



# Using Quantitative Methodologies to Study Women's Empowerment

Women's Empowerment in Development (WED) Lab Seminar Series





International Development Research Centre Centre de recherches pour le développement international





# Panelists



Franque Grimard, McGill University (Facilitator)



Carl Asuncion, MEDA



Bouba Housseini, IDRC





# Seminar/Webinar Format



- Opening presentation by facilitator
- Audience Q&A

Break

- Expert panel discussion
- Audience Q&A

Participants on Zoom can email questions to: <u>kathleen.grantham@mcgill.ca</u>





### Dr. Franque Grimard (Facilitator)



#### Associate Professor, Department of Economics, McGill University





# Using Quantitative Methodologies to Study Women's Empowerment

Franque Grimard McGill University





# Today's Presentation

- Why measure quantitatively, Why and when use IE ?
- Impact Evaluation Principles: Counterfactual
- Examples from Progresa
- Randomization: RCTs
- Discussion
- Appendices
  - Other techniques: RDD, DiD, PSM
  - Examples
  - Web links





### Principles for Measuring the impact of Programs

- This material is based on a recent book on Impact Evaluation:
  - Gertler, P. J.; Martinez, S., Premand, P., Rawlings, L. B. and Christel M. J. Vermeersch, 2016, Impact Evaluation in Practice: 2<sup>nd</sup> Edition, The World Bank, Washington DC (www.worldbank.org/ieinpractice).





# Monitoring

A continuous process of collecting and analyzing information,

- to compare how well a project, program or policy is performing against expected results, and
- to inform implementation and program management.





# Evaluation

A systematic, objective assessment of an on-going or completed project, program, or policy, its design, implementation and/or results,

- to determine the relevance and fulfillment of objectives, development efficiency, effectiveness, impact and sustainability, and
- to generate lessons learned to inform the decision making process,
- tailored to key questions.





# Impact Evaluation

An assessment of the **causal** effect of a project , program or policy on beneficiaries. **Uses a counterfactual**...

- to estimate what the state of the beneficiaries would have been in the absence of the program (the control or comparison group), compared to the observed state of beneficiaries (the treatment group), and
- o to determine intermediate or final outcomes attributable to the intervention .





# When to use Impact Evaluation?

Evaluate impact when project is:

- Innovative
- Replicable/scalable
- Strategically relevant for reducing poverty
- Evaluation will fill knowledge gap
- Substantial policy impact

Use impact evaluation within a program to test alternatives and improve programs





### MEASURING IMPACT

### Impact Evaluation Principles for Researchers, Decision and Policy Makers





# Our Objective

# Estimate the causal effect (impact) of intervention (P) on outcome (Y).

(P) = Program or Treatment(Y) = Indicator, Measure of Success





# Our Objective

# Estimate the causal effect (impact) of intervention (P) on outcome (Y).

(P) = Program or Treatment(Y) = Indicator, Measure of Success

Example: What is the effect of a Cash Transfer Program (P) on Household Consumption (Y)?





# Causal Inference

## What is the impact of (P) on (Y)?





# Causal Inference

# What is the impact of (P) on (Y)?

$$\alpha = (Y | P=1) - (Y | P=0)$$





# Causal Inference

# What is the impact of (P) on (Y)?

$$\alpha = (Y | P=1) - (Y | P=0)$$

#### Can we all go home?





# Problem of Missing Data

For a program beneficiary:

we observe (Y | P=1): Household Consumption (Y) with a cash transfer program (P=1)

### but we do not observe (Y | P=0): Household Consumption (Y) without a cash transfer program (P=0)





# Solution ?

• Estimate what **would** have happened to **Y** in the absence of **P**.





# Solution ?

• Estimate what **would** have happened to **Y** in the absence of **P**.

We call this the

# Counterfactual.





# Solution ?

• Estimate what **would** have happened to **Y** in the absence of **P**.

We call this the

# **Counterfactual.**

The key to a good impact evaluation is

a valid counterfactual!

THE REAL	Estimating impact of <i>P</i> on <i>Y</i>				
			<b>α=(Y   P=1)</b>	- (Y   P=0)	
	<b>OBSERVE</b> (Y   P=1) Outcome with treatment		P=1) with treatment	<b>ESTIMATE</b> (Y   P=0) The Counterfactual	
		IMPACT	= Outcome with treatment	- counterfactual	
	<ul> <li>Intention to Treat (ITT) –Those to whom we wanted to give treatment</li> <li>Treatment on the Treated (TOT) – Those actually receiving treatment</li> </ul>		eat ( <b>ITT</b> ) <i>—Those to whom give treatment</i> the Treated ( <b>TOT</b> ) — Those ng treatment	• Use <b>comparison</b> or <b>con</b>	<b>trol</b> group

### Example: What is the Impact of...

**Giving Maria** 



### Example: What is the Impact of...

**Giving Maria** 



#### additional pocket money



## Example: What is the Impact of...

**Giving Maria** 



#### additional pocket money



# On Maria's consumption of candies



# The Perfect Clone



#### Maria





# The Perfect Clone



### Maria







# The Perfect Clone



#### Maria's Clone









# In reality, use statistics







# In reality, use statistics





Average Y=6 candies



Average Y=4 Candies

# In reality, use statistics







Average Y=6 candies

Average Y=4 Candies

IMPACT=6-4=2 Candies

# Finding good comparison groups



We want to find **clones** for the Marias in our programs.

The treatment and comparison groups should

- have identical characteristics
- except for benefiting from the intervention.

In practice, use program eligibility & assignment rules to construct valid counterfactuals

# Finding good comparison groups



We want to find **clones** for the Marias in our programs.

The treatment and comparison groups should

have identical characteristics 

h the intervention.

With a good comparison group, the only reason for different outcomes is the intervention (P)

between treatments and comparisons ty & assignment rules to construct valid nterfactuals





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# Finding good Comparison Groups: Impact Evaluation Methods Toolbox








**Discontinuity Design** 





**Discontinuity Design** 

**Difference-in-Differences** 





**Discontinuity Design** 

**Difference-in-Differences** 

Matching





National anti-poverty program in Mexico

- o Started 1997
- o 5 million beneficiaries by 2004





National anti-poverty program in Mexico

- o Started 1997
- o 5 million beneficiaries by 2004
- Eligibility based on poverty index

#### Cash Transfers

 $\circ$   $\,$  Conditional on school and health care attendance.



- Rigorous impact evaluation with rich data
  - 506 communities, 24,000 households
  - Baseline 1997, follow-up 1998
- Many outcomes of interest Here: Consumption per capita
- What is the effect of Progresa (P) on Consumption Per Capita (Y)?
  - If impact is an increase of \$20 or more,
  - then scale up nationally



• How do we find counterfactuals?

1. False counterfactual #1

Before and after

2. False counterfactual #2

Looking at enrollment/eligibility: enrolled vs non-enrolled

# Eligibility and Enrollment





# Eligibility and Enrollment





# Eligibility and Enrollment





Y







Time



Y



Baseline



Time



Y













# False Counterfactual #1 **Before & After** V ۱A **IMPACT?** В Time T=0 T=1 Endline Baseline

#### False Counterfactual #1 **Before & After** V Α A-B = 4**IMPACT?** В Time T=0 T=1 Endline Baseline













What is the effect of Progresa (P) on consumption (Y)?



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(1) Observe only beneficiaries(P=1)

(2) Two observations in time:Consumption at T=0





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(1) Observe only beneficiaries(P=1)

(2) Two observations in time:Consumption at T=0and consumption at T=1.





Consumption (Y)	
Outcome with Treatment (After)	268.7
Counterfactual ( <i>Before</i> )	233.4
Impact (Y   P=1) - (Y   P=0)	35.3***

Estimated Impact on Consumption (Y)	
Linear Regression	35.27**
Multivariate Linear Regression	34.28**

:If the effect is statistically significant at the 1% significance level, we label the estimated impact with 2 stars (\*\*).







DEVELOPPEMENT INTERNATIONAL





#### DÉVELOPPEMENT INTERNATIONAL

**Economic Boom:** 





#### DÉVELOPPEMENT INTERNATIONAL

Economic Boom:Real Impact=A-C





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Before & After doesn't control for other timevarying factors!

## False Counterfactual #2



#### **Enrolled & Not Enrolled**

- If we have post-treatment data on
  - Enrolled: treatment group
  - Not-enrolled: "comparison" group (counterfactual)
    - Those ineligible to participate.
    - Those that choose NOT to participate.
#### False Counterfactual #2

#### **Enrolled & Not Enrolled**

- If we have post-treatment data on
  - Enrolled: treatment group
  - Not-enrolled: "comparison" group (counterfactual)
    - Those ineligible to participate.
    - Those that choose NOT to participate.

#### Selection Bias

- Reason for not enrolling may be correlated with outcome (Y) *Control for observables.* 
  - But not un-observables!
- Estimated impact is confounded with other things.



#### Case 2: Enrolled & Not Enrolled

Consumption (Y)	
Outcome with Treatment (Enrolled)	268
Counterfactual (Not Enrolled)	290
Impact (Y   P=1) - (Y   P=0)	-22**

Estimated Impact on Consumption (Y)		
Linear Regression	-22**	
Multivariate Linear Regression	-4.15	

Note: If the effect is statistically significant at the 1% significance level, we label the estimated impact with 2 stars (\*\*).

#### **Progresa Policy Recommendation**?

Impact on Consumption (Y)			
Case 1: Before & After	Linear Regression	35.27**	
	Multivariate Linear Regression	34.28**	
<b>Case 2:</b> Enrolled & Not Enrolled	Linear Regression	-22**	
	Multivariate Linear Regression	-4.15	

Will you recommend scaling up Progresa?

**B&A:** Are there other time-varying factors that also influence consumption?

#### E&NE:

- Are reasons for enrolling correlated with consumption?
- Selection Bias.

If the effect is statistically significant at the 1% significance level, we label the estimated impact with 2 stars (\*\*).



## B&A

Compare: Same individuals Before and After they receive P.



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## E&NE

Compare: Group of individuals Enrolled in a program with group that chooses not to enroll.

Problem: Other things may have happened over time.



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## B&A

Compare: Same individuals Before and After they receive P.

## E&NE

Compare: Group of individuals Enrolled in a program with group that chooses not to enroll.

Problem: Other things may have happened over time.

Problem: Selection Bias. We don't know why they are not enrolled.

Both counterfactuals may lead to **biased estimates** of the impact.

#### 1. Population













treatment 1. Population 2. Evaluation sample









#### Unit of Randomization



- Choose according to type of program
  - $\circ$  Individual/Household
  - School/Health Clinic/catchment area
  - Block/Village/Community
  - $\circ$  Ward/District/Region

- Keep in mind
  - Need "sufficiently large" number of units to detect minimum desired impact: Power.
  - Spillovers/contamination
  - $\,\circ\,$  Operational and survey costs

#### Unit of Randomization



- Choose according to type of program
  - $\circ$  Individual/Household
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#### Keep in mind

- Need "sufficiently large" number of units to detect minimum desired impact: Power.
- Spillovers/contamination
- $\,\circ\,$  Operational and survey costs

Progresa: Case 3 :Randomized Assignment



- Progresa CCT program
- Unit of randomization: Community
- 506 communities in the evaluation sample
- Randomized phase-in
  - 320 treatment communities (14446 households):
     First transfers in April 1998.
  - 186 comparison communities (9630 households):
     First transfers November 1999



#### Case 3: Randomized Assignment T=0 T=1 320 Time Treatment Communities 186 Comparison Communities **Comparison Period**

#### Case 3: Randomized Assignment

	<b>Treatment Group</b> (Randomized to treatment)	<b>Counterfactual</b> (Randomized to Comparison)	Impact (Y   P=1) - (Y   P=0)
<i>Baseline <b>(T=0)</b></i> Consumption (Y)	233.47	233.40	0.07
<i>Follow-up <b>(T=1)</b></i> Consumption (Y)	268.75	239.5	29.25**

Estimated Impact on Consumption (Y)		
Linear Regression	29.25**	
Multivariate Linear Regression	29.75**	

: If the effect is statistically significant at the 1% significance level, we label the estimated impact with 2 stars (\*\*).

#### Progresa Policy Recommendation?



Impact of Progresa on Consumption (Y)			
Case 1: Before & After	Multivariate Linear Regression	34.28**	
<b>Case 2:</b> Enrolled & Not Enrolled	Linear Regression	-22**	
	Multivariate Linear Regression	-4.15	
<b>Case 3:</b> Randomized Assignment	Multivariate Linear Regression	29.75**	

Note: If the effect is statistically significant at the 1% significance level, we label the estimated impact with 2 stars (\*\*).



#### **Randomized Assignment**

In Randomized Assignment, large enough samples, produces 2 statistically equivalent groups.

We have identified the perfect clone.

Feasible for prospective evaluations with over-subscription/excess demand.

Most pilots and new programs fall into this category.







# RCTs and Women Empowerment: Some Research funded by IDRC's GrOW program

• Kenya : Access to Daycare and women's empowerment:

• Tanzania: Cash Transfer and Women's empowerment





#### But Life is not always a RCT...

- Impact evaluation estimates <u>whether</u> there is an effect. Does not explain <u>why</u> there is (or not) an effect. (Glennerster et al. paper)
- Ethical issues
- Costs
- There may be important policy changes that do not lend themselves to randomization
  - For instance, minimum wage policies, foreign aid, trade, etc
- Other methods exist (see appendix 1 for more), but not without problems either.





#### Quasi-Experimental methods

- Wijesiri, M. and F. Grimard 2019 Microfinance programs and women's empowerment: new evidence from rural middle hills of Nepal, Forthcoming in Business and Development Studies: Issues and Perspectives
  - data collected from rural women in hill villages in Tanahun district located in the mid-hill region of Nepal from a survey done in collaboration with Nirdhan Utthan Bank Limited (NUBL).
  - We used <u>the quasi-experimental pipeline design approach</u> proposed by Coleman (1999) to select treatment and control groups





Wijesiri and Grimard (2019), Microfinance programs and women's empowerment: new evidence from rural middle hills of Nepal, alocio alo ala

Women attending a group meeting in Bhimad village, Dulegauda, Tanahun Dstrict, Nepal





- Our sample strategy consisted of two main steps.
- First, we spoke with the NUBL. We obtained a <u>list of treatment and</u> <u>control villages in Tanahun district from the bank</u>.:
  - The <u>control group consisted of randomly selected villages, pre-identified by</u> <u>the microfinance bank, which would soon receive microfinance support</u>. Women in these villages had been allowed to self-select into the microfinance programs. These women had been organized into groups but no loans had yet been disbursed to them.
  - <u>The treatment group, on the other hand, consisted of randomly selected</u> <u>villages where the bank has been in operation for at least a five-year period.</u>











- In **the second step**, we randomly drew <u>10 treatment and 8 control</u> <u>villages from the list of villages provided by the bank.</u>
- Care was also taken that the control villages in our sample reflected comparable physical and socio-economic characteristics (availability of infrastructure facilities, level of economic developments, and social and cultural similarities) as the treatment villages. All study villages were approximately 1-2 hours' walking distance from the closest paved road.
- We then surveyed women in both treatment and control villages and we compared their outcomes regarding empowerment





- Our results show that women's participation in Nirdhan Bank's microfinance program has had had a significant positive effect on their <u>financial empowerment</u> with respect to financial indicators such as control of income, independent savings, asset purchases and applying for loans.
- On the other hand, our results reveal that access to microfinance did not result in significant impact on in most women's <u>social empower</u> <u>ment outcomes</u> (for instance women's household decision-making regarding groceries, their children's marriage, and women's role as the household head).





- How valid are these results?
  - Internally valid?
  - Externally valid?
  - Reproducible?
  - Scalable?
- Not expensive, limited study, but there are trade-offs





#### Quantitative Approaches used by Practitioners

- Oxfam: Rapid Care Analysis, Household Care Survey
  - <u>https://policy-practice.oxfam.org.uk/publications/rapid-care-analysis-training-modules-620449</u>
- Even Oxfam does some impact evaluation:
  - <u>https://policy-practice.oxfam.org.uk/publications/livelihoods-in-south-sudan-impact-evaluation-of-the-south-sudan-peace-and-prosp-620864</u>
- CARE (Power Africa) <u>https://www.carepowerafrica.com</u>
- 60 million girls NGO



Key information you will need for identifying the right method for your program:

Prospective/Retrospective Evaluation?



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Key information you will need for identifying the right method for your program:

Prospective/Retrospective Evaluation?

Eligibility rules and criteria?

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Key information you will need for identifying the right method for your program:

**Prospective/Retrospective Evaluation?** Poverty targeting? Eligibility rules and criteria? Geographic targeting? Roll-out plan (pipeline)? Is the number of eligible units larger than available resources at a given point in time? Budget and capacity constraints? Excess demand for program? Etc.

 $\cap$ 





#### Choose the **best possible design** given the operational context:





 Best comparison group you can find + least operational risk




#### Choose the **best possible design** given the operational context:

Best Design



Have we controlled for everything?



Internal validity

operational risk

Good comparison group

Best comparison group you can find + least





#### Choose the **best possible design** given the operational context:

Best Design



Have we controlled for everything?



Is the result valid for everyone?

o External validity

operational risk

Internal validity

Good comparison group

- $\circ$  Local versus global treatment effect
- Evaluation results apply to population we're interested in

Best comparison group you can find + least





Warning: technique is not a panacea, and is not a substitute for thinking carefully about what it is that you want to estimate

• In the case of progresa, here are the various estimates of the returns of the program, according to the estimation methods





The objective of impact evaluation is to estimate the causal effect or impact of a program on outcomes of interest.





## To estimate impact, we need to estimate the counterfactual.

- what would have happened in the absence of the program and
- use comparison or control groups.





# Choose the best evaluation method that is feasible in the program's operational context.





- Be cautious with
  - internal validity issues
  - as well as <u>external</u> validity issues





#### Audience Q&A

Participants on Zoom can email questions to: kathleen.grantham@mcgill.ca





### 5 minute break





### Panelists



Franque Grimard, McGill University (Facilitator)



Carl Asuncion, MEDA



Bouba Housseini, IDRC





1. What type of empirical analysis and results do you use to support your programming and/or funding of research projects? Among the various sources and methods you use, do you also consider impact evaluation? I.e. do you measure results by taking into account a counterfactual? Do you use impact evaluation results from the literature (for instance, 3ieimpact.org) in your programming of projects (MEDA) or in your research financing (IDRC)? Why, why not?



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2. What would you need in your operations to integrate some approaches that would look at results compared to a counterfactual? For instance, more budget? More expertise? A requirement by the funder? Do you think this would change what you do and how you do it?



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Bouba Housseini, IDRC





3. In which directions would you like to see researchers, people in the field, policy analysts and funders (either IDRC and/or GAC) to address how one can learn together to assess what works better, both in terms of replicating activities to empower women as well as scaling them up?



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http://womensempowerment.lab.mcgill.ca







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