**Development Economics Research Workshop 2024** PIER, Bank of Thailand Bangkok, Thailand on Oct 31, 2024





# Next-Generation of Empirical Research in Development Economics

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#### "Empiricalization" of Economics

- 1<sup>st</sup> G (1960's~): Micro-Econometrics
- 2<sup>nd</sup> G (2000's~): Credibility revolution by causal inference
- 3<sup>rd</sup> G (2020's~): Data science and stronger partnership

#### AER, JPE, and QJE publications



Data) Hamermesh (2011) JEL Table 4 with updated information

#### **1<sup>st</sup> Generation: Micro-Econometrics**



#### 1<sup>st</sup> G: Panel Study Craze in 1970s

- OVB ← Panel data
- Around 1970, panel studies in developed and developing countries started:
  - − 1968**~**PSID
  - 1974~Palanpur (Nick Stern)
  - 1966 (74) ~Yujiro Hayami's East Laguna Village
  - 1975~ICRISAT VLS (Binswanger & Rosenzweig)
  - 1975 ~ Bob Evenson's Laguna Multipurpose Household Survey
  - 1976 ~ Rand Corporation's FLS
  - 1980~LSMS (WB & Deaton)





ECONOMIC DEVELOPMENT IN PALANPUR OVER FIVE DECADES

PETER LANJOUW NICHOLAS STERN

#### **Problem of 1<sup>st</sup> G: Selection Bias**

• Causal inference (counterfactual) representation of the G1 model:  $ATT = E (v^{d=1} - v^{d=0} | d=1)$ (4)

Observed 
$$\Delta y = \beta^{OLS} = ATT + selection bias. If the bias = 0, \beta^{OLS} = ATT:$$
  
 $E(y^{d=1} | d=1) - E(y^{d=0} | d=0)$   
 $= E(y^{d=1} - y^{d=0} | d=1) + [E(y^{d=0} | d=1) - E(y^{d=0} | d=0)]$  (5)  
(ATT) (Selection bias)

- Ignorability condition:  $E(y^{d=0} | d=1, W) = E(y^{d=0} | d=0, W)$
- Impossible missions to eliminate unobservables; limits to G1<sup>st</sup> microeconometrics (IV, FE, and control function approach)

(6)

#### 2<sup>nd</sup> Generation: Causal Inference



## 2<sup>nd</sup> G: Causal Inference

- "Credibility revolution" to remove selection bias
- Experimental method ✓ RCT
- Quasi-experimental (natural-experimental) methods:
   ✓DID
  - $\checkmark$  IV (with clean variation)
  - ✓ RDD
  - ✓ Conditioning on X (e.g., PSM, IPW)
  - ✓ Synthetic Controls

## 2<sup>nd</sup> G: Causal Inference

- RCT guarantees "selection bias = 0 by design," leading to  $\beta^{OLS} = ATT$ :
- "Nothing new"
  - RCTs available since the 19<sup>th</sup> century
  - Social experiments in 1960's 80's (e.g., Rand health insurance RCT)
- Why resuscitated?
  - 1. Not only RCT, but also quasi-experimental methods (RDD, DID, PSM, IV, SCM). Yet, Donald Campbell in the 60's
  - 2. Strong policy orientations (Progresa; Cochrane; Campbell; and 3ie); Power of EBPM (Hjort et al., 2021 *AER*)
  - 3. Mechanism experiments (Ludwig, et al., 2011 JEP)

#### 2<sup>nd</sup> G: Causal Inference



Nakamura and Suzuki (2019, 2020) on *JDE*, *WBER*, *EDCC*, *WD* 



### An Illustration: Microcredit Program Ineffective?

- Microfinance: A variety of programs (credit, savings, insurance, and money transfers for migrants) that provide small-scale financial services to the poor (without assets) who have been excluded from the formal banking and other financial sectors.
- Microcredit: A mode of microfinance typically is a collateral-free loan program popularized by Grameen Bank of Bangladesh, led by Professor Muhammad Yunus, who won the Nobel Peace Prize in 2006.

American Economic Journal: Applied Economics 2015, 7(1): 1–21 http://dx.doi.org/10.1257/app.20140287

#### Six Randomized Evaluations of Microcredit: Introduction and Further Steps<sup>†</sup>

By Abhijit Banerjee, Dean Karlan, and Jonathan Zinman\*

#### The impact of microcredit: 6 RCTs

	Bosnia	Ethiopia	India	Mexico	Mongolia	Morocco
<ul> <li>♠ = (+) significant</li> <li>∞ = insignificant</li> <li>♥ = (-) significant</li> </ul>	Men & women, individual loans, \$1,800, 22% APR	Men & women, group liability, \$500, 12% APR	Women only, group liability, \$600, 24% APR	Women only, group liability, \$450, 110% APR	Women only, individual & group, \$700, 27% APR	Men & women, group liability, \$1,100, 15% APR
Credit access	$\widehat{\mathbf{T}}$	$\mathbf{\hat{T}}$	Ŷ	Ŷ	$\widehat{\mathbf{T}}$	Ŷ
Business Activity	Ŷ	$\hat{\mathbf{T}}$	Ŷ	Ŷ	$\approx$	Ŷ
Income	$\approx$	$\approx$	$\approx$	$\approx$	$\approx$	$\approx$
Consumption	•	4	$\approx$	$\approx$	$\hat{\mathbf{T}}$	$\approx$
Social effects	$\approx$	$\approx$	$\approx$	$\mathbf{\hat{T}}$	$\approx$	$\approx$

Source) Justin Sandefur (2016) The Final Word onMicrocredit? CGD10

#### **Problem of 2<sup>nd</sup> G: Replicability**

- Theoretically, an RCT has "internal validity," i.e., causal effects are correctly estimated for the population K at time T.  $E(b^{KT}) = \beta^{KT}$
- No guarantee of "external validity" (e.g., general equilibrium effects)  $E(b^{KT}) = \beta^{K'T'}$
- Theory of change, mediation analysis, and mechanism experiments are also available, but reduced-form ≈ black box approach
- b<sup>KT</sup> > 0 is not a sufficient condition for the policy to actually work (e.g., general equilibrium effects), nor is it a necessary condition, as other different mechanisms may be at work (McKenzie, 2011)

### **Problem of 2<sup>nd</sup> G: Replicability**

- Camerer et al. (2016) *Science;* Camerer, et al. (2018) *NHB*; O'Grady (2021) *Science* 
  - <u>Research design</u>: internal/external validity
  - <u>Research process</u>: reproducibility/replicability
- *p*-hacking, reporting and publication bias, *HARKing*, and other QRP
  - For example, e replication challenges in the disaster and preference nexus (Sawada, 2022)



FIGURE 2. *z*-Statistics by Method

*Notes:* This figure displays histograms of test statistics for  $z \in [0, 10]$  by method: difference-in-differences (DID), instrumental variables (IV), randomized control trial (RCT), and regression discontinuity design (RDD). Histogram bins are 0.1 wide. Reference lines are displayed at conventional two-tailed significance levels. We have also super-imposed an Epanechnikov kernel. We do not weight articles.

Source) Brodeur, Abel, Nikolai Cook, and Anthony Heyes. 2020. "Methods Matter: p-Hacking and Publication Bias in Causal Analysis in Economics." *American Economic Review*, 110 (11): 3634-60. 12

### Problem of 2<sup>nd</sup> G: Fundamental Bias of EBPM

- The "evidence pyramid" is powerful given a specific policy goal
- It is not assured that *the given policy goal is correct. The feasibility of rigorous research does not guarantee its importance.* 
  - Only ONE infrastructure paper (1.4%) of 74
     RCT papers in the top development journals (Suzuki and Nakamura, 2019)
- Reinvention of the Wheel?
  - Deworming on schooling (Kim, et al., 2014)
  - Gray Peace Corp (Banerjee, ed., 2007)



Source) Jacob J. Adashek & Razelle Kurzrock (2021). "Balancing clinical evidence in the context of a pandemic." *Nature Biotechnology* 39, 270–274.



Source) Hendren and Sprung-Keyser (2020) QJE

#### **Problem of 2<sup>nd</sup> G: Academic Exclusion**

- Monopolization of academic research by elite institutions/groups that can conduct high-powered super-expensive RCTs (Subramanian and Kapur, 2021)
- The status of developing country researchers in development economics, significantly reduced (Subramanian and Kapur, 2021)
- Return of "imperial medicine"?
  - Negative effects of "imperial medicine" persist over the decades (Lowes and Montero, 2021 AER)
- There exist agenda from the field (MF and TUP) but also idea "exploitation"? (Banerjee et al., 2015a; Banerjee et al., 2015b; Balboni et al., 2022)

### **Problem of 2<sup>nd</sup> G: Partial Solutions**

- Tackling replication challenges
  - Norm of open data and codes for reproduction
  - Wide use of refined methods (e.g., multiple hypothesis testing)
  - AEA/RCT Registry with pre-analysis plan
  - Pre-Results Review (JDE)
- Dealing with external validation
  - Addressing site selection bias by comparison of RCTs (Allcott, 2015 QJE)
  - Hybrid of structural estimation approach and RCT (Todd and Wolpin, 2022 JEL).

### Whither the 3<sup>rd</sup> G?

- Alternative data and Computational Social Science (Lazer et al., 2020)
   "Hybrid" data
  - Structural framework (e.g., structural estimation; quantitative spatial economics; multisector dynamic GE)
- Collaboration among industry, government, academia, and civil society – "Bottom-Up EBPM" and "Policy-Based Evidence"
- Revival of 1<sup>st</sup> and 2<sup>nd</sup> generation approaches:
  - Conventional data and field-based studies
  - Continued importance of "credible" research design

#### **Innovative Data**

NC

#### • Big data, alternative data:

• Extremely large and complex datasets from unconventional sources, characterized by three key features of extraordinarily large volume, high velocity, and wide variety.

#### • Types:

- Administrative data from public sector and private companies
- Data from people's activities such as credit card transaction, SNS information, and CDRs
- **Data generated by machines** such as satellite imageries

<b>D. 279</b> EEMBER 2023		ADB BR	IEFS	
<ul> <li>KEY POINTS</li> <li>Impact-based forecasting, nowcasting, and big data-supported post-disaster damage and loss assessments can provide disaster disample and loss assessments controlled the likely socioeconomic impacts of disasters. These tools enhance traditional resource-intensive frameworks.</li> <li>The speed of these assessments enables disaster management agencies and ministries of finance to mobilize resources and implement relief and recovery measures earlier, thereby reducing human stiffering and the overall costs of disasters.</li> <li>Major challenges in using big data for disaster propose and technological infrastructure, and data privacy and tecung logical</li> </ul>	Rapid Insights for Big Data's Role in Forecasting, Nowo Post-Disaster Dan Loss Assessments	Earlier Action: Impact-Based casting, and nage and		
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ISBN 978 ISBN 978 ISSN 207 ISSN 221 Publicatic DOI: http	<ul> <li>To incorporate big data in disaster management, the government, private sector, and relevant agencies must secure data access, standardize structures and protocols, enhance information management capacity and technical skills, integrate new tools, and allocate finance for big data and forecasting tools, and for the action to be taken based on the information produced.</li> <li>92-9270-515-2 (print) 1-9202 (print) 8-2675 (electronic) 1-7202 (print) 8-2675 (electronic) 0 stock No. BRF230575-2 v/dx.doi.org/10.22617/BRF230575-2</li> </ul>	AD Making Big Data Work for Economic Assessment Innovative data can generate more detailed and timely feedback for planning and investment. How can Asia benefit from the data revolutior Watch experts make a case for Big Data-driven economic analysis and policy making.	<image/> <image/> <image/> <image/> <table-row><table-row><table-row><image/><table-row></table-row></table-row></table-row></table-row>	Here the second

#### 3<sup>rd</sup> Generation: Innovative Data



#### **Remarks**

- Empirical development economics, rapidly evolved over 3 generations
- "Credibility revolution," "arrival of large-scale data," and "changing role of (development) economics in society"
- A need for bottom-up, innovative development research that integrates frontier data and broadens cross-cutting collaborative efforts

Keijiro Otsuka Takashi Kurosaki Yasuyuki Sawada Tetsushi Sonobe Editors **Next-Generation** of Empirical **Research** in Economics D Springer