AI Education as State Capacity

Experimental Evidence from Pakistan

Sultan Mehmood, Shaheen Naseer, Daniel L. Chen

State Capacity and Economic Development

Training of public officials is a multi-billion dollar/yr endeavor

- The training of public officials is one of the key dimensions governments use to improve bureaucratic performance
- For example, in 2017 alone, the U.S. government allocated 4% of its annual budget for personnel compensation and benefits, or around $10 billion, towards training civil servants (Credibility Engine 2021; USA Spending)

Large macro & development literature documenting leaders matter

- Despite its significance, there is limited empirical research on effective methods to improve the training of public officials using RCTs
- Particularly relevant in the developing world, as slow and unreliable bureaucracies represent a key barrier to economic growth

Are adult professionals malleable?

- If so, what trainings should be promulgated?
- How to ensure the effects of trainings are enduring?

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How Should We Train Civil Servants?

Personnel economics of the state (Finan, Olken, and Pande 2017)

selection

incentives

monitoring

attitudes, preferences, beliefs (Dixit 2002; Besley 2005; Benabou Tirole 2006)

schools of thought that underlie decision-making

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Mental models

- Subjective decision-making creates scope for **schools of thinking**
  - Ideas and **normative commitments** forming basis for policy (Rodrik 2014)
  - Principles of thinking agents use to organize **values** (Benabou et al. 2018)
  - **Heuristics** to focus on salient attributes when deciding (Koszegi et al. 2013)
  - **Salience** in decision making (Bordalo et al. 2015)

Mental models

- Broadly speaking, one can think of three possible reasons why economic choices differ from theoretically-optimal choices:
  - Non-standard preferences
  - Cognitive Limitations --- Frictions
  - Cognitive Limitations --- Mental gaps
- Frictions --- rational inattention:
  - you have some cost for coming up with the correct answer and you approximate
  - you are aware that you are approximating and if you had more computing power, then you'd give a better answer
- Mental gaps refer to conceptual issues.
  - When you're voting in a jury problem there are many contingencies, but the only ones that are relevant are the ones where your vote is pivotal.
  - Either you understand this or you don't. If you don't, it doesn't matter how much computing power you have, you'll likely get it wrong.

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Training Public Servants

Civil Servants	Junior	Senior	Frontline
Effective Altruism	x		
Credibility Revolution	x		x
AI Fairness		x	
Gender Rights			x
Vaccinations			x

This paper: Case Study in AI

- Artificial Intelligence has revolutionized multiple industries
- AI uses algorithms to perform tasks previously requiring humans
- AI is having significant repercussions on labor markets, inequality, possibly bias
- Academic debate over policy measures that could mitigate potential negative consequences of AI **(such as training ethics)**
- Policymakers need to make informed decisions regarding AI

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Measurement

1. What are the consequences of varying AI perspectives?
2. How does AI training disseminate among policymakers and influence the population?

This Paper

- We randomized deputy ministers into different AI workshops
  - "Benefits of AI" vs. "costs and solutions to AI" versus control macroeconomics workshop
  - Examined impacts on policymakers, their staff, and the population

- Treated ministers and their subordinate staff increase support for AI
  - Treated ministers funding for land record digitization increases
  - Citizens' perceptions of treated ministers' performance increases in a digital democracy platform

- We cross-randomized ministers into AI fairness activism
  - AI fairness activism reduces support for AI in policy
  - Funding recommendations and funding for land record digitization fall
  - Resolution time for land disputes increases and citizen satisfaction falls
  - ➤ Algorithmic bias appeals may impede crucial policy reforms

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  - governance: Tirole, 2021; Beraja et al. 2021
- Digitization, a pre-cursor to AI, has also enabled ICT technologies that have been rigorously documented to have substantial state capacity impacts
  - Muralidharan et al. 2013; Fujiwara, 2015; Banerjee et al., 2020.
- A pre-cursor to both is the mindset - willingness to adopt AI or to digitize
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  - Augmented trainings with social-emotional learning have sustained effects
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Roadmap

1. Background
2. Experimental Details
3. Data
4. Empirical Specification
5. Results
6. Robustness Checks
7. Conclusion

AI Training

- Three workshops delivered to deputy ministers.
- Cross-randomization into AI fairness activism arguments.
- Randomized control trial used to identify causal effects.

Pakistan Civil Service

- Advise the President, Prime Minister, cabinet ministers, and governors
- "key wheels on which the entire engine of the state runs"
- Select 1.5% of test-takers, roughly 200 per year
  - Similar civil service as in India and Bangladesh (25% of the world)
- Institute for Public Policy: Mandatory attendance and high-stakes
  - Mid-career civil servants (with at least 15 years of experience)
  - Chief administrative heads of districts and subdistricts (tehsils) where they supervise policy implementation and budgetary needs assessments

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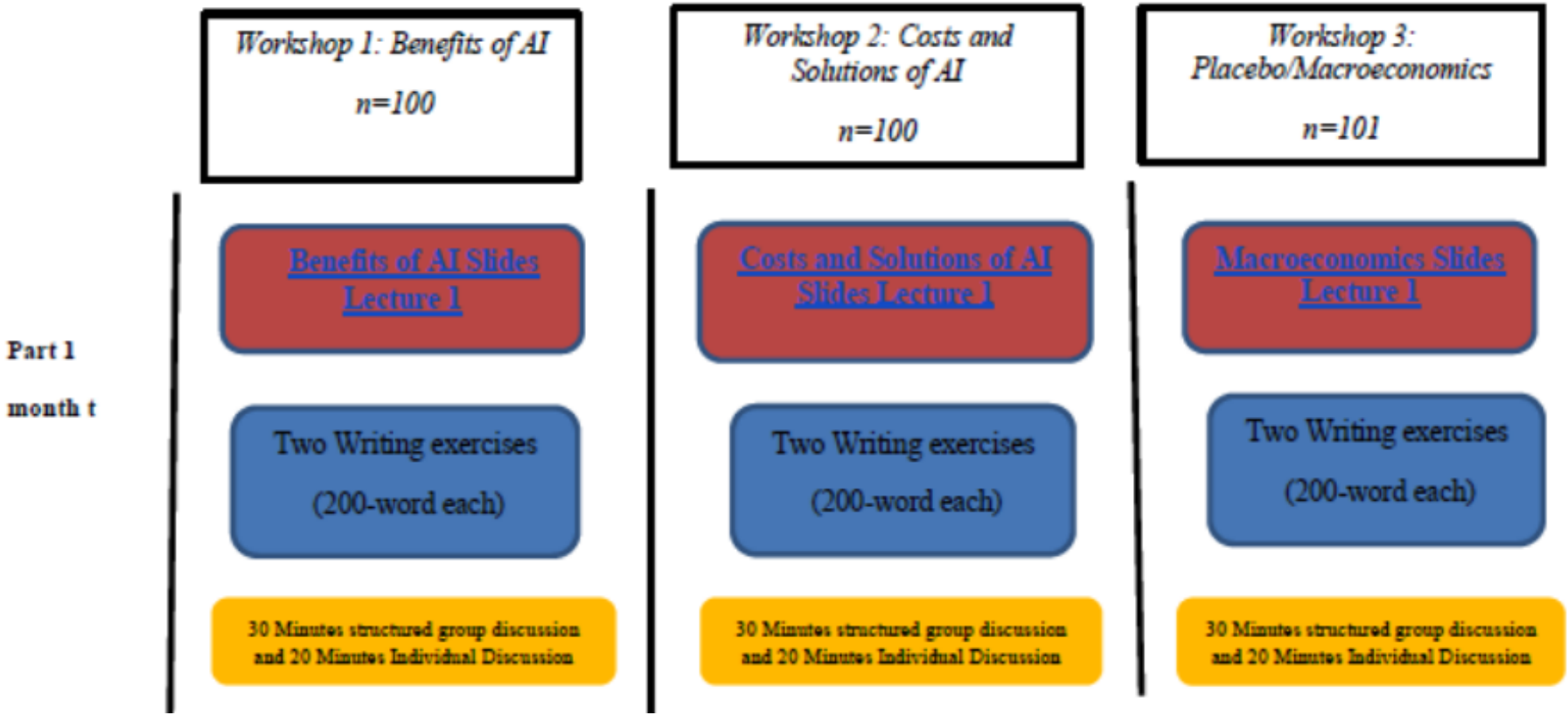
Treatment Conditions

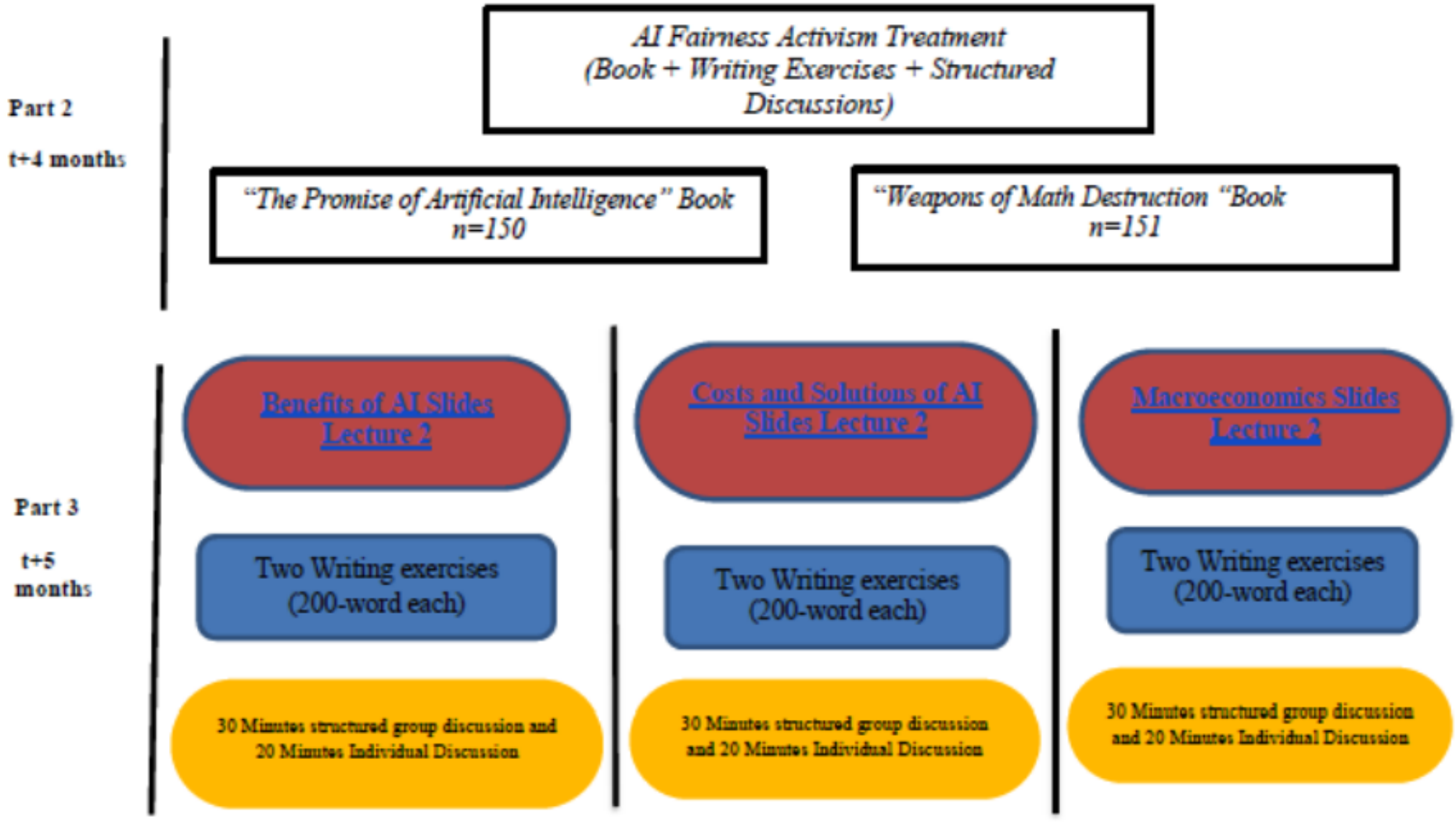
- First treatment arm: lectures on AI benefits.
- Second treatment arm: lectures on AI costs and solutions.
- Control group received a similar series of lectures on macroeconomics.

Timeline

- Baseline survey conducted one week before the first lecture
- Midline survey conducted 3 months after the first lecture
  - Book assignment 4 months after the first lecture
  - Second lecture 5 months after the first lecture
- Endline survey conducted 6 months after the second lecture
- Annual budgetary policy decisions made 8 months after the workshops
- Outcomes on population measured 13 months after the workshops



In more detail: you can see after each lecture, there was a light-touch social-emotional learning exercise - Two writing exercises and two oral exercises


Part 2
t+4 months
AI Fairness Activism Treatment
(Book + Writing Exercises + Structured Discussions)
"The Promise of Artificial Intelligence" Book
n=150
"Weapons of Math Destruction "Book
n=151
Part 3
t+5 months
Benefits of AI Slides Lecture 2
Costs and Solutions of AI Slides Lecture 2
Macroeconomics Slides Lecture 2
Two Writing exercises (200-word each)
Two Writing exercises (200-word each)
Two Writing exercises (200-word each)
30 Minutes structured group discussion and 20 Minutes Individual Discussion
30 Minutes structured group discussion and 20 Minutes Individual Discussion
30 Minutes structured group discussion and 20 Minutes Individual Discussion

Social-Emotional Learning/Self-Reflection

- Summarization, visualization, and self-persuasion to maximize retention
- After each lecture, ministers complete two writing exercises
  - Summarizing key takeaways from the lecture
  - How they intend to apply those lessons in their job
- Final component features structured group discussions (self-persuasion)

OLS Estimation

All Treatments

$$Y_i = \theta + \alpha \, \text{AI Benefits}_i + \beta \, \text{AI Costs and Solutions}_i + \mathbf{W'}_i\psi + \epsilon_i \quad (1)$$

- Subscript *i* is an individual deputy minister
- Y represents the respective outcome
- **W** is a vector of individual characteristics
- Clustering is done at the individual level (the level of randomization)
- α and β gives the causal impact of benefits of AI for policy and costs with solutions treatment

Results

- Both training series increased ministers' support for AI & willingness to provide public financing for digitization projects

Impact of AI Workshops

Table B3: Impact of AI Education on Ministers' and Subordinates' support for AI and digitization Funding *by Training Components*

	Support for AI	Opposition for AI	AI Benefits on Net	AI Harms on Net	Digitization Funding Request to Planning Ministry	Digitization Amount in the Funding Request (PKR)
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: Deputy Ministers						
Benefits AI	0.338**	-0.283	0.388**	-0.322*	0.133*	60,783
	(0.166)	(0.182)	(0.182)	(0.190)	(0.0682)	(51,319)
Costs & Solutions AI	0.272*	-0.145	0.318*	-0.0693	0.139**	78,328***
	(0.164)	(0.199)	(0.177)	(0.191)	(0.0679)	(27,373)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Observations	301	301	301	301	301	301
R-squared	0.059	0.048	0.082	0.031	0.078	0.054
Mean Dep. Variable	3.900	2.103	3.598	2.429	0.608	71698.67
Panel B: Subordinates						
Benefits AI	0.365**	-0.366**	0.365**	-0.318*	-	-
	(0.169)	(0.173)	(0.178)	(0.177)	-	-
Costs & Solutions AI	0.356*	-0.401**	0.309**	-0.386*		
	(0.184)	(0.195)	(0.153)	(0.197)		
Controls	Yes	Yes	Yes	Yes	-	-
Observations	204	204	204	204	-	-
R-squared	0.132	0.093	0.077	0.090	-	-
Mean Dep. Variable	4.039	2.059	3.951	2.289	-	-

Impact of AI Education

Merged Treatments

Table 3: Impact of AI Education on Ministers' and Subordinates' Support for AI

	Support for AI	Opposition for AI	AI Benefits on Net	AI Harms on Net
	(1)	(2)	(3)	(4)
Panel A: Deputy Ministers				
AI Education	0.305**	-0.214	0.353**	-0.195
	(0.144)	(0.159)	(0.156)	(0.160)
Controls	Yes	Yes	Yes	Yes
Observations	301	301	301	301
R-squared	0.059	0.046	0.081	0.025
Mean Dep. Variable	3.900	2.103	3.598	2.429
Panel B: Subordinates				
AI Education	0.369**	-0.382**	0.351**	-0.347**
	(0.159)	(0.168)	(0.147)	(0.170)
Controls	Yes	Yes	Yes	Yes
Observations	204	204	204	204
R-squared	0.124	0.077	0.080	0.090
Mean Dep. Variable	4.039	2.059	3.951	2.289

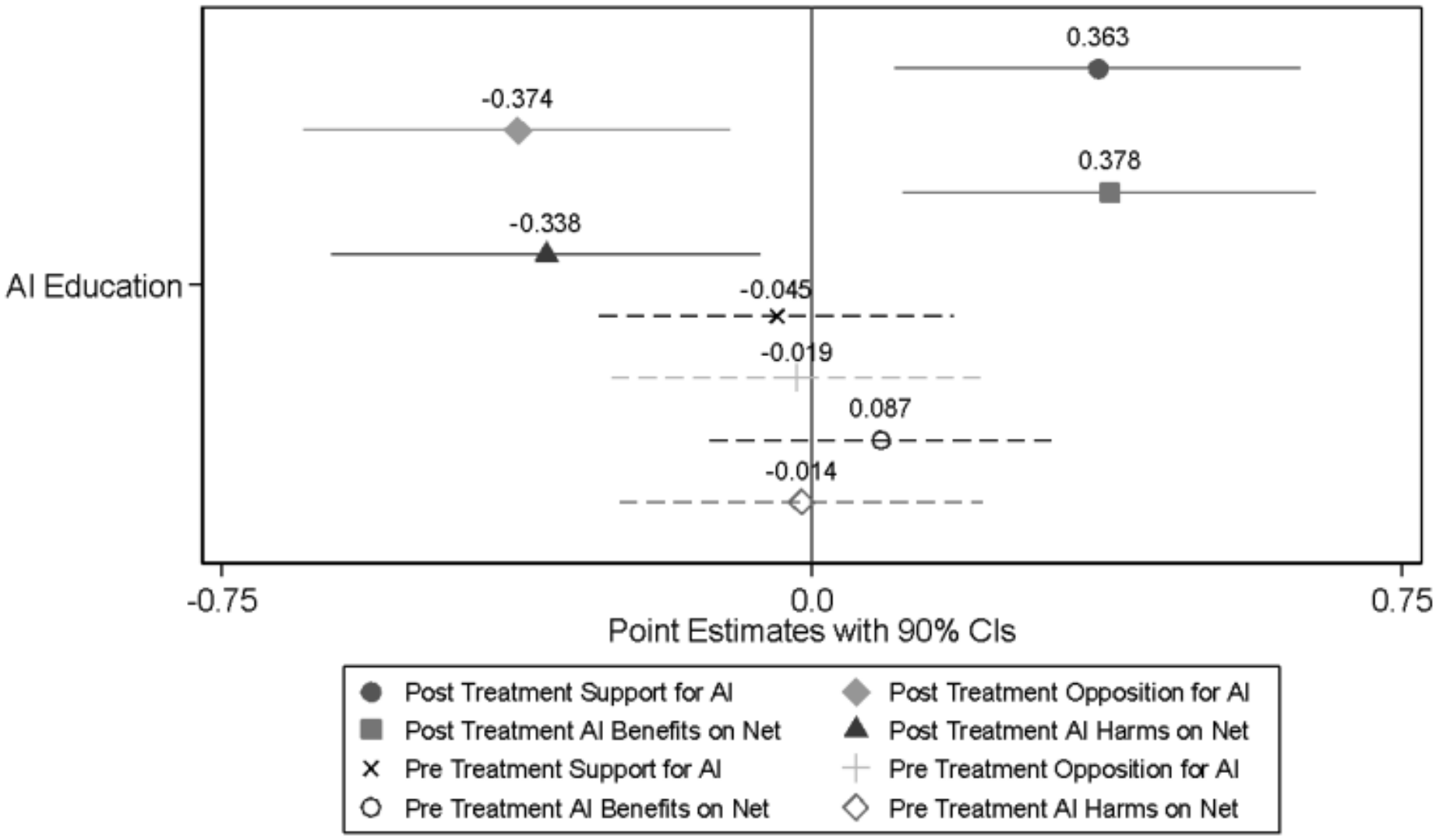
The benefits of AI featured a talk by luminaries like Sandy Pentland, at MIT, who discussed the power of the new digital landscape, platform, and network economics. The costs and solutions featured discussions algorithmic bias but also what could be done.

It is possible that in a low digital infrastructure setting, both had the same impacts.

Impact of AI Education on Ministers' Subordinates

Figure 3: Transmission of Treatment Effects on Subordinate Staff

Panel A: Impact of AI Education on Subordinates



Magnitudes

- The effects on policy support for AI are qualitatively significant and indicate a persuasion rate of 6% (DellaVigna and Gentzkow, 2010)
  - This rate is roughly equivalent to the impact of gaining access to independent TV (NTV) on anti-Putin voting (Enikolopov et al., 2011)
  - or the expansion of television in the 1950's on voter turnout in the United States (Gentzkow and Shapiro, 2006)

Funding

- Nascency of AI in policy implied that digitization of paper records is precursor to AI implementation
  - "Only when the paper-based data is digitized, can we even begin to think of training and implementing AI algorithms"
- Stated and actual policy choices of deputy ministers
- Budget requested to and granted by the Ministry of Planning
  - We obtain data for two policies
    - one related to AI (digitization spending allowance)
    - the other unrelated to AI (office maintenance spending allowance) that serves as the placebo policy choice
  - Pretreatment (prior year) and the posttreatment year data
  - Post-treatment decisions taken after the ministers graduated from the Institute about 8 months after the treatment

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  - Post-treatment decisions taken after the ministers graduated from the Institute about 8 months after the treatment

Impact of AI Education

Original Units

Table 2: Impact of AI Education on Stated, Actual and Last Year's Policy Decision

	Stated Policy Decision		*Actual Policy Decision*		*Last Year's Actual Policy Decision*	
	Stated Funding Request to PlanningMinistry	Stated Amount in Funding Request (PKR)	Funding Request to PlanningMinistry	Amount in Funding Request (PKR)	Last Year's Funding Request to Planning Ministry	Last Year's Amount in Funding Request (PKR)
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: Digitization Funding Request						
AI Education	0.171***	215,507	0.136**	69,560**	-0.00390	-26,137
	(0.0568)	(147,370)	(0.0589)	(34,052)	(0.0618)	(37,659)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Observations	301	301	301	301	301	301
R-squared	0.091	0.050	0.078	0.054	0.022	0.037
Mean Dep. Variable	0.688	227881.1	0.608	71698.67	0.436	616697.7
Panel B: Office Maintenance Funding Request						
AI Education	-0.000530	-18,194	0.00387	-11,438	-0.0475	24,651
	(0.0626)	(33,958)	(0.0624)	(23,492)	(0.0625)	(59,905)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Observations	301	301	301	301	301	301
R-squared	0.022	0.011	0.053	0.028	0.033	0.020
Mean Dep. Variable	0.488	207515	0.528	42235.88	0.518	461534.9

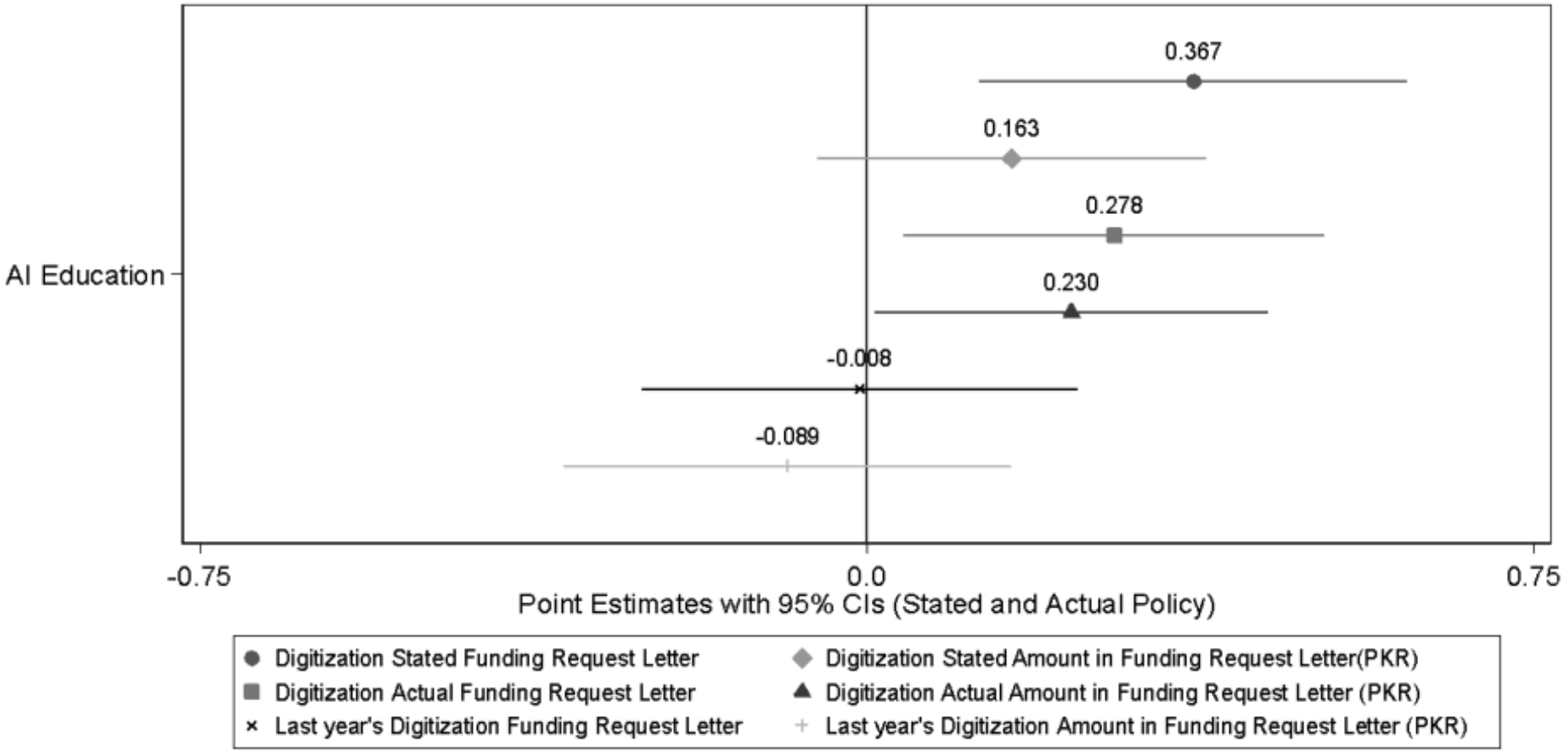
14-17% more likely to make a funding request

Funding requests are almost all entirely met, equals to actual funding that they disburse

Impact of AI Education on Ministers

Standardized

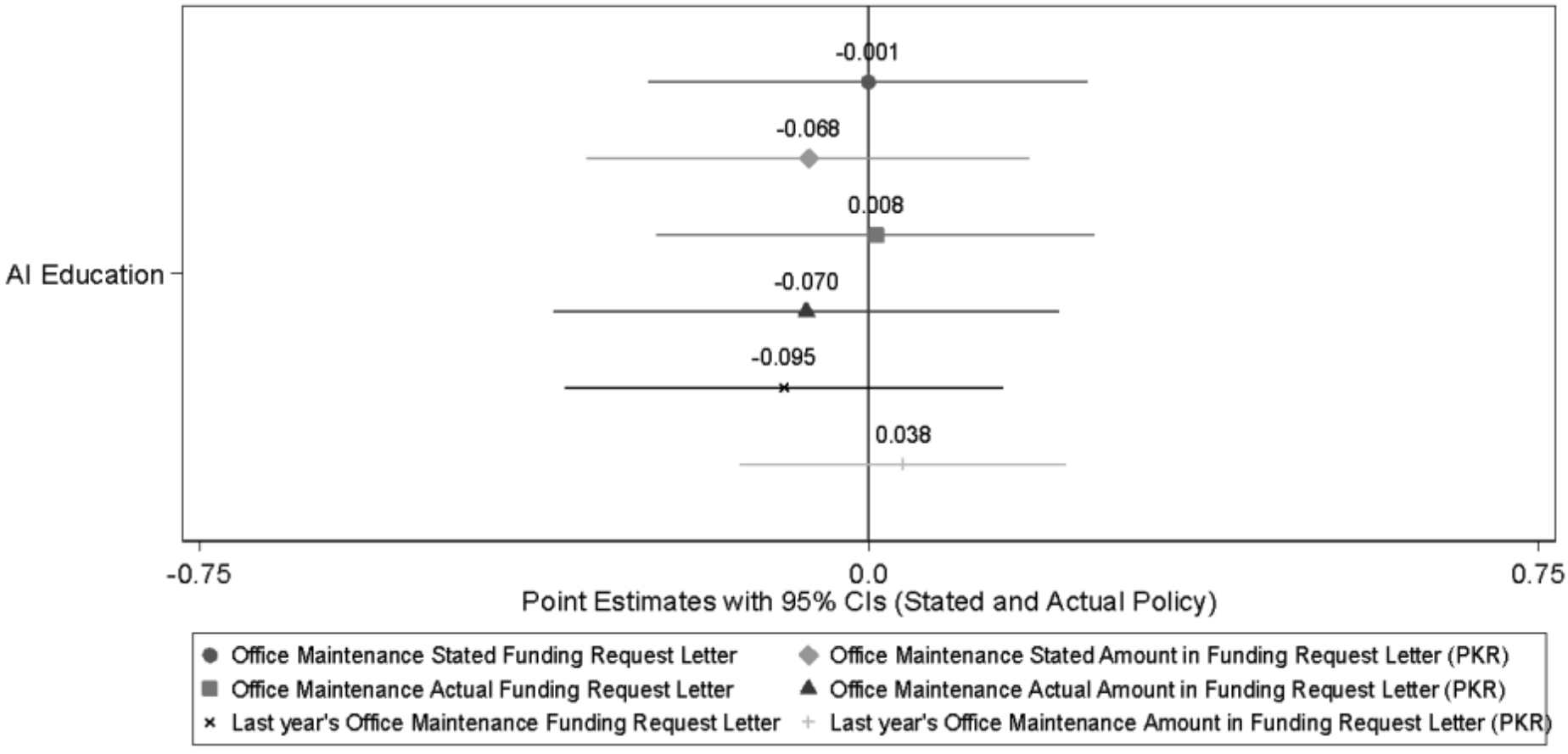
Figure 1: Impact of AI Education on Ministers' Funding Allowances for Digitization (treatment and pretreatment year)



Impact of AI Education on Ministers

Placebo

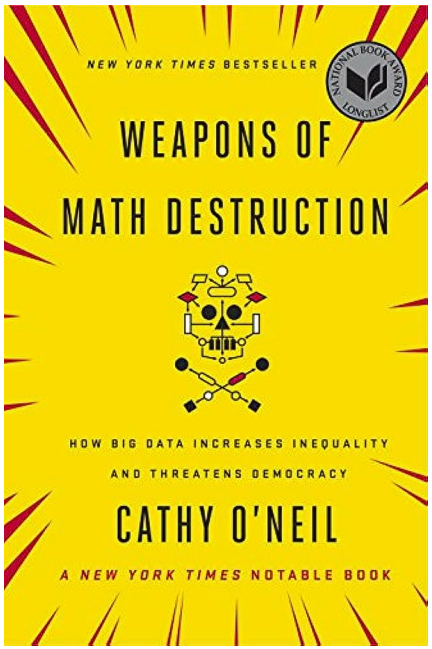
Figure 2: Placebo - Impact of AI Education on Ministers' Office Maintenance Funding Request (treatment and pretreatment year)

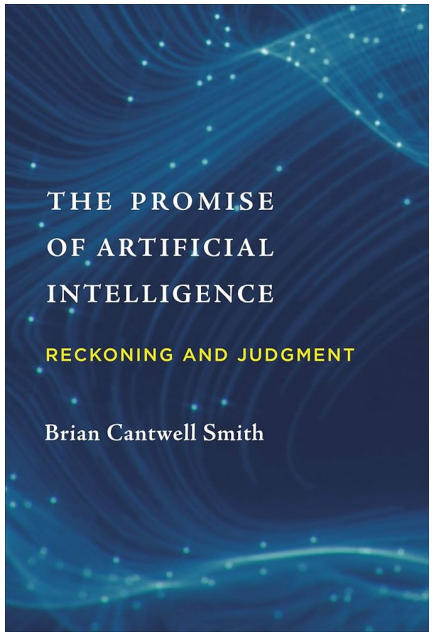


Impact of AI Fairness Activism

- How does AI Fairness Activism arguments on the inevitability of algorithmic bias impact state and society?

Cross-randomized and distributed 4 months after the first lecture





The weapons of math destruction, in particular, gives examples of how bias in algorithms can be self-reinforcing. If the algorithm predicts a minority neighborhood is more likely to have crime The police go to that neighborhood That can self-perpetuate the bias

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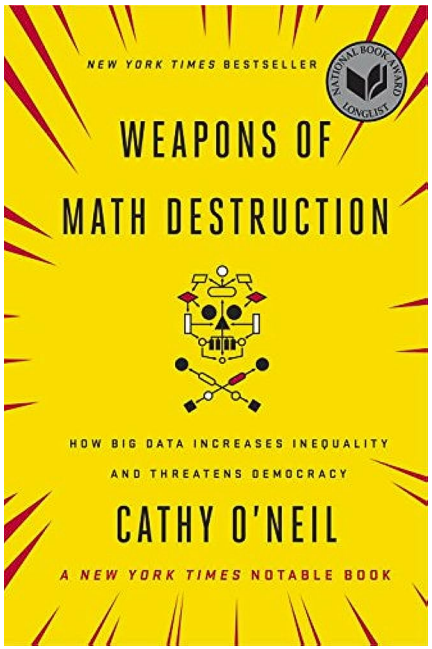

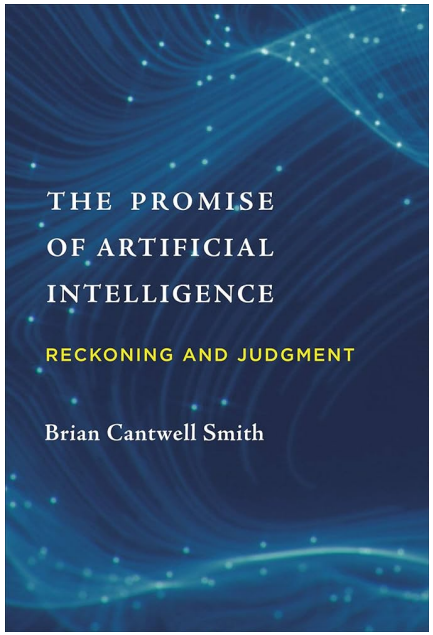

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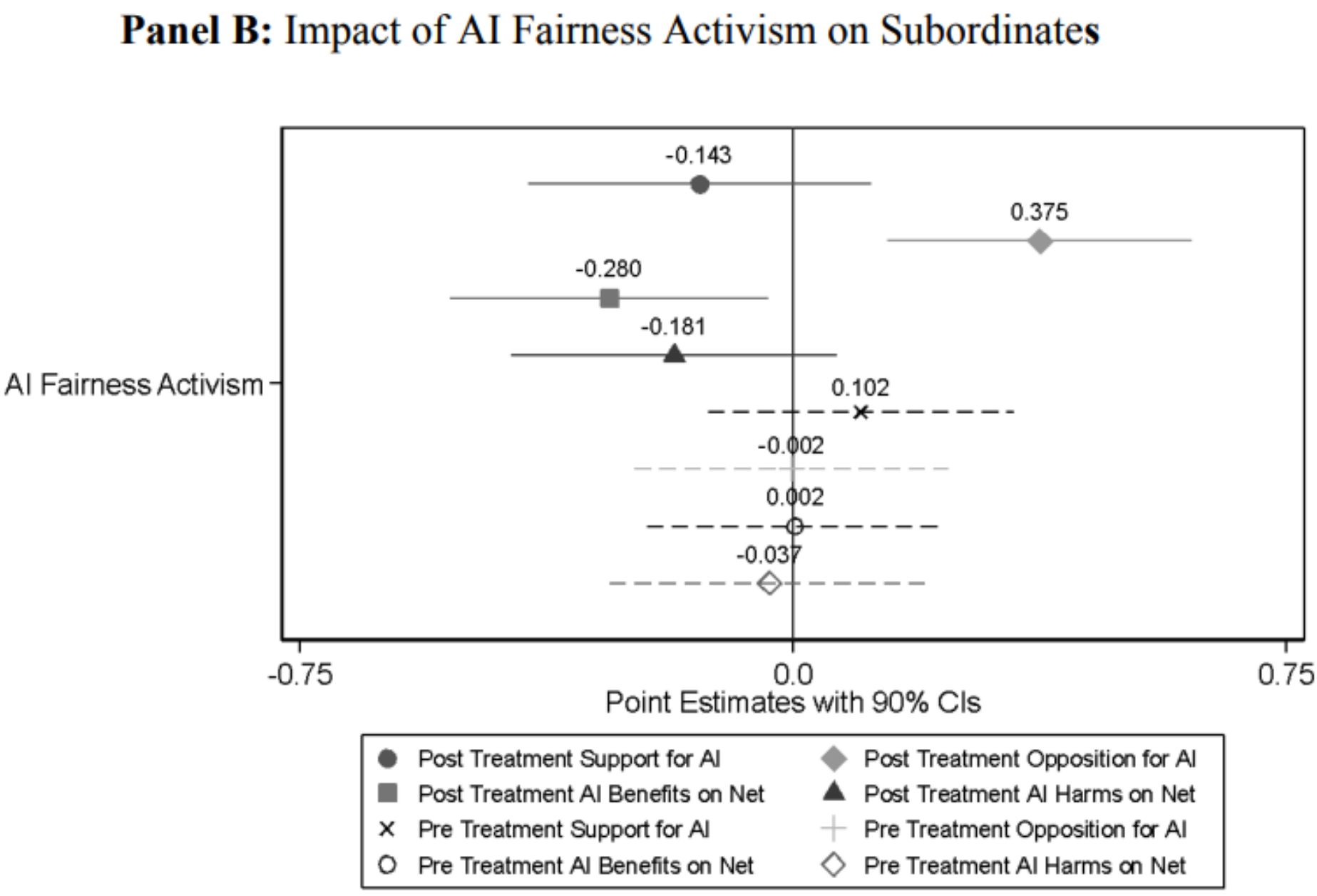
Impact of AI Fairness Activism

Table 4: Impact of AI Fairness Activism on Ministers and their Subordinates

	Support for AI	Opposition for AI	AI Benefits on Net	AI Harms on Net
	(1)	(2)	(3)	(4)
Panel A: Deputy Ministers				
AI Fairness Activism	-0.312**	0.188	-0.268*	0.369**
	(0.133)	(0.159)	(0.148)	(0.157)
Controls	Yes	Yes	Yes	Yes
Observations	301	301	301	301
R-squared	0.061	0.046	0.076	0.039
Mean Dep. Variable	3.900	2.103	3.598	2.429
Panel B: Subordinates				
AI Fairness Activism	-0.145	0.382***	-0.260*	-0.186
	(0.160)	(0.143)	(0.136)	(0.154)
Controls	Yes	Yes	Yes	Yes
Observations	204	204	204	204
R-squared	0.103	0.080	0.086	0.074
Mean Dep. Variable	4.039	2.059	3.951	2.289

Impact of AI Fairness Activism on Subordinates

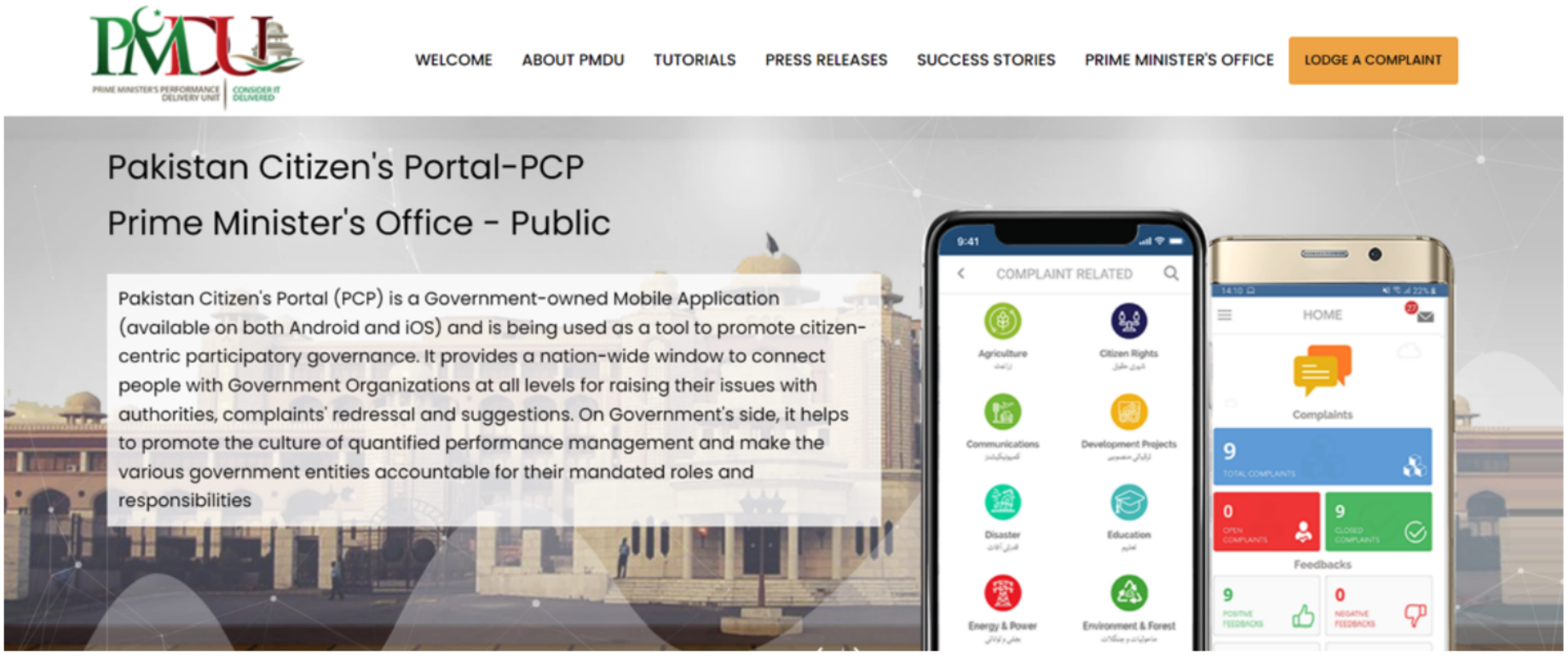


Impact of AI Fairness Activism

Table 5: Impact of AI Fairness Activism on Policy Decisions

	Digitization Funding Request				*Office Maintenance Funding Request*			
	Funding Request to Planning Ministry	Amount in Funding Request (PKR)	Last Year's Funding Request to Planning Ministry	Last Year's Amount in Funding Request (PKR)	Funding Request to Planning Ministry	Amount in Funding Request (PKR)	Last Year's Funding Request to Planning Ministry	Last Year's Amount in Funding Request (PKR)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
AI Fairness Activism	-0.380***	-34,137	0.0591	21,039	-0.0670	-7,802	0.0748	136,970
	(0.0521)	(30,380)	(0.0587)	(34,927)	(0.0583)	(15,188)	(0.0597)	(87,763)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	301	301	301	301	301	301	301	301
R-squared	0.216	0.046	0.043	0.050	0.058	0.028	0.036	0.031
Mean Dep. Variable	0.608	71698.67	0.429	616697.7	0.528	42235.88	0.518	461534.9

Societal Impacts



a new data source and rather unique e-governance/digital democracy platform to have a uniform measure of civil servant performance

AMID LAND RECORD DIGITIZATION EFFORTS..

Societal Impacts

- The Pakistan Citizen Portal (PCP) was established in 2013 with the aim of connecting public officials to citizens
- It takes complaints from citizens on government services which are then relayed to the deputy ministers in charge of their districts
- 4 million registered citizens on its platform
- Citizens rate their satisfaction of public service delivery upon closing of the complaint on a 1 to 5 scale
- We link the deputy ministers to the complaints
- We construct two proxies for deputy ministers' performance
  - Citizen rating on the complaint resolution
  - Number of days for which the complaint remains open

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AI Training Improves Resolution of Land Disputes

while AI Fairness Activism Worsens Resolution of Land Disputes

Table 8: Impact of Training and Fairness Activism on Citizen Complaints – Original Units

	Citizen Rating Average		Resolution Days Average	
	(1)	(2)	(3)	(4)
Panel A: AI Education				
AI Education	0.312*	0.323	-18.35*	-17.09*
	(0.188)	(0.201)	(9.697)	(8.711)
Controls	No	Yes	No	Yes
Observations	95	95	95	95
R-squared	0.030	0.073	0.042	0.222
Mean Dep. Variable	2.429	2.429	65.029	65.029
Panel B: AI Fairness Activism				
AI Fairness Activism	-0.353*	-0.360*	15.60*	11.66
	(0.179)	(0.187)	(8.828)	(8.370)
Controls	No	Yes	No	Yes
Observations	95	95	95	95
R-squared	0.038	0.080	0.031	0.204
Mean Dep. Variable	2.429	2.429	65.029	65.029

In terms of ratings and time-to-resolution, a 15 day shift over an average of 65 days.

AI Training Improves Resolution of Land Disputes

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Table 9: Impact of AI Education Training and Fairness Activism by Land and Placebo Schools & Road Construction Complaints

	Land and Residential Property Complaints		*Placebo - Schools & Road Construction Complaints*	
	Citizen Rating Average	Resolution Days Average	Citizen Rating Average	Resolution Days Average
	(1)	(2)	(3)	(4)
Panel A: AI Education				
AI Education	0.477**	-22.31**	0.203	-12.49
	(0.185)	(8.746)	(0.270)	(9.157)
Controls	Yes	Yes	Yes	Yes
Observations	95	95	95	95
R-squared	0.155	0.269	0.023	0.192
Mean Dep. Variable	1.703	65.356	2.403	63.723
Panel B: AI Fairness Activism				
AI Fairness Activism	-0.332*	15.85*	-0.373	8.512
	(0.192)	(8.709)	(0.251)	(8.617)
Controls	Yes	Yes	Yes	Yes
Observations	95	95	95	95
R-squared	0.126	0.244	0.041	0.182
Mean Dep. Variable	1.703	65.356	2.403	63.723

Additional Analyses

- Does AI Fairness Activism reduce the effects of AI Education or
  - Does AI Fairness Activism have independent effects?
- Did the book enhance or mitigate the impact of AI Education training?
- Transmission of ideas within the bureacracy
- Balance
- Attrition
- Spillovers
- Multiple Hypotheses
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Impact of AI Fairness Activism

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  - Does AI Fairness Activism have independent effects?

Impact of AI Education and Fairness Activism

Table 6: Impact of AI Fairness Activism on Officers and their Subordinate Staff Support Perceived for AI

	Support for AI	Opposition for AI	AI Benefits on Net	AI Harms on Net
	(1)	(2)	(3)	(4)
Panel A: Deputy Ministers				
AI Education	0.612***	-0.306	0.507**	-0.580***
	(0.209)	(0.234)	(0.242)	(0.219)
AI Fairness Activism	0.0383	0.165	-0.105	-0.117
	(0.242)	(0.240)	(0.266)	(0.245)
AI Education X *AI Fairness Activism*	-0.586**	0.158	-0.290	0.742**
	(0.286)	(0.316)	(0.322)	(0.315)
Controls	Yes	Yes	Yes	Yes
Observations	301	301	301	301
R-squared	0.094	0.069	0.097	0.060
Panel B: Subordinates				
AI Education	0.328	-0.152	0.332*	-0.201
	(0.209)	(0.199)	(0.200)	(0.222)
AI Fairness Activism	-0.220	0.730***	-0.323	0.0160
	(0.275)	(0.271)	(0.252)	(0.279)
AI Education X *AI Fairness Activism*	0.0936	-0.509	0.0752	-0.290
	(0.319)	(0.327)	(0.300)	(0.319)
Controls	Yes	Yes	Yes	Yes
Observations	204	204	204	204
R-squared	0.131	0.124	0.120	0.101

AI Training and AI Fairness Activism

AI Training/Activism Impacts AI Attitudes and Subordinates and Digitization Funding

Table 7: Impact of AI Fairness Activism on Fiscal Support – Original Units

	Digitization Funding Request				*Office Maintenance Funding Request*			
	Funding Request to Planning Ministry	Amount in Funding Request (PKR)	Last Year's Funding Request to Planning Ministry	Last Year's Amount in Funding Request (PKR)	Funding Request to Planning Ministry	Amount in Funding Request (PKR)	Last Year's Funding Request to Planning Ministry	Last Year's Amount in Funding Request (PKR)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
AI Education	0.287***	63,073**	-0.0606	-30,965	-0.0620	24,739	-0.149	-88,541
	(0.0726)	(31,295)	(0.0871)	(52,153)	(0.0858)	(17,175)	(0.0902)	(54,165)
AI Fairness Activism	-0.193**	-44,249*	-0.0160	13,998	-0.153	38,817	-0.0533	-6,102
	(0.0956)	(24,960)	(0.101)	(63,928)	(0.102)	(43,026)	(0.105)	(90,863)
AI Education X *AI Fairness Activism*	-0.286**	13,532	0.114	11,320	0.131	-70,383	0.195	216,322
	(0.113)	(62,630)	(0.125)	(76,616)	(0.125)	(51,370)	(0.127)	(150,551)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	301	301	301	301	301	301	301	301
R-squared	0.252	0.057	0.045	0.052	0.061	0.039	0.046	0.037

Mechanisms

- We leverage the fact that the book and the associated structured discussion was randomly assigned 4 months after the first lecture
- The timing of the surveys before and after the book assignment allows us to investigate if the book enhanced or mitigated the impact of AI Education training
- We find that both enhancement and mitigation occurs

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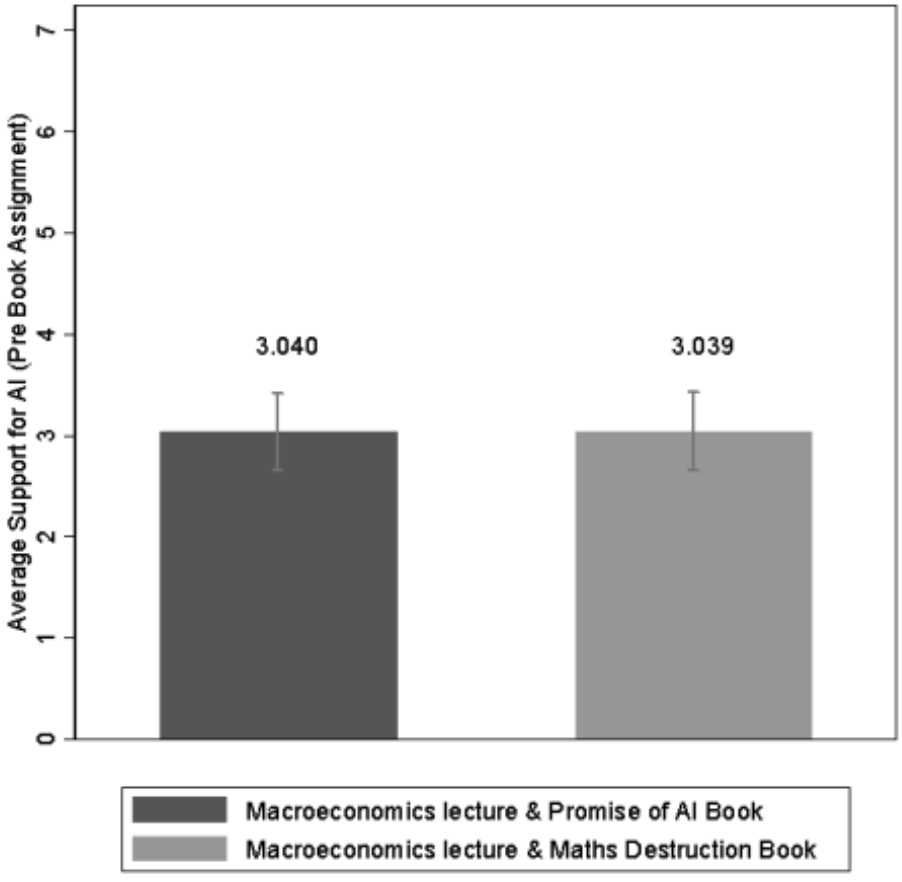
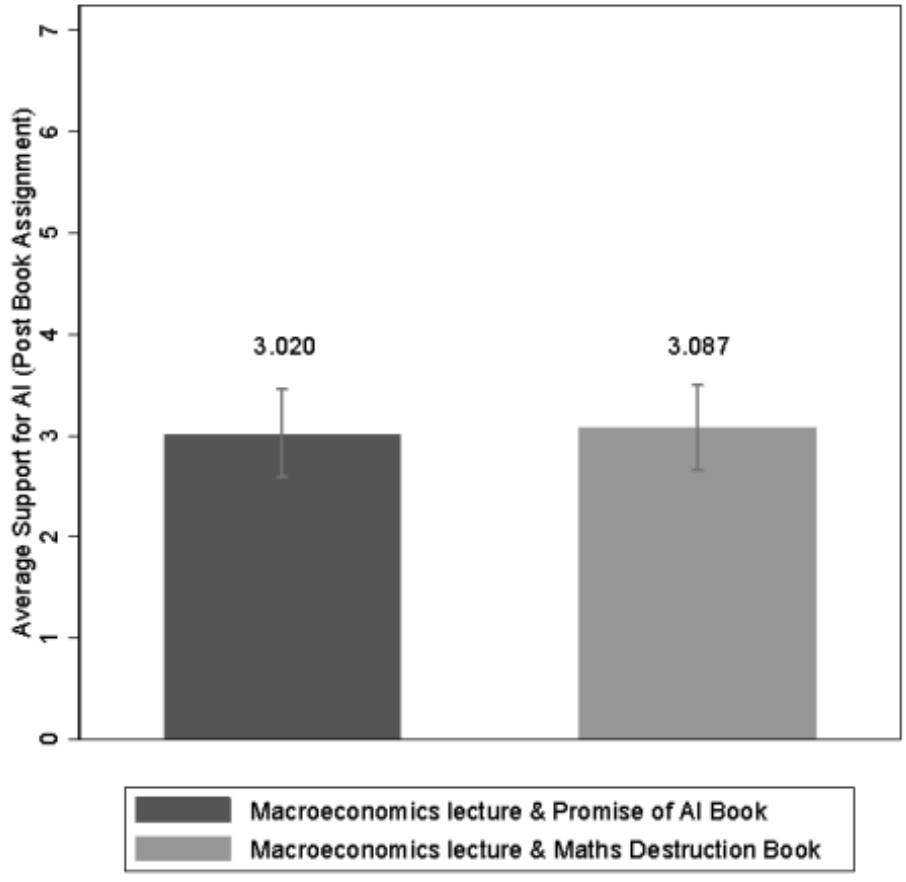
Book Mechanism

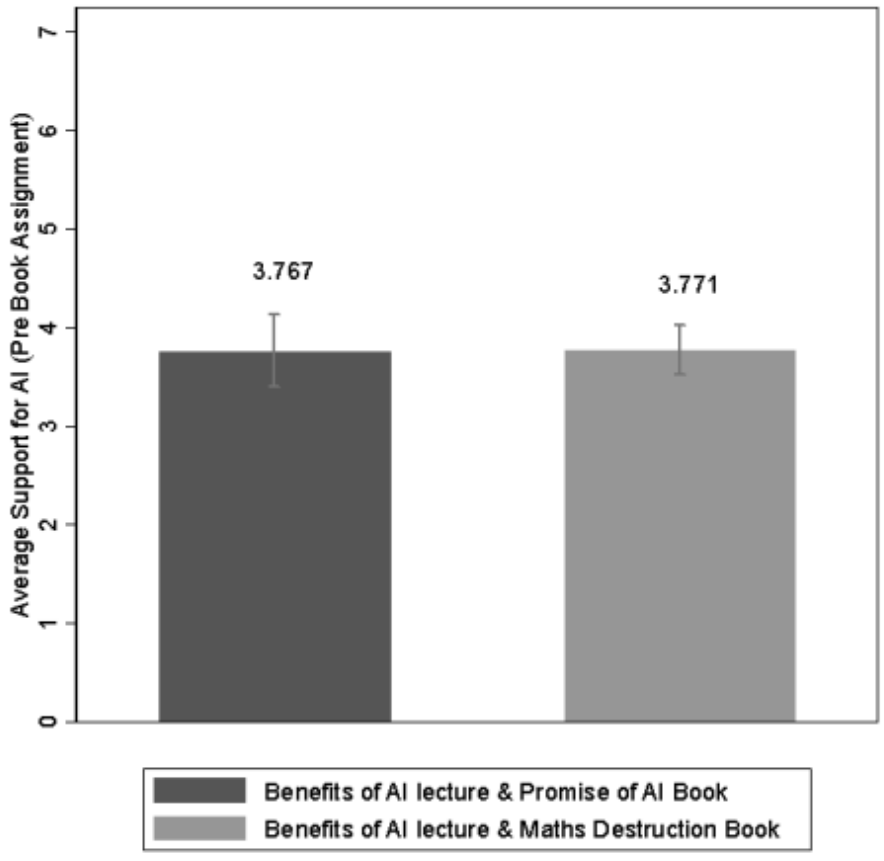
Figure B7: Ministers Assigned the "Macroeconomics lectures" (Pre vs Post Book Assignment)

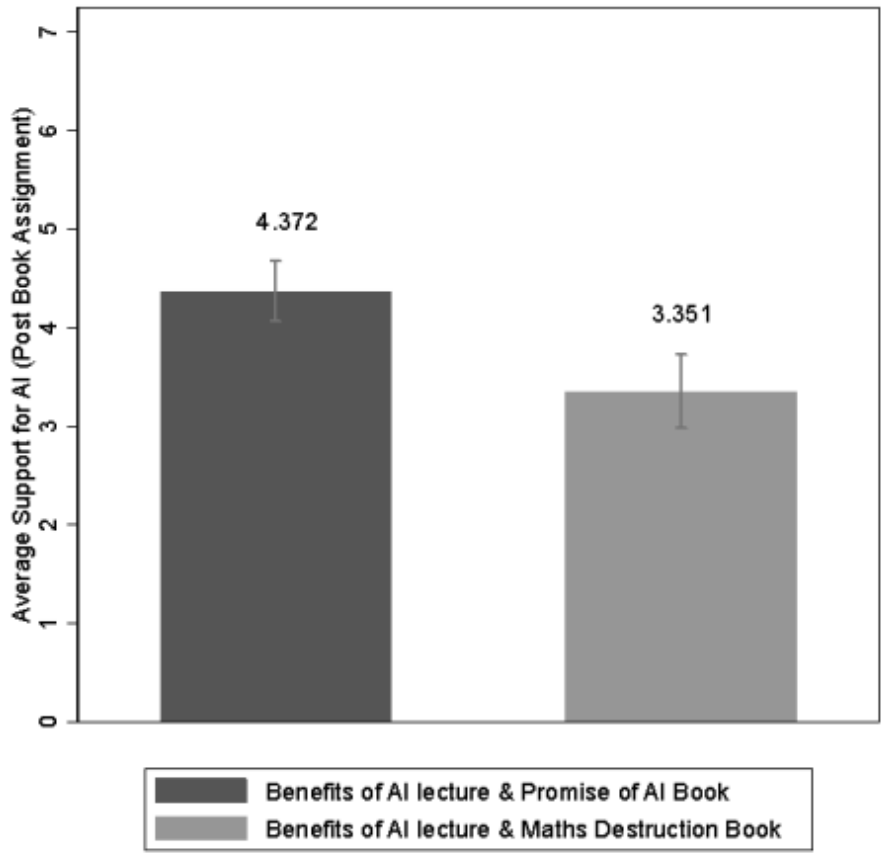




Book Mechanism

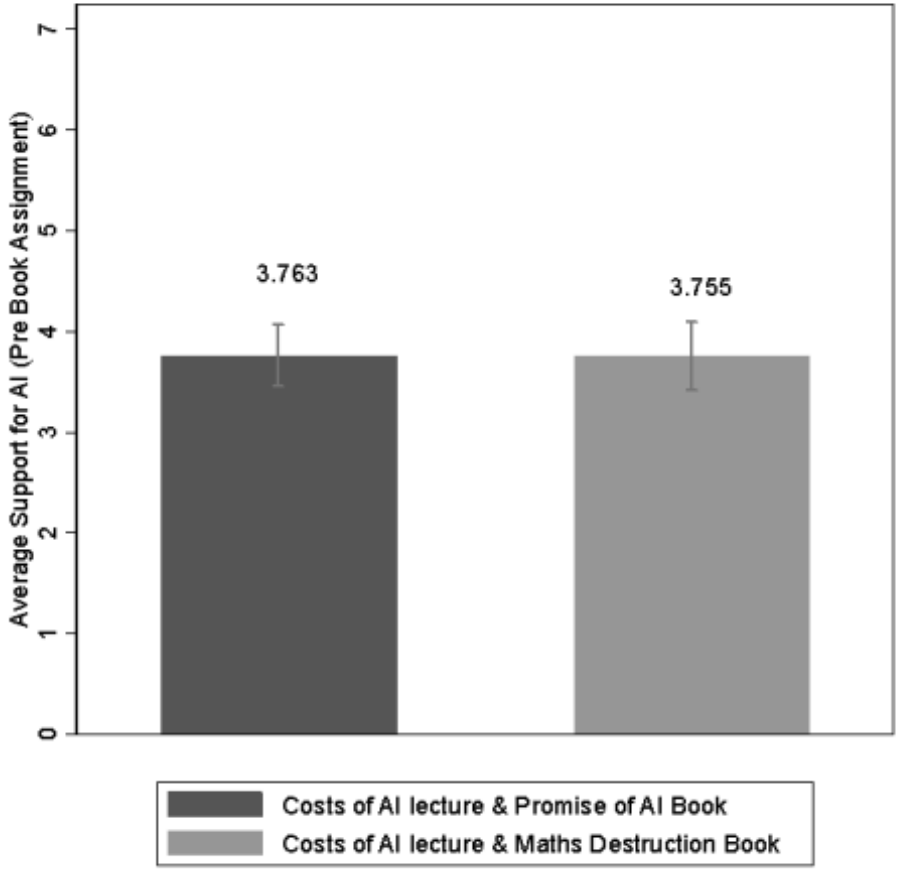
Figure B5: Ministers Assigned the "Benefits of AI" lectures (Pre vs Post Book Assignment)

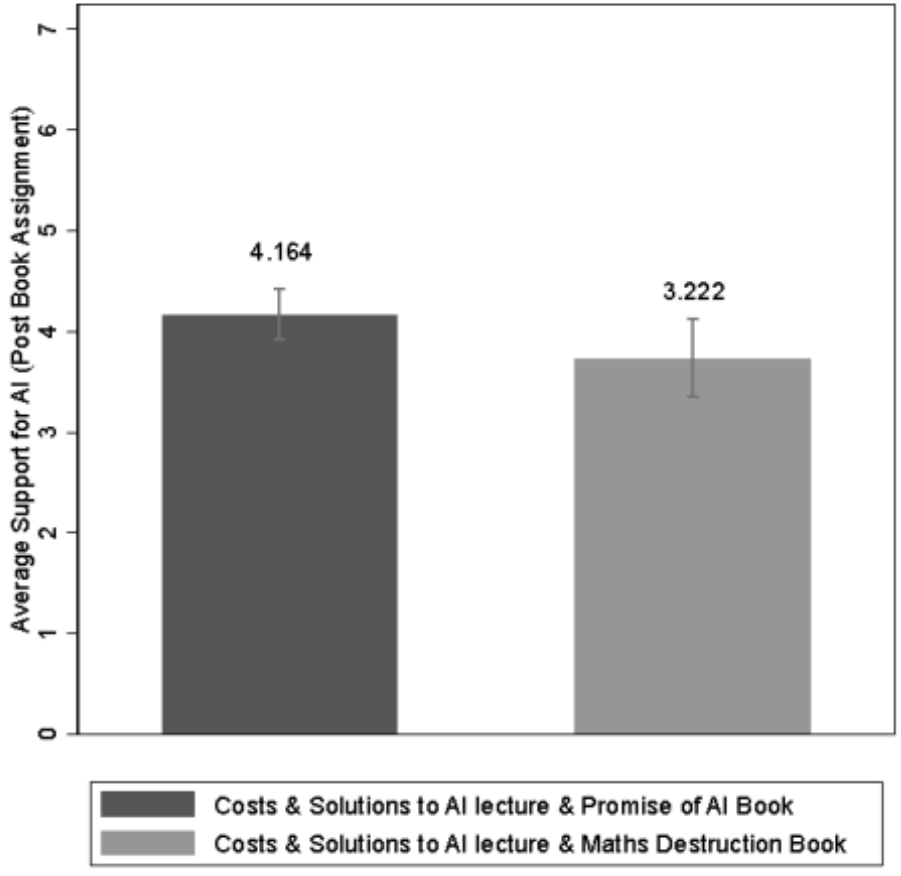




Book Mechanism

Figure B6: Ministers Assigned the "Costs and Solutions of AI" lectures (Pre vs Post Book Assignment)





Transmission

- Transmission to subordinates is greater, the larger the experience differential between the deputy minister and her subordinate
- Homophily based on gender or birthplace does not appear to mediate
- Results are consistent with vertical transmission within the bureaucracy

Transmission

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- Homophily based on gender or birthplace does not appear to mediate
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Transmission Mechanism

Table 10: Impact of AI Education on Support for AI by Subordinates - Vertical vs Horizontal Transmission

	Support for AI	Opposition for AI	AI Benefits on Net	AI Harms on Net
	(1)	(2)	(3)	(4)
AI Education X *Diff in Experience*	0.110***	-0.0105	0.0236	-0.0633*
	(0.0396)	(0.0386)	(0.0407)	(0.0377)
AI Education X Same *Gender*	0.159	0.369	-0.318	-0.309
	(0.433)	(0.247)	(0.333)	(0.414)
AI Education X Same *Birthplace Dist.*	-0.356	0.399	-0.205	0.515
	(0.340)	(0.341)	(0.285)	(0.341)
AI Education X *Years of Experience*	0.0273	0.0257	-0.0821*	0.0175
	(0.0473)	(0.0490)	(0.0423)	(0.0519)
AI Education	-0.872	-0.208	0.615	0.149
	(0.779)	(0.737)	(0.885)	(0.894)
Difference in years of Experience	-0.0578	-0.00585	-0.00165	0.0288
	(0.0375)	(0.0358)	(0.0362)	(0.0346)
Same Gender	0.159	0.369	-0.318	-0.309
	(0.433)	(0.247)	(0.333)	(0.414)
Same Birthplace District	0.547*	-0.435	0.347	-0.339
	(0.301)	(0.288)	(0.258)	(0.298)
Years of Experience	0.00516	-0.00299	0.0343	-0.0221
	(0.0405)	(0.0335)	(0.0310)	(0.0445)
Controls	Yes	Yes	Yes	Yes
Observations	204	204	204	204
R-squared	0.222	0.111	0.157	0.151

Robustness

- Balance
- Attrition
- Spillovers
- Multiple Hypotheses
- Experimenter Demand
  - Ministry of Planning - independent of the experimenter/institute
  - Pakistan Citizen Portal - independent of the experimenter/institute
  - Identity of the book was blinded to the experimenters
  - Staff officers, who were not part of the training, were also affected

Table 1: Balance Check over Deputy Ministers' and their Staff Officers Characteristics

Panel A: Ministers' Characteristics

	(1) Gender	(2) Age	(3) Years of Education	(4) Birth Place	(5) Pre-Treatment Modernization Needed	(6) STEM Major	(7) District Administration (PAS)	(8) Law and Order (PSP)	(9) Revenue Affairs (FBR)	(10) Foreign Affairs (FSP)
AI Education	-0.068	-0.0243	-0.115	-0.0612	-0.0479	-0.040	-0.0383	0.00598	-0.008	0.0538
	(0.053)	(0.542)	(0.202)	(0.061)	(0.161)	(0.060)	(0.039)	(0.0383)	(0.038)	(0.042)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	301	301	301	301	301	301	301	301	301	301
R-squared	0.038	0.024	0.020	0.027	0.041	0.044	0.104	0.098	0.112	0.118
Mean Dep V	0.757	46.05	16.714	0.405	3.841	0.385	0.123	0.116	0.113	0.150

Panel B: Subordinates' Characteristics

	Gender	Age	Years of Education	Birth Place	Pre-Treatment Modernization Needed	STEM Major	District Administration (PAS)	Law and Order (PSP)	Revenue Affairs(FBR)	Foreign Affairs (FSP)
AI Education	-0.013	-0.108	-0.120	-0.118	-0.0505	-0.088	-0.0038	0.0701	-0.037	0.0722
	(0.059)	(0.685)	(0.207)	(0.076)	(0.198)	(0.074)	(0.050)	(0.048)	(0.046)	(0.049)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	204	204	204	204	204	204	204	204	204	204
R-squared	0.094	0.022	0.049	0.060	0.086	0.046	0.103	0.116	0.116	0.098
Mean Dep V.	0.809	43.29	15.784	0.480	3.892	0.358	0.127	0.123	0.108	0.123

Attrition

Table B2: Testing for Differential Attrition

	Attrition			
	Attrition of Subordinates Data		Attrition of PCP Data	
	(1)	(2)	(3)	(4)
Panel A: *AI Education*				
AI Education	-0.0365	-0.0570	0.0912	0.0856
	(0.0577)	(0.0556)	(0.0580)	(0.0588)
Controls	No	Yes	No	Yes
Observations	301	301	301	301
R-squared	0.001	0.112	0.009	0.054
Mean Dep. Variable	0.322	0.322	0.684	0.684
Panel B: *AI Fairness Activism*				
AI Fairness Activism	0.0491	0.0500	0.0570	0.0574
	(0.0540)	(0.0536)	(0.0537)	(0.0555)
Controls	No	Yes	No	Yes
Observations	301	301	301	301
R-squared	0.003	0.112	0.004	0.055
Mean Dep. Variable	0.322	0.322	0.684	0.684

Spillovers

Table B7: Fraction of More intensely Treated Group does not have a differential effect - *Assessing Spillovers*

	Support for AI	Opposition for AI	AI Benefits on Net	AI Harms on Net	Petition to Planning Ministry	Amount in Petition (PKR)
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: Deputy Ministers						
AI Education X Fraction Treated	-3.009	0.0594	-4.795*	0.371	0.947	-454,183
Within Occupational Group	(2.682)	(3.174)	(2.847)	(3.103)	(1.085)	(977,825)
AI Education	2.291	-0.265	3.519*	-0.452	-0.490	368,265
	(1.794)	(2.095)	(1.889)	(2.046)	(0.718)	(673,911)
Fraction Treated Within Occupational Group	1.689	7.356	2.218	6.948	0.152	935,508
	(3.705)	(4.565)	(4.055)	(4.341)	(1.610)	(702,181)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Observations	301	301	301	301	301	301
R-squared	0.063	0.057	0.090	0.036	0.081	0.057
Panel B: Subordinates						
AI Education X Fraction Treated	-1.042	-2.891	-1.102	0.874	-	-
Within Occupational Group	(3.033)	(3.773)	(2.834)	(3.232)	-	-
AI Education	1.052	1.521	1.087	-0.926	-	-
	(2.013)	(2.479)	(1.885)	(2.113)	-	-
Fraction Treated Within Occupational Group	-1.647	7.322*	-1.246	-2.179	-	-
	(4.270)	(4.287)	(4.005)	(4.355)	-	-
Controls	Yes	Yes	Yes	Yes	-	-
Observations	204	204	204	204	-	-
R-squared	0.126	0.085	0.080	0.089	-	-

Multiple Hypothesis Testing

Table B9: Multiple Hypothesis Testing

	Support for AI	Opposition for AI	AI Benefits on Net	AI Harms on Net	Petition to Planning Ministry	Amount in Petition (PKR)
	(1)	(2)	(3)	(4)	(5)	(6)
AI Education	0.305	-0.214	0.353	-0.195	0.136	69,560
Standard p-values	(0.035)**	(0.179)	(0.025)**	(0.222)	(0.021)**	(0.042)**
Sharpened q-values	{0.068}*	{0.078}*	{0.068}*	{0.080}*	{0.068}*	{0.068}*
FWER p-values	[0.096]*	[0.135]	[0.077]*	[0.135]	[0.074]*	[0.106]
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Observations	301	301	301	301	301	301
R-squared	0.059	0.046	0.081	0.025	0.078	0.055

Conclusion

- Schools of thought on AI impact state and society
  - AI training for policymakers leads to increased budget allocations for digitization and improved citizen ratings and complaint resolution
  - AI fairness activism arguments decrease digitization funding and citizen satisfaction with government services
  - Awareness of algorithmic bias may hinder important policy reforms like land record digitization
- Personnel (economics) of state capacity is malleable
  - AI Training changes senior minsters and transmit to their chiefs of staff and the population
  - Differences in experience, not gender or birthplace, mediate the transmission to subordinates
  - Augmented trainings with self-reflection (summarization, visualization, self-persuasion) can have long-lasting effects

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