Prospering through Prospera: CCT Impacts on Educational Attainment and Achievement in Mexico

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Research question

- Conditional cash transfer (CCT) programs provide money to poor families contingent on certain behavior
  - Investments in human capital, such as sending children to school or bringing them to health clinics
  - First launched in Mexico (Progresa) and Brazil (Bola Escola) in 1998, programs with similar features adopted in over 60 countries (Fiszbein and Schady (2009))
- The evaluation of CCT programs
  - The literature demonstrated positive impacts on school enrollment and educational attainment. (Schultz (2004); Behrman et al. (2005, 2009); Todd and Wolpin (2006); Attanasio et al. (2012))
  - Open question whether increased school enrollment translates into higher academic achievement?
- We examine the effects of the *Prospera* program not only on enrollment and educational attainment but also on academic achievement in mathematics and Spanish

Key challenge: dynamic selection

Lower-secondary	General	Telesecondary	Technical	Dropout
Non beneficiary (P=0)				
Grade 7	0.50	0.16	0.28	0.07
Grade 8	0.47	0.15	0.26	0.12
Grade 9	0.42	0.13	0.23	0.23
Prospera beneficiary (P=1)				
Grade 7	0.25	0.46	0.20	0.09
Grade 8	0.23	0.43	0.18	0.16
Grade 9	0.20	0.38	0.16	0.26

- Three types of public secondary schools: general, technical, or telesecondary
  - Technical: vocational/technical educational components in their curriculum
  - Telesecondary: distance-learning schools, largely serve students living in rural communities

Our data

- We combine multiple linked data sources
  - Nationwide administrative enrollment and test score data (the ENLACE data)
  - Survey data from students and parents
  - Administrative data on *Prospera* participation
  - Geocode data on school locations
  - Labor market data from the Mexican census
- Our analysis focuses on students who were 4th graders in 2008 for whom we observe test scores in grades 4-9.
- Very few *Prospera* beneficiaries attend private schools, so our analysis focuses on public schools.

Average test scores and dropout rates by *Prospera* status (P)

	Mathematics score			Spanish score			dropout proportion	
Prospera	$P = 0$	$P = 1$	Gap	$P = 0$	$P = 1$	Gap	$P = 0$	$P = 1$
Grade 4	546	489	11.7%	540	474	13.8%	-	-
Grade 5	551	502	9.7%	552	495	11.6%	-	-
Grade 6	575	533	8.0%	573	521	10.1%	-	-
Grade 7	517	501	3.2%	506	471	7.4%	2.8%	5.4%
Grade 8	544	541	0.6%	517	488	5.9%	5.9%	9.9%
Grade 9	566	569	-0.6%	517	486	6.3%	16.3%	23.5%

Our approach: a unified framework combined value-added model and school-choice model

- Value-added models (Boardman and Murnane (1979); Hanushek (1979); Todd and Wolpin (2003); Cunha et al. (2006, 2010); Chetty et al. (2014a,b))
  - Coefficients of past learning inputs following geometric patterns, summarizing the impacts of all past inputs
  - Focusing on learning as measured by test scores, but generally do not incorporate school choices nor dynamics

- School-choice models (Neal (1997); Altonji et al. (2005); Angrist et al. (2006); Cameron and Heckman (2001); Eisenhauer et al. (2015))
  - Focusing on enrollment, schooling attainment and dropout decisions, but not on the dynamics of learning

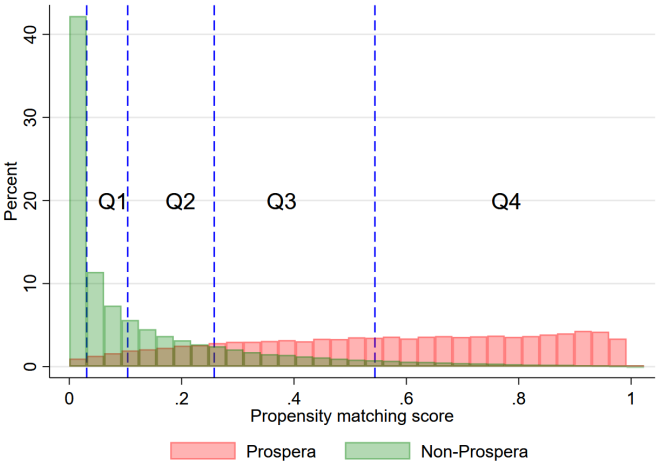
Initial heterogeneity

- We assume three source of initial (4th grade) heterogeneity
  - Observed time-invariant heterogeneity (family background, gender, *Prospera* status)
  - Unobserved heterogeneity μ_l (four discrete types following Heckman and Singer (1984))
  - Initial achievement test scores in math and Spanish at grade 4

- Prospera beneficiaries and non-beneficiaries differ in terms of their initial conditions.
  - Controling for difference in observables
  - Allowing for selection in unobserved types

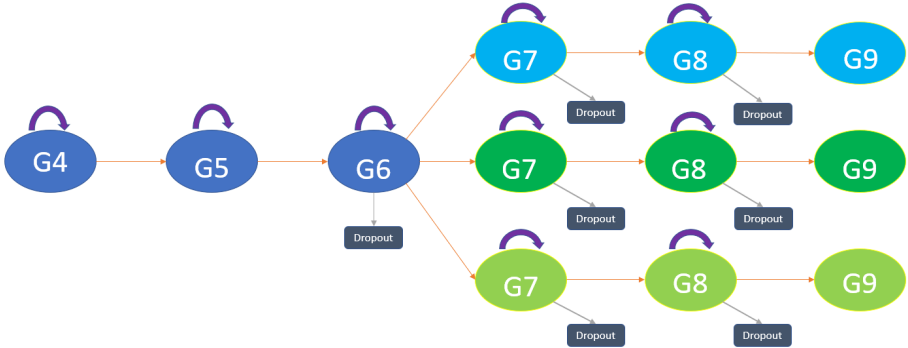
- Estimate a propensity score model (probit) of the probability of family participating in the Prospera program.
  - Most families who are eligible for Prospera participate in it to some extent.
  - Eligibility criteria are based on demographics, assets and housing characteristics, which are largely observed in our data.
  - Probit model has a high percentage correctly classified (90%).

The propensity score distribution by *Prospera* status (P)



- Imposing common support (by excluding from our analysis the bottom 1% of *Prospera* students
- Modeling treatment effect heterogeneity by quartiles (following Heckman and Vytlacil (2005))

Sequential decisions

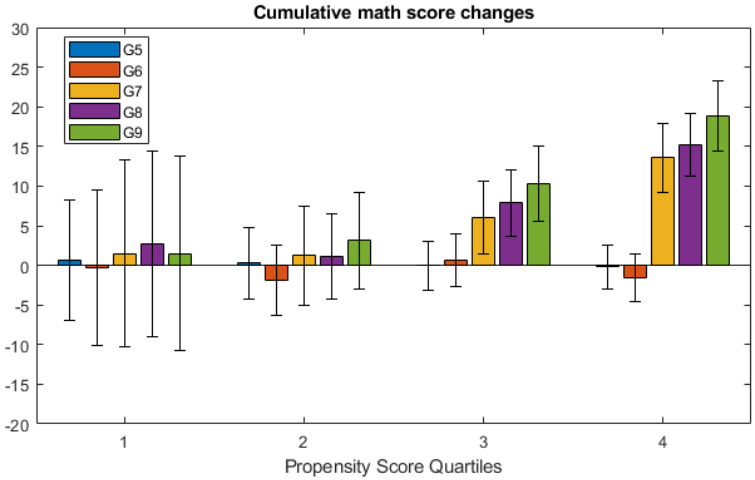


- Primary schools (general (j=1)/indigenous (j=4)).
- Secondary schools (general (j=1), telesecondary (j=2), technical (j=3)).
- Grade retention (through grade 4)
- Dropout decision (through grade 6)

Cumulative program impacts

	Mathematics score				Spanish score				Dropout rate		
	$P=1$	$\tilde{P}=0$	Diff	S.E.	$P=1$	$\tilde{P}=0$	Diff	S.E.	$P=1$	$\tilde{P}=0$	Diff
Grade 5	499	499	-0.1	2.3	495	496	-1.1	2.1	-	-	-
Grade 6	534	535	-0.9	2.4	523	525	-2.1	2.1	-	-	-
Grade 7	501	492	9.2	3.4	472	469	3.1	2.9	0.106	0.149	-0.043
Grade 8	534	524	10.5	3.3	484	479	4.9	2.7	0.117	0.162	-0.045
Grade 9	562	549	13	3.7	485	481	3.5	3.0	0.201	0.247	-0.046

Prospera achievement effects by propensity score quartile



Conclusions

- Using newly available data, we develop and implement a model of school progression and academic achievements, which explicitly controls for selective school enrollment/dropping out and selection into different school types.
- Program impacts
  - The *Prospera* program did not significantly impact test scores in grades 5 and 6.
  - There are positive and statistically significant impacts on test scores in grades 7, 8, 9 with larger average impacts in mathematics (0.09-0.13 standard dev) than in Spanish (0.03-0.05 standard dev). Largest program effects for the most disadvantaged children.
  - *Prospera* program decreases school dropout by 4 percentage points, mainly at the transition from 6th to 7th grade.
- Telesecondary schools are important to *Prospera*'s success in improving educational outcomes.
  - Telesecondary schools are effective in producing achievement gains, particularly in mathematics.
  - When we simulate the effect of removing the telesecondary option, the dropout rate prior to grade 9 increases from 21% to 58% and educational attainment decreases by 1.2 years.