DISCUSSION

Online Learning and the Education Gap:
A Digital Footprint Approach

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INTRODUCTION

Household finance

- **Human capital** is a central concern. (Agarwal, Qian and Tan 2021)
  - Main driving force for *all* household-level financial outcomes.
- In life cycle models education is a **state variable**:

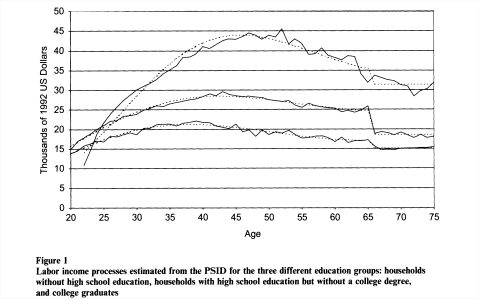


Figure 1
Labor income processes estimated from the PSID for the three different education groups: households without high school education, households with high school education but without a college degree, and college graduates

Cocco et al. (2005)

- Abundant evidence of inter-generational transfers:
  - Chetty et al. (2014), Benetton et al. (*Dynastic Home Equity*, 2022).

Summary

- **This paper:** Endogenous parental effort.
  - Suggests that academic outcomes depend on circumstances just before exams.
  - "Last-mile effect".
- **Identification:**
  - Parental wealth correlates with the probability of being admitted to a top school.
  - During the **Covid-19** pandemic:
    - Exposure to online learning ***increases*** performance gap.
    - Evidence consistent with marginal role of **educational apps**.
- **Distinguishing factors** for the paper:
  - Limited actual exposure to the virus in China, initially.
  - Algorithm to identify treated households precisely (''digital footprint approach").
  - No legacy admissions, purely based on performance.

Comments

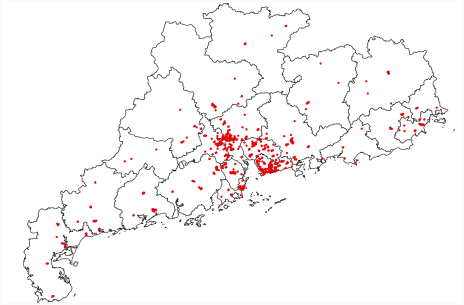
1. Validation of digital footprint approach
2. What is the treatment that the family is subjected to?
3. A tale of two cohorts: 2020 vs. 2021
4. Policy on commercial education vendors
5. Direct formulation of the problem

1. Validation of digital footprint approach

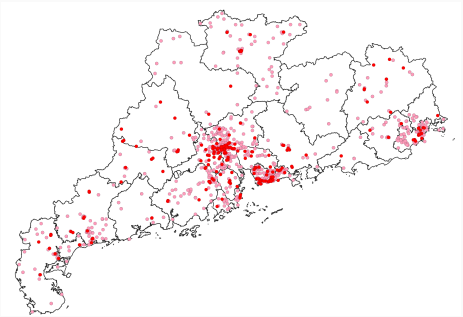
- Key innovation of the paper.
  - **Wealth** proxied by property values and observed shopping behaviour. *Great!*
- But very limited **validation** of student outcomes:
  - Footnote 12: *Around* 3% families with children entering middle school (administrative data).
- Important because measurement error can be correlated with wealth/location.
  - Time of the call not included in the algorithm. School hours?
  - The role of distance (urban agglomerations)

1. Validation of digital footprint approach

High-end shopping centers

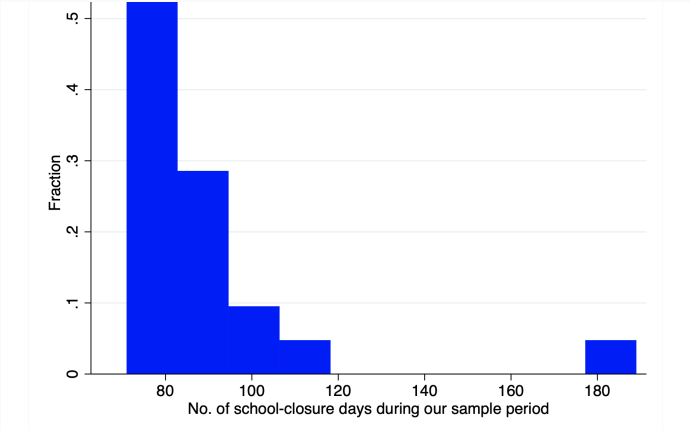


Top schools



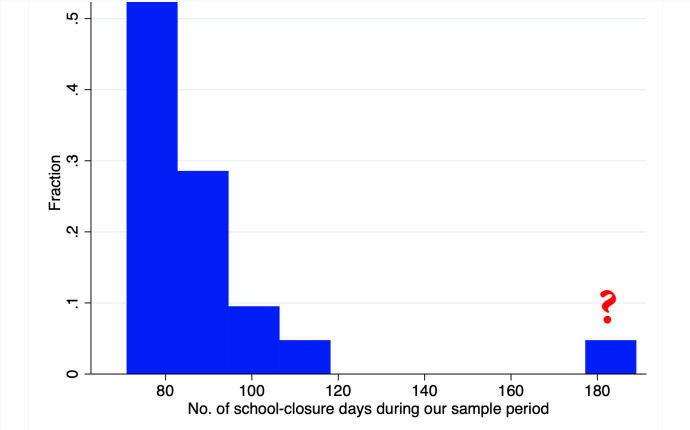
- Theoretical admission rate: 20%. Average in the sample: 21.7%
- Homogeneous across schools in sub-regions?

2. What is the treatment that the family is subjected to?



- What determines the variation of policy magnitude at city level?
- Potentially important: variation during calendar year.

2. What is the treatment that the family is subjected to?



- What determines the variation of policy magnitude at city level?
- Potential identification opportunity: variation during calendar year.

2. What is the treatment that the family is subjected to?

- More intense closures correlated with overall disruption?
- Recent emerging research on the link between the experience of lock-downs and mental health:
  - Gao et al. (*Plos One*, 2020), Reid et al. (*Plos One*, 2022), Guo et al. (2022)
- Key to understand this: **Living conditions**.
  - Number of members per household.

3. A Tale of Two Cohorts: 2020 vs 2021

- This is the most intriguing part of the paper!
- Effect of school closure in 6^{th} grade more pronounced than 5^{th} grade:

No. of school closure days in 6^{th} grade (10 days)	0.001	0.003*
* Housing prices (1 million RMB)	(0.002)	(0.002)
No. of school closure days in 5^{th} grade (10 days)		0.001*
* Housing prices (1 million RMB)		(0.000)

- Supports hypothesis of "unequal quality of home support".
- Last-mile effect!

4. Policy on commercial education vendors

- Private tutoring = above **US$100 billion** market.
- June 2021:
  - Require private companies that teach compulsory school subjects to be **non-profit**.
  - Ban tutoring related to the core school syllabus during vacations and weekends.
  - Caps on the fees that firms can charge and time limits on after-school programs.
- Post-policy:
  - Rich parents can sidestep education curbs with private tutors.
  - One-on-one lessons can cost as much as **USD 450 an hour**. (Bloomberg 2021)

4. Policy on commercial education vendors

	(1) Child edu	(2) Games	(3) Video	(4) Social media	(5) Other	(6) Daily home time
Panel A: Mother sample						
No. of school closure days (10 days)	0.15**	0.04	0.10	0.04	0.07	1.07*
	(0.07)	(0.05)	(0.11)	(0.05)	(0.06)	(0.56)
No. of school closure days (10 days)	0.39***	-0.12	0.03	-0.12	0.06	0.25**
* Housing prices (1 million RMB)	(0.12)	(0.10)	(0.07)	(0.10)	(0.06)	(0.11)

- Can we distinguish these effects by cohort?
- Did parents of 6^{th} grade students behave differently?

5. Direct formulation of the problem

- Include educational app usage directly:

$$\underbrace{E_{ict}}_{\substack{\text{Educational} \\ \text{outcome}}} = \underbrace{\alpha_1 P_{ict}}_{\substack{\text{Educational} \\ \text{app use}}} + \theta_i + \lambda_t + \varepsilon_{ict}. \tag{1}$$

- Additional interaction with time fixed effects informs about **coefficient stability** by cohort!
- Does education app use drive academic success, controlling for wealth?
- Clear decomposition of cohort effects: parental effort vs. tutoring impact.

Conclusions

- Children from richer families have better education outcomes, and their advantage **increases** with the severity of the school closure episode.
- Evidence from parental app usage consistent with decisive last-mile effect of private tuition.
- Likely to have very persistent impact over the life cycle.

Comments:

1. Validation of digital footprint approach
2. Understanding the treatment
3. Two cohorts: 2020 vs. 2021
4. Government policy on commercial education vendors
5. Direct formulation of the problem