ARTIFICIAL INTELLIGENCE AND GOVERNMENTS: 
THE GOOD, THE BAD, AND THE UGLY

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AI can transform modern economies but has brought new challenges to the fore.

This has raised questions about the role of governments.
AI and Governments: the Good, the Bad, and the Ugly

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- This has raised questions about the role of governments.
  1. **The Good:** AI is a data-intensive technology. New gov’t policies to foster innovation?
     “Data-intensive innovation and the state: Evidence from AI firms in China” (with Yang and Yuchtman)
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1. **The Good**: AI is a data-intensive technology. New gov’t policies to foster innovation?
   
   “*Data-intensive innovation and the state: Evidence from AI firms in China*” (with Yang and Yuchtman)

2. **The Bad**: AI is an automation technology. How should gov’ts respond?

   “*Inefficient automation*” (with Zorzi)
AI can transform modern economies but has brought new challenges to the fore.

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1. **The Good:** AI is a data-intensive technology. New gov’t policies to foster innovation?
   “Data-intensive innovation and the state: Evidence from AI firms in China” (with Yang and Yuchtman)

2. **The Bad:** AI is an automation technology. How should gov’ts respond?
   “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)
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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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
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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)
1. Identify all facial recognition AI firms

   - 7,837 firms
   - Two sources: Tianyancha (People’s Bank of China) and PitchBook (Morningstar)
DATA 1: LINKING AI FIRMS TO GOVT. CONTRACTS

1. Identify all facial recognition AI firms
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2. Obtain universe of government contracts
   - 2,997,105 contracts
   - Source: Chinese Govt. Procurement Database (Ministry of Finance)
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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)
Registered with Min. of Industry and Information Technology

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
Public security contracts “data-richness” & Commercial AI innovation

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
Regional variation in contracts

Cumulative commercial software releases

Magnitude: 2 new products over 3 years
The Bad: Inefficient Automation

- Automation raises productivity but displaces workers and lowers their earnings.

Increasing adoption has fueled an active policy debate (Atkison, 2019; Acemoglu et al., 2020). No optimal policy results that take into account frictions faced by displaced workers.

Two literatures can justify taxing automation. Reallocation is frictionless or absent.

Recognize that displaced workers face two important frictions:

(i) Slow reallocation: workers face mobility barriers and may go through unemployment/retraining.

(ii) Imperfect credit markets: workers have limited ability to borrow against future incomes.

Could firms automate excessively? How should the government respond?
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**Tax automation**

Guerreiro et al 2017; Costinot-Werning 2018

(i) Govt. has preference for redistribution

(ii) Automation/reallocation are efficient
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**Tax capital (long-run)**  
Aiyagari 1995; Conesa et al. 2002

(i) Improve efficiency in economies with IM  
(ii) Worker displacement/reallocation absent
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- Recognize that displaced workers face two important **frictions**:
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Could firms automate excessively? How should the gov’t respond?
Laissez-faire

Optimal Policy

Quantitative Analysis
Continuous time $t \geq 0$
Continuous time $t \geq 0$

Occupations
Continuous time $t \geq 0$

Occupations

$h = A$ (degree $\alpha \geq 0$) or $h = N$
Continuous time $t \geq 0$

### Occupations

$h = A$ (degree $\alpha \geq 0$) or $h = N$

$$y^A = F(\mu^A, \alpha), \quad y^N = F^*(\mu^N) \equiv F(\mu^N, 0)$$
Continuous time $t \geq 0$

**Occupations**

$h = A \text{ (degree } \alpha \geq 0) \text{ or } h = N$

\[ y^A = F(\mu^A, \alpha), \quad y^N = F^*(\mu^N) \equiv F(\mu^N, 0) \]

**Final good producer**

\[ G^* (\mu^A, \mu^N; \alpha) \equiv G \left( \left\{ y^h \right\} \right) - C(\alpha) \]
Continuous time \( t \geq 0 \)

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\[ h = A \text{ (degree } \alpha \geq 0 \text{) or } h = N \]

\[ y^A = F (\mu^A, \alpha) , \quad y^N = F^* (\mu^N) = F (\mu^N, 0) \]

**Automation**

\[ \partial_A G^* (\mu^A, \mu^N; \alpha) \downarrow \text{ in } \alpha \text{ (labor-displacing)} \]

\[ G^* (\mu^A, \mu^N; \alpha) \text{ concave in } \alpha \text{ (costly)} \]

**Final good producer**

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Firms

Continuous time $t \geq 0$

**Occupations**

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**Profit maximization**

$$\max_{\alpha \geq 0} \int_0^{+\infty} Q_t \Pi_t (\alpha) \, dt$$
Continuous time \( t \geq 0 \)

**Occupations**

\[ h = A \text{ (degree } \alpha \geq 0 \text{) or } h = N \]

\[ y^A = F (\mu^A, \alpha) \quad , \quad y^N = F^* (\mu^N) \equiv F (\mu^N, 0) \]

**Final good producer**

\[ G^* (\mu^A, \mu^N ; \alpha) \equiv G \left( \{ y^h \} \right) - C (\alpha) \]

**Automation**

\[ \partial_A G^* (\mu^A, \mu^N ; \alpha) \downarrow \text{ in } \alpha \text{ (labor-displacing)} \]

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**Profit maximization**

\[ \max_{\alpha \geq 0} \int_0^{+\infty} Q_t \Pi_t (\alpha) \, dt \]

\[ \Pi_t (\alpha) \equiv \max_{\mu^A, \mu^N \geq 0} G^* (\mu^A, \mu^N ; \alpha) - \mu^A w_t^A - \mu^N w_t^N \]
Preferences

\[ U_0 = \int \exp(-\rho t) \frac{c_t^{1-\sigma}}{1-\sigma} dt \]
Preferences

\[ U_0 = \int \exp(-\rho t) \frac{c_t^{1-\sigma}}{1-\sigma} dt \]

Initial allocation

\[
\begin{align*}
(\mu_t^A, \mu_t^N) \\
= 1/2 & \quad \text{in } t = 0 \\
\text{Reallocation} & \quad \text{afterwards}
\end{align*}
\]
**Preferences**

\[ U_0 = \int \exp(-\rho t) \frac{c_t^{1-\sigma}}{1-\sigma} dt \]

**Budget constraint**

\[ da_t^h = [\gamma_t^{h,*} + r_t a_t^h - c_t^h] dt \]

**Initial allocation**

\[ \left( \mu_t^A, \mu_t^N \right) \]

\[ = 1/2 \hspace{1cm} \text{in } t = 0 \]

Reallocation afterwards
Workers

Preferences

\[ U_0 = \int \exp(-\rho t) \frac{c_t^{1-\sigma}}{1-\sigma} dt \]

Initial allocation

\( (\mu^A_t, \mu^N_t) \)

\[ = \frac{1}{2} \quad \text{in } t = 0 \]

Reallocation afterwards

Budget constraint

\[ da_t^h = \left[ \nu_t^{h,*} + r_t a_t^h - c_t^h \right] dt \]

Two frictions

1. Reallocation (neoclassical)

- Random opportunities arrive at rate \( \lambda \)
- Unemployment / retraining exit at rate \( \kappa \)
- Productivity loss \( \theta \)
Workers

Preferences

\[ U_0 = \int \exp(-\rho t) \frac{c_1^{1-\sigma}}{1-\sigma} \, dt \]

Initial allocation

\[ (\mu_A^t, \mu^N_t) \begin{cases} 
= 1/2 & \text{in } t = 0 \\
\text{Reallocation afterwards} & \end{cases} \]

Budget constraint

\[ da_t^h = \left[ y_t^{h,*} + r_t a_t^h - c_t^h \right] \, dt \]

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\[ da_t^h = \left[ \mathcal{Y}_t^h,^* + r_t a_t^h - c_t^h \right] dt \]

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   - Random opportunities arrive at rate \( \lambda \)
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Workers

Preferences

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

Initial allocation

$$\begin{cases} \mu_t^A = 1/2 & \text{in } t = 0 \\ \mu_t^N \end{cases}$$

Reallocation afterwards

Budget constraint

$$da_t^h = [\gamma_t^h,* + r_t a_t^h - c_t^h] dt$$

Two frictions

1. Reallocation (neoclassical)
   - Random opportunities arrive at rate $\lambda$
   - Unempl. / retrain. exit at rate $\kappa$
   - Productivity loss $\theta$
Workers

Preferences

\[ U_0 = \int \exp(-\rho t) \frac{c_t^{1-\sigma}}{1-\sigma} dt \]

Initial allocation

\[
\begin{cases}
\mu^A_t, \mu^N_t & = 1/2 \\
\text{Reallocation} & \text{afterwards}
\end{cases}
\]

Budget constraint

\[ da^h_t = \left[ \mathcal{Y}^{h,*} + r_t a^h_t - c^h_t \right] dt \]

Two frictions

1. Reallocation (neoclassical)
   - Random opportunities arrive at rate \( \lambda \)
   - Unempl. / retrain. exit at rate \( \kappa \)
   - Productivity loss \( \theta \)

2. Borrowing
   \[ a^h_t \geq a \text{ for some } a \leq 0 \]
Workers expect income to improve as they reallocate.

Motive for borrowing
Workers expect income to improve as they reallocate → Motive for borrowing.
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**Binding Borrowing Constraints**

Average income

- \( \hat{y}_t^N \)
- \( \hat{y}_t^A \)

Tight constraint

Borrowing constrained

Slow reallocation

Two benchmarks: instant realloc. (Costinot-Werning) or no borrowing frictions (Guerreiro et al)
**Binding Borrowing Constraints**

Evidence: Earnings partially recover (Jacobson et al) + Imperfect cons. smoothing (Landais-Spinnewijn)
Firm automation choice $\alpha_{LF}$: trades off cost $C(\alpha)$ with increase in output
Laissez-faire: Automation

- Firm automation choice $\alpha^{LF}$: trades off cost $C(\alpha)$ with increase in output
- Optimality condition

$$\int_{0}^{+\infty} Q_t \Delta_t^* \, dt = 0$$

where

$$\Delta_t^* \equiv \frac{\partial}{\partial \alpha} G^* (\mu^A_t, \mu^N_t; \alpha^{LF})$$

denotes the output gains (net of cost) from automation, and

$$Q_t = \exp \left( - \int_{0}^{t} r_s \, ds \right) = \exp (-\rho t) \frac{u'(c^N_t)}{u'(c^N_0)}$$

since non-automated workers are unconstrained (savers).
Outline

Laissez-faire

Optimal Policy

Quantitative Analysis
How should a government respond to automation?

Depends on the tools available:

First best tools:
- Lump sum transfers (directed, UBI)

Info requirements? Fiscal cost? (Guerreiro et al., 2017; Costinot-Werning, 2018; Guner et al., 2021)

Primal problem:
The government maximizes the social welfare function

\[ U ≡ X \eta_h Z + \int_0^\infty \exp(-\rho t) u_{ch} dt \]

by choosing \( \alpha, T, \mu_A, \mu_N, c_A, c_N \) subject to workers choosing consumption optimally, the law of motion of labor, firms choosing labor optimally, and market clearing.
How should a government respond to automation?

- Depends on the tools available

Primal problem: The government maximizes the social welfare function

\[ U = X_{h}^{\eta_{h}} Z + \int_{0}^{\infty} \exp(-\rho t) u c_{h} t \, dt \]

by choosing \( \alpha, T, \mu_{A_{t}}, \mu_{N_{t}}, c_{A_{t}}, c_{N_{t}} \) subject to workers choosing consumption optimally, the law of motion of labor, firms choosing labor optimally, and market clearing.
How should a government respond to automation?

- Depends on the tools available

- **First best tools**: lump sum transfers (directed, UBI)
  
  Info requirements? Fiscal cost? (Guerreiro et al., 2017; Costinot-Werning, 2018, Guner et al., 2021)
How should a government respond to automation?

- Depends on the **tools** available

- **Second best tools**: tax automation + active labor market interventions
  
  E.g., South Korea’s reduction in automation tax credit in manuf; Geneva’s tax on automated cashiers.
Constrained Ramsey problem

How should a government respond to automation?

- Depends on the **tools** available

- **Second best tools**: **tax automation** + **active labor market interventions**
  
  E.g., South Korea’s reduction in automation tax credit in manuf; Geneva’s tax on automated cashiers.

- **Primal problem**: The government maximizes the social welfare function

\[
U \equiv \sum_h \frac{\eta^h}{\rho} \int_0^{+\infty} \exp(-\rho t) u \left( c^h_t \right) dt
\]

by choosing \( \{ \alpha, T, \mu^A_t, \mu^N_t, c^A_t, c^N_t \} \) subject to workers choosing consumption optimally, the law of motion of labor, firms choosing labor optimally, and market clearing.
Consider a perturbation $\delta \alpha$ starting from the laissez-faire. Welfare change

$$\frac{\delta U}{\delta \alpha} = \eta^N u' (c^N_0) \times \int_0^{+\infty} \exp(-\rho t) \frac{u'(c^N_t)}{u'(c^N_0)} \times \left( \Delta^*_t + \Sigma^N_t \right) dt$$

$$+ \eta^A u' (c^A_0) \times \int_0^{+\infty} \exp(-\rho t) \frac{u'(c^A_t)}{u'(c^A_0)} \times \left( \Delta^*_t + \Sigma^A_t \right) dt$$

where $\Delta^*_t$ is aggregate term and $\Sigma^A_t + \Sigma^N_t = 0$ are distributional terms.
Consider a perturbation $\delta \alpha$ starting from the laissez-faire. Welfare change

$$ \frac{\delta U}{\delta \alpha} = \eta^N u'(c_0^N) \times \int_0^{+\infty} \exp(-\rho t) \frac{u'(c_t^N)}{u'(c_0^N)} \times \left( \Delta_t^\star + \Sigma_t^{N,*} \right) dt $$

$$ + \eta^A u'(c_0^A) \times \int_0^{+\infty} \exp(-\rho t) \frac{u'(c_t^A)}{u'(c_0^A)} \times \left( \Delta_t^\star + \Sigma_t^{A,*} \right) dt $$

where $\Delta_t^\star$ is aggregate term and $\Sigma_t^{A,*} + \Sigma_t^{N,*} = 0$ are distributional terms.

No borrowing constraints $\rightarrow \frac{u'(c_t^N)}{u'(c_0^N)} = \frac{u'(c_t^A)}{u'(c_0^A)} \rightarrow \textbf{Efficiency}$ (only distributional terms)

How automated workers value flows
Consider a perturbation $\delta \alpha$ starting from the laissez-faire. Welfare change

\[
\frac{\delta U}{\delta \alpha} = \eta^N u'(c^N_0) \times \int_0^{+\infty} \exp(-\rho t) \frac{u'(c^N_t)}{u'(c^N_0)} \times \left( \Delta^*_t + \sum^N_t \right) dt
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\[
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No borrowing constraints $\rightarrow \frac{u'(c^N_t)}{u'(c^N_0)} = \frac{u'(c^A_t)}{u'(c^A_0)} \rightarrow \text{Efficiency (only distributional terms)}$

Still rationale for redistribution since $u'(c^N_t) < u'(c^A_t)$, e.g., utilitarian weights
Consider a perturbation $\delta \alpha$ starting from the laissez-faire. Welfare change

$$\frac{\delta U}{\delta \alpha} = \eta^N u' (c^N_0) \times \int_0^{+\infty} \exp(-\rho t) \frac{u'(c^N_t)}{u'(c^N_0)} \times \left( \Delta^*_t + \Sigma^N_t \right) dt$$

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How automated workers value flows

where $\Delta^*_t$ is aggregate term and $\Sigma^A_t + \Sigma^N_t = 0$ are distributional terms.

Borrowing constraints $\rightarrow \frac{u'(c^N_t)}{u'(c^N_0)} > \frac{u'(c^A_t)}{u'(c^A_0)} \rightarrow$ Inefficiency
Consider a perturbation $\delta \alpha$ starting from the laissez-faire. Welfare change

$$\frac{\delta U}{\delta \alpha} = \eta^N u' (c^N_0) \times \int_0^{+\infty} \exp (-\rho t) \frac{u' (c^N_t)}{u' (c^N_0)} \times (\Delta^*_t + \Sigma^N_t) \, dt$$

How automated workers value flows

$$+ \eta^A u' (c^A_0) \times \int_0^{+\infty} \exp (-\rho t) \frac{u' (c^A_t)}{u' (c^A_0)} \times (\Delta^*_t + \Sigma^A_t) \, dt$$

where $\Delta^*_t$ is aggregate term and $\Sigma^A_t + \Sigma^N_t = 0$ are distributional terms.

Borrowing constraints $u'(c^N_t) > u'(c^A_t)$ → Inefficiency

There is a conflict between how the firm and displaced workers value the effects of automation over time. This creates room for Pareto improvements.
**Proposition.** (Constrained inefficiency)

Generically, there exists \( \{\delta \alpha, \delta T\} \) such that \( \delta U^A > 0 \) and \( \delta U^N = 0 \). This requires \( \delta \alpha < 0 \).
**Proposition.** (Constrained inefficiency)

Generically, there exists \(\{\delta\alpha, \delta T\}\) such that \(\delta U^A > 0\) and \(\delta U^N = 0\). This requires \(\delta\alpha < 0\).

\[
\delta\alpha \times \int_0^{+\infty} \exp(-\rho t) \frac{u'(c^A_t)}{u'(c^A_0)} \left(\Delta^* + \Sigma^*_{t,A}\right) dt
\]

\[
\delta\alpha \times \int_0^{+\infty} \exp(-\rho t) \frac{u'(c^N_t)}{u'(c^N_0)} \left(\Delta^* + \Sigma^*_{t,N}\right) dt
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**Proposition.** (Constrained inefficiency)

Generically, there exists \( \{\delta \alpha, \delta T\} \) such that \( \delta U^A > 0 \) and \( \delta U^N = 0 \). This requires \( \delta \alpha < 0 \).

\[
\begin{align*}
\text{(automated)} & \quad \delta \alpha \times \int_0^{+\infty} \exp(-\rho t) \frac{u'(c^A)}{u'(c^A_0)} \Delta^*_t dt = 0 \\
\text{(non-automated / firm)} & \quad \delta \alpha \times \int_0^{+\infty} \exp(-\rho t) \frac{u'(c^N)}{u'(c^N_0)} \Delta^*_t dt = 0
\end{align*}
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Proposition. (Constrained inefficiency)

Generically, there exists \( \{\delta \alpha, \delta T\} \) such that \( \delta U^A > 0 \) and \( \delta U^N = 0 \). This requires \( \delta \alpha < 0 \).

\[
\delta \alpha \times \int_0^{+\infty} \exp(-\rho t) \frac{u'(c_t^A)}{u'(c_0^A)} \Delta_t^* \, dt = 0
\]

1. The output gains from automation \( \Delta_t^* \) build up over time
**Proposition.** (Constrained inefficiency)

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1. The output gains from automation \( \Delta^*_t \) **build up** over time

2. **Automated workers** are *more impatient* than the firm — priced by unconst. workers
**Constrained Inefficiency (for any Pareto weights)**

**Proposition.** (Constrained inefficiency)

Generically, there exists \( \{\delta \alpha, \delta T\} \) such that \( \delta U^A > 0 \) and \( \delta U^N = 0 \). This requires \( \delta \alpha < 0 \).

\[
\begin{align*}
\delta \alpha \times \int_0^{+\infty} \exp(-\rho t) \frac{u'(c^A_t)}{u'(c^A_0)} \left( \Delta^*_t + \Sigma^*_{t;A} \right) dt > 0 \quad & \delta \alpha \times \int_0^{+\infty} \exp(-\rho t) \frac{u'(c^N_t)}{u'(c^N_0)} \left( \Delta^*_t + \Sigma^*_{t;N} \right) dt < 0 \\
\end{align*}
\]

1. The output gains from automation \( \Delta^*_t \) build up over time

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**Proposition.** (Constrained inefficiency)

Generically, there exists \( \{\delta \alpha, \delta T\} \) such that \( \delta U^A > 0 \) and \( \delta U^N = 0 \). This requires \( \delta \alpha < 0 \).

<table>
<thead>
<tr>
<th>(automated)</th>
<th>(non-automated / firm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>( \delta U^A &gt; 0 )</td>
<td>( \delta U^N = 0 )</td>
</tr>
</tbody>
</table>

1. The output gains from automation \( \Delta_t^* \) **build up** over time.
2. **Automated workers** are *more impatient* than the firm — priced by unconst. workers.
3. Set \( \delta \alpha < 0 \), and \( \delta T < 0 \) to compensate non-auto. workers (akin to future transfer).
Proposition. (Constrained inefficiency)
Generically, there exists \( \{\delta\alpha, \delta T\} \) such that \( \delta U^A > 0 \) and \( \delta U^N = 0 \). This requires \( \delta\alpha < 0 \).
Optimal Policy Intervention

- Optimal intervention depends on how the government values efficiency vs. equity.
Optimal Policy Intervention

- Optimal intervention depends on how the government values efficiency vs. equity.

- **No pref. for equity**: The government uses *efficiency weights* \( \eta^{h,\text{effic}} \)

  Gov’t does not distort an efficient allocation to improve equity (think ”inverse marginal utility weights”)

Proposition. (Taxing automation on efficiency grounds) A government using efficiency weights \( \eta^{h,\text{effic}} \) finds it optimal to tax automation.
Optimal intervention depends on how the government values efficiency vs. equity.

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**Optimality condition wrt** \( \alpha \)

\[
\frac{\delta U}{\delta \alpha} = \sum_h \eta^{h,\text{effic}} u'(c^h_0) \times \int_0^{+\infty} \exp(-\rho t) \frac{u'(c^h_t)}{u'(c^h_0)} \times \left( \Delta^*_t + \Sigma^{h,*} \right) dt = 0
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Optimal Policy Intervention

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- Optimality condition wrt $\alpha$. **Negative when evaluated at laissez-faire**

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\]

- Back-loaded
- $<\exp(-\int_0^t r_s ds)$ for $h=A$

**Proposition.** (Taxing automation on efficiency grounds)

A government using efficiency weights $\eta^{h,\text{effic}}$ finds it optimal to tax automation.

- **Pref. for equity**: Government taxes even more with utilitarian weights

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Optimal Policy Intervention

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  \[
  \frac{\delta U}{\delta \alpha} = \sum_h \eta_{h,\text{effic}} u'(c_0^h) \times \int_0^{+\infty} \exp\left(-\rho t\right) \frac{u'(c_t^h)}{u'(c_0^h)} \times \left(\Delta_t^* + \Sigma_{h,*}^h\right) dt < 0
  \]
  \(<\exp\left(-\int_0^t r_s ds\right) \text{ for } h=A \text{ Back-loaded} >

**Proposition.** (Taxing automation on efficiency grounds)
A government using efficiency weights \( \{ \eta_{h,\text{effic}} \} \) finds it optimal to tax automation.

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Laissez-faire

Optimal Policy

Quantitative Analysis
Quantitative Model

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

  - 15 years at LF vs 20 years at SB
  - Welfare gains: 0.8% for A workers and 0.2% overall
**Quantitative Model**

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

---

**Automation**

- Half-life of automation: 15 years at LF vs. 20 years at SB

**Wages**

- Share of workers in $h = A$

**Consumption**

- Automated vs. Non-Automated
You are reading this naturally.
As a technology of **prediction**, gov’ts may use AI for repression and social control (Zuboff, 2019; Tirole, 2021; Acemoglu, 2021)

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

Facial recognition AI, in particular, is a technology of surveillance (and dual-use)

Evidence from China?
Unrest and gov’t procurement of AI
Unrest and gov’t procurement of AI

Unrest $\rightarrow$ Gov’t buys AI and cameras
Exports of AI: China v. US

China AI Exports:
- Autocracies and weak democracies: 40 links (48%)
- Authoritarian states: 15 links (18%)
- Total: 75 links (96%)

Democracies: Palty Score 7 or greater; Autocracies and weak democracies: Palty Score below 7

United States AI Exports:
- Autocracies and weak democracies: 29 links (36%)
- There is no data available for democracies in this case.
- Total: 154 links (100%)

Democracies: Palty Score 7 or greater; Autocracies and weak democracies: Palty Score below 7
Exports of AI: China v. US

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

We have only started to scratch the surface. More questions as AI is widely adopted. Much work ahead!
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
- Social scientists 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.

Much work ahead!