao, Yang and Yuchtman)
   "*Exporting the surveillance state via trade in AI*" (with Kao, Yang and Yuchtman)

Outline

1. **The Good:** Access to Government Data as Innovation Policy
2. The Bad: Inefficient Automation
3. The Ugly: AI-tocracy

The Good: Access to Government Data as Innovation Policy

- Much focus on how data collected by **private** firms shapes AI innovation
  (Agrawal et al., 2019; Jones and Tonetti, 2020)
- Yet, throughout history, **states** have also collected massive quantities of data
- The state has a large role in many areas
  - Public security, health care, education, basic science...

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Can access to **government data** stimulate **commercial** AI innovation?

A common way in which firms **access** to gov't data is by **providing services** to the state

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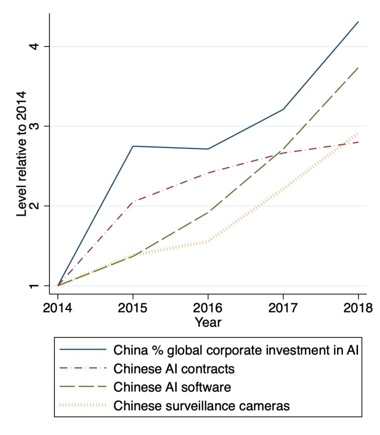
AI and the State in China



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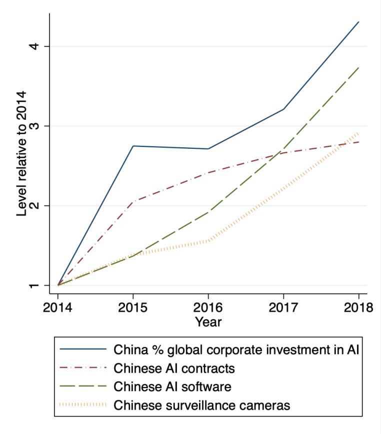
Think about **facial recognition AI sector in China...**

- Algo's trained on video of faces from many angles
- Government units collect this data through their surveillance apparatus, and contract AI firms
- Firms gaining access to this data use it to train algorithms and provide gov't services
- If gov't data or algorithms are **sharable** across uses, they can be used to develop commercial AI
  (e.g., a facial recognition platform for retail stores)

AI and the State in China



Data 1: linking AI firms to govt. contracts

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    - 7,837 firms
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3. Link government **buyers** to AI **suppliers**
   - 10,677 AI contracts issued by public security arms of government (e.g., local police department)


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中国政府采购网 首页 » 地方标讯 » 中标公告

道路交通安全综合管理平台维护升级项目中标（成交）公告

2016年12月30日 16:26 来源：中国政府采购网 【打印】【显示公告概要】

1、项目名称:道路交通安全综合管理平台维护升级项目
2、项目编号: GZGC-2016-38
3、项目序列号: S5200000000007081001
4、项目联系人: 王维娟
5、项目联系人电话: 0851-85226523
6、项目用途、简要技术要求及合同履行日期: 嵌入式"人脸识别"系统软件开发
7、采购方式: 公开招标
8、采购日期 2016-12-07
9、公告媒体 贵州省政府采购网
10、评审时间: 2016-12-29
11、评审地点: 贵州省公共资源交易中心
12、评审委员会成员名单:
熊验翔、李旭、彭歆北、戚玉峰、黄荣伟
13、定标日期 2016-12-29
14、中标（成交）信息:

序号	中标供应商	中标供应商地址	主要中标内容	中标金额(元)
1	上海依图网络科技有限公司	上海市闵行区吴中路1189号，德必易园830-846室	嵌入式"人脸识别"系统软件开发	639000.00

15、PPP项目:否
16、采购人名称: 贵州省公安厅交通管理局
联系地址:贵阳市龙洞堡园林路116号
项目联系人:宋先生
联系电话:0851-85226880
17、采购代理机构全称:贵州贵财招标有限责任公司
联系地址:贵州省贵阳市观山湖区金阳北路233号贵州产业投资（集团）有限责任公司大楼413室
项目联系人:王维娟
联系电话:0851-85226523
18、采购文件上传（PDF格式）:
附件:
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无

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Categorize by intended customers (with RNN model using tensorflow):

1. **Commercial:** e.g., *visual recognition system for smart retail*;
2. **Government:** e.g., *smart city — real time monitoring system on main traffic routes*;
3. General: e.g., *a synchronization method for multi-view cameras based on FPGA chips*.

Within AI public security contracts: variation in the data collection capacity of the public security agency's local surveillance network

1. Identify non-AI contracts: police department purchases of street cameras
2. Measure quantity of advanced cameras in a prefecture at a given time
3. Categorize public security contracts as coming from "high" or "low" camera capacity prefectures

Regional variation in contracts

Empirical strategy

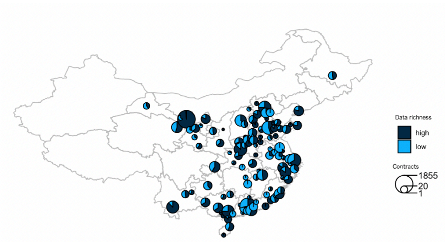
- **Triple diff:** software releases before and after firm receives 1st data-rich contract (relative to data-scarce)

$$y_{it} = \sum_T \beta_{1T} T_{it} Data_i + \sum_T \beta_{2T} T_{it} + \alpha_t + \gamma_i + \sum_T \beta_{3T} T_{it} X_i + \epsilon_{it}$$

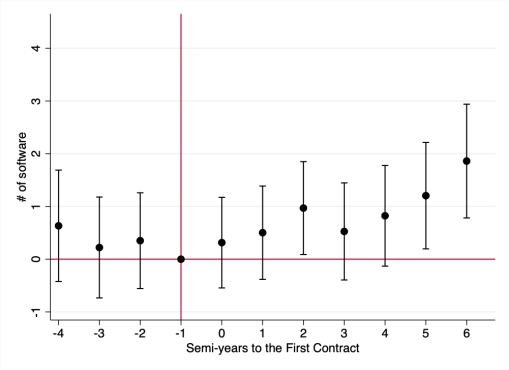
  - T_{it}: 1 if T semi-years before/since firm i's 1st contract
  - $Data_i$: 1 if firm i receives "data rich" contract
  - X_i pre-contract controls: age, size, and software prod

Public security contracts "data-richness" & Commercial AI innovation

Regional variation in contracts



Cumulative commercial software releases



Magnitude: 2 new products over 3 years

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- As a technology of prediction, gov'ts may use AI for repression and social control (Zuboff, 2019; Tirole, 2021; Acemoglu, 2021)
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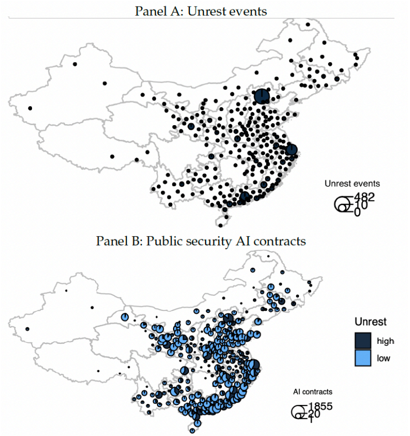
- Facial recognition AI, in particular, is a technology of **surveillance** (and dual-use)

Evidence from China?

Unrest and gov't procurement of AI



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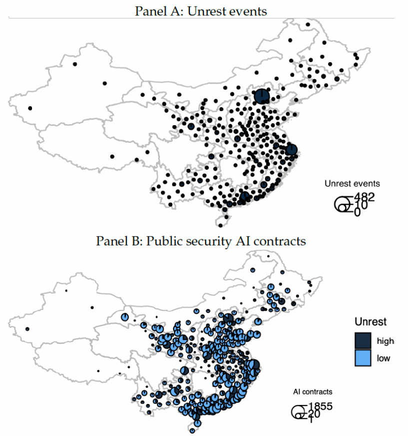
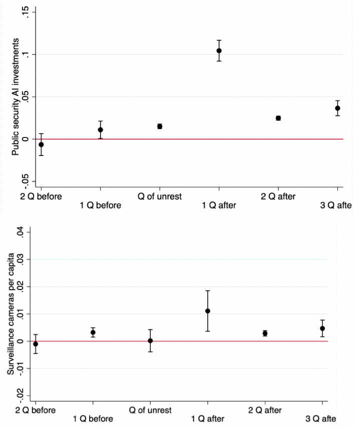
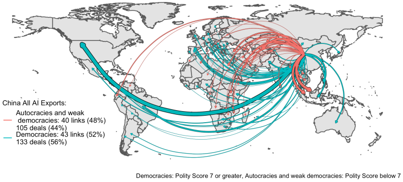
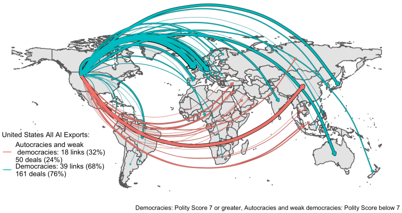


Unrest ⟶ Gov't buys AI and cameras



Exports of AI: China v. US





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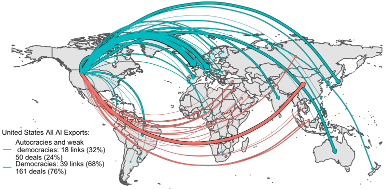
Democracies: Polity Score 7 or greater, Autocracies and weak democracies: Polity Score below 7



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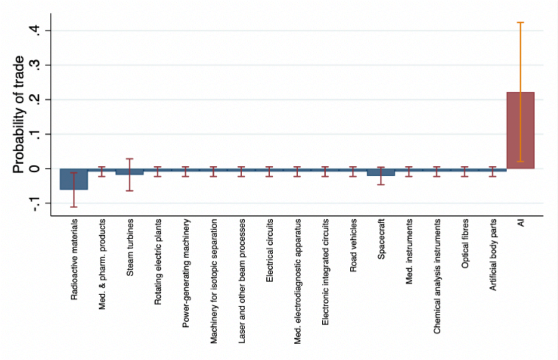
Autocracies and weak democracies are more likely to import AI from China



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- Past automation (robots) has **displaced workers** and **lowered their earnings**

  Acemoglu and Restrepo, 2020, 2022; Humlum, 2021

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- Two economic arguments for slowing down automation based on:
  1. Equity considerations (Guerreiro et al, 2022; Costinot and Werning, 2022)
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Are these arguments as strong for AI (e.g., LLMs) as they were for robots?

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Automation

$\partial_A G^\star\left(\mu^A, \mu^N; \alpha\right) \downarrow$ in α (labor-displacing)

$G^\star\left(\mu^A, \mu^N; \alpha\right)$ concave in α (costly)

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$$y^A = \mu^A + \alpha \ , \ y^N = \mu^N$$

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$$G^\star\left(\mu^A, \mu^N; \alpha\right) \equiv$$

$$\left[\left(\alpha + \mu^A\right)^{\frac{\nu-1}{\nu}} + \left(\mu^N\right)^{\frac{\nu-1}{\nu}}\right]^{\frac{\nu}{\nu-1}} - \mathcal{C}\left(\alpha\right)$$

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Profit maximization

$$\max_{\alpha \geq 0} \int_0^{+\infty} Q_t \Pi_t\left(\alpha\right) dt$$

$$\Pi_t\left(\alpha\right) \equiv \max_{\mu^A, \mu^N \geq 0} G^\star\left(\mu^A, \mu^N; \alpha\right) - \mu^A w_t^A - \mu^N w_t^N$$

Preferences

$$U_0 = \int \exp\left(-\rho t\right) \frac{c_t^{1-\sigma}}{1-\sigma} dt$$

Workers

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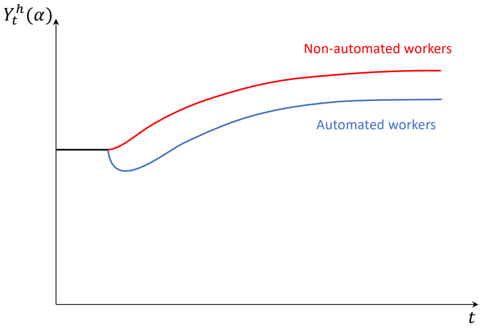
2. Borrowing

$$a_t^h \geq \underline{a} \quad \text{for some} \quad \underline{a} \leq 0$$

Workers' Incomes



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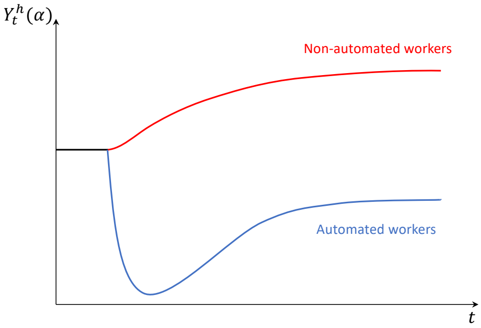

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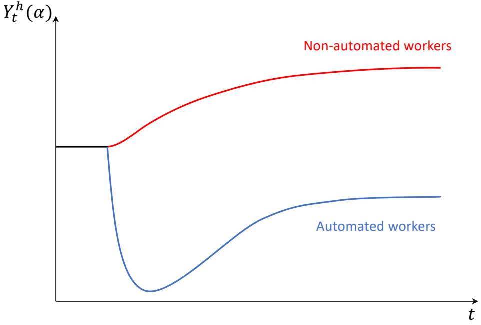

Ricardian workers (ample savings, borrow easily)

$$c_t^h = \beta_t \times \int_0^\infty e^{-\int_0^s r_v dv} y_s^h(\alpha)\, ds$$

- Non-auto. better-off; Auto. worse-off

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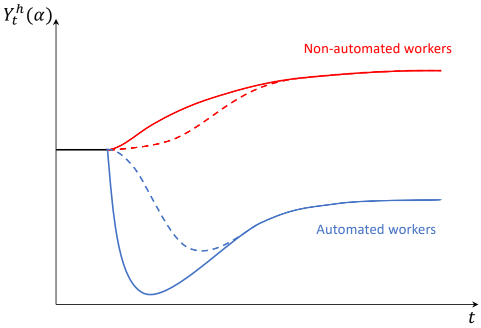

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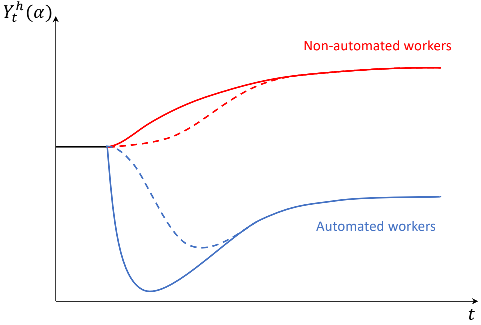

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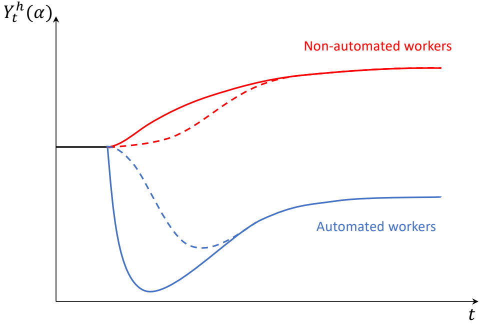
- But firm automation is **efficient**
  Maximize output PDV. Income timing irrelevant

Equity and Efficiency Rationales for Taxing Automation

Workers' Incomes



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  Permanent income redistribution
- But firm automation is **efficient**
  Maximize output PDV. Income timing irrelevant
- In practice, workers may be financially vulnerable...

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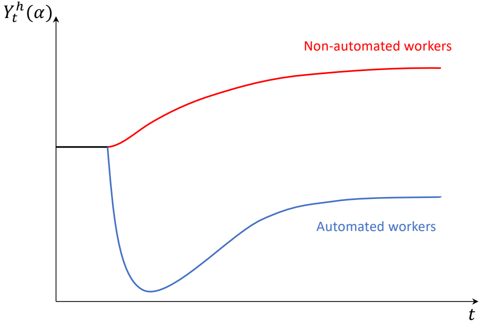
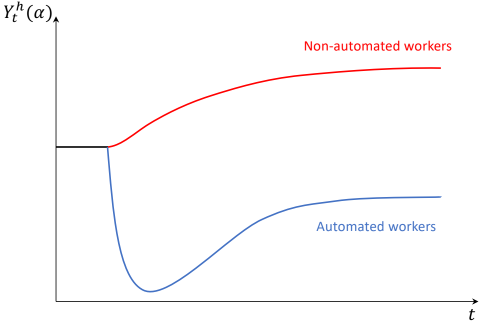


HtM workers (no savings, cannot borrow)

$$c_t^h = \mathcal{Y}_t^h(\alpha)$$

- Timing of $\mathcal{Y}_t^h$ matters. Not just PDV

Workers' Incomes



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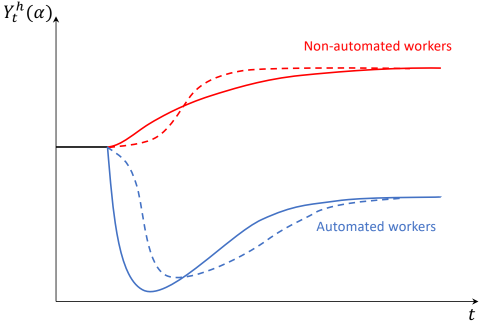
(no savings, cannot borrow)

$$c_t^h = \mathcal{Y}_t^h(\alpha)$$

- **Timing** of $\mathcal{Y}_t^h$ matters. Not just PDV
- Firms fail to internalize that automation lowers $\mathcal{Y}_t^{\text{Auto}}$ early on

Workers' Incomes



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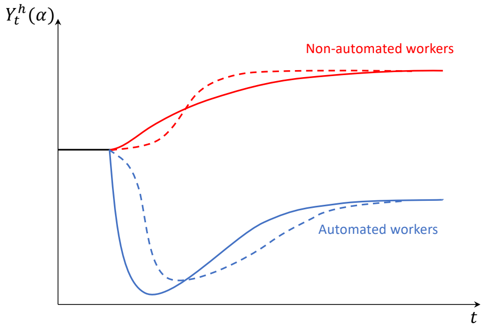

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  As firms and workers disagree on how they value income over time
- No **Efficiency** v. **Equity** trade-off

Quantitative Model (calibrated to robots / routine-intensive occs. in the US)

- **Adds**: gradual autom. + idiosync. risk (Huggett-Aiyagari) + gross flows (McFadden)

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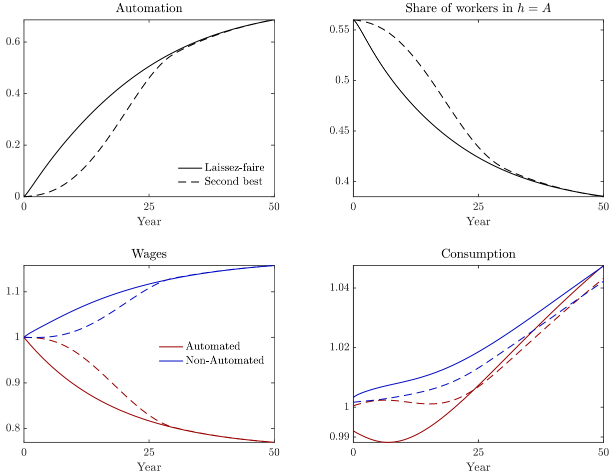

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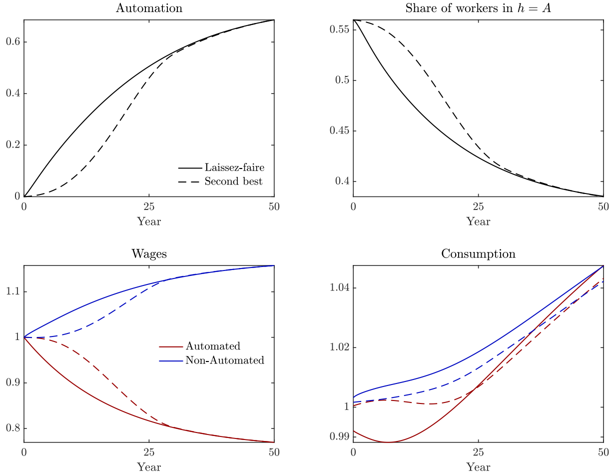

Half-life of automation

16 years at LF v. 22 years at SB

Welfare gains

0.8% for A workers and 0.2% overall

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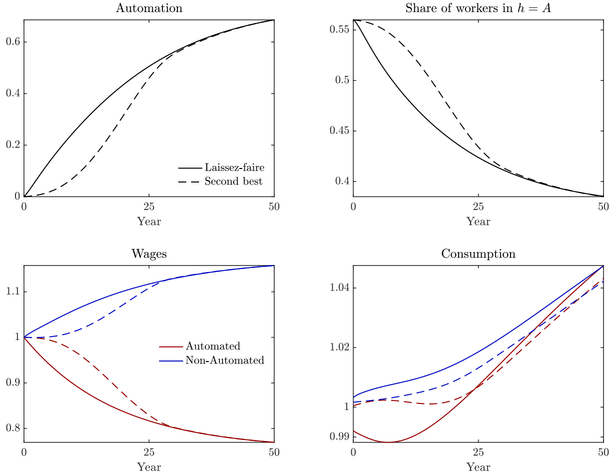

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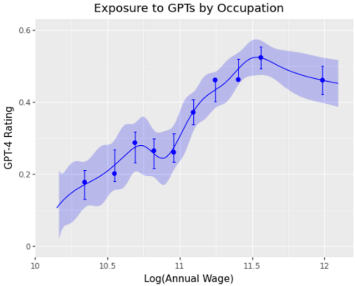
Wage supplements: In PDV, second best *as if* giving \$19,116 to *A*, and taking \$4,615 from *N*

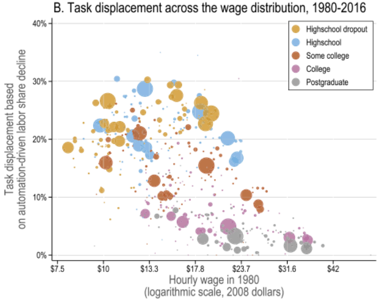
Robots$\neq$ AI (generative, LLMs)

Robots≠ AI (generative, LLMs)

- Equity rationale seems much **weaker for AI** than it was for robots
  - Robots automate routine, low-to-middle-wage jobs (car manuf)
  - AI (likely) automates cognitive, middle-to high-wage jobs (lawyers, journos, soft devs)



Eloundou et al (2023)



Acemoglu and Restrepo (2022)

ROBOTS≠ AI (GENERATIVE, LLMS)

- **Efficiency** rationale seems much **weaker too**
  - Lawyers, journos, and soft devs not the first that come to mind as ”financially vulnerable”
  - Call centers? College debt?

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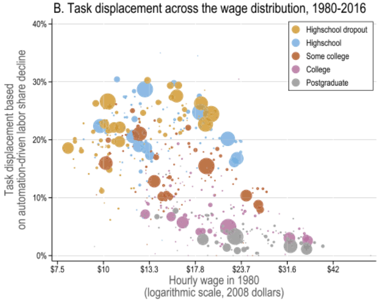

Acemoglu and Restrepo (2022)

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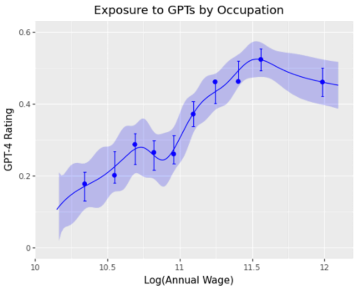
- Weaker rationale for **slowing down AI** due to job automation. AI **alignment** concerns?



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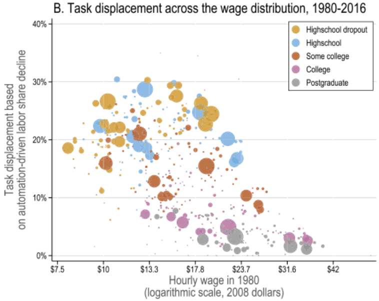

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Final thoughts

- AI is a new technology with many different features and uses
- Touches on issues across fields: macro (growth, innovation, labor), pol. econ, IO

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- AI is a new technology with many different features and uses
- Touches on issues across fields: macro (growth, innovation, labor), pol. econ, IO
- We have a responsibility to study the benefits, risks, and policy implications of AI
  - Otherwise, we leave the task to...
- We have only started to scratch the surface. More questions as AI is widely adopted.