Upping the Ante: Equilibrium Effects of Unconditional School Grants

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Question

- Market failures underpin efficiency rationale for state intervention, including in education
- Movement from state financing and provision to alternate models
  - State financing, private provision: Extensive use of vouchers (HSEIH AND URQUILOA 2006, MURALIDHARAN ET AL. 2015, BARRERA-OSORIO ET AL. 2017); Charter schools in the U.S.(HOXBY AND ROCKOFF 2004; HOXBY, MURARKA AND KANG 2009, ABDULKADIROGLU ET AL. 2016; ANGRIST ET AL. 2013), PPP arrangements (ROMERO ET AL. 2017)
  - One key finding: Market structure and intervention design matters (EPPLE ET AL. 2017, MURNANE ET AL. 2017, NIELSEN 2017)
  - Nevertheless, difficult to attribute supply side responses to policy changes in the literature (see, for instance, debate on Chile: FEIGENBERG, RIVKIN & YAN 2017)

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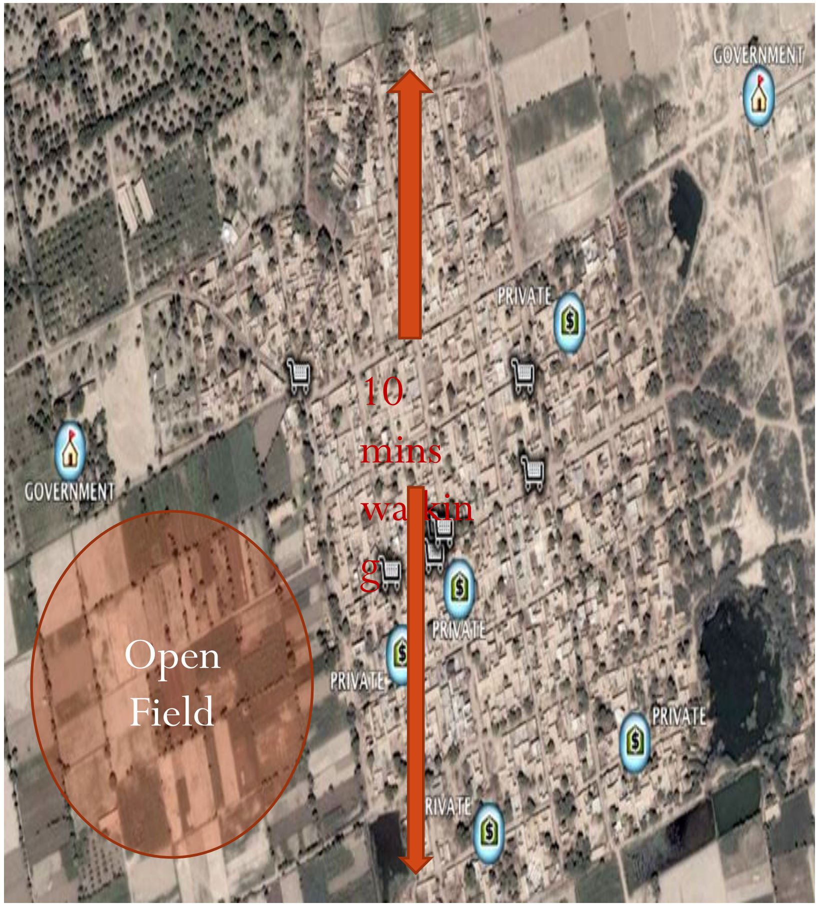
Market-based approach

- Growth of private schools in LMIC offers opportunity to experimentally link supply side responses to policy changes in local markets (ANDRABI ET AL. 2013, ANDRABI ET AL. 2017)
- Three requirements
  - **Closed Markets:** >95% of children in village go to school in village; >95% of school enrollment drawn from village
  - **Flexibility:** Private school owners can adjust behavior to respond to localized changes
  - **Variation:** Experimental (or natural) variation in local environment



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Market Functioning: 2003-2011

- Market "works" Considerable churn and schools that shut down have lower test scores (0.18sd): 20% of schools that shut down after 2003 are replaced by 20% that open

BUT

- No increase in test scores of "always open" schools
- No increase in market shares of better performing schools
- Test scores in new schools the same as those that shut down
- Aggregate village test scores identical in 2003 and 2011 at a low level

FINANCIAL CONSTRAINTS?

- 95% of school owners say that funds for improvement come from `their own pocket' or school fees; 50% say that the biggest issue is financing investment

Data from 26 control LEAPS villages (no interventions) between 2003 and 2011

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New Research: Lack of capital as a market failure

- Take market failure approach one step farther to investigate potential role of credit constraints in these settings
- SME literature consistently shows that credit to small firms increases profits in short and long-run (De Mel et al. 2009, 2012; Banerjee and Duflo, 2012),
  - However, directed credit to some firms may lead to spillovers (Rotemberg 2014)
- We broaden the literature to schools, where importance of capital constraints is unknown
  - Perhaps credit constraints not that important
  - Perhaps hard to evaluate quality of service (if parents find it hard to evaluate, then hard to pay for quality improvements)
    - Some improvements may be easier to monetize
  - Schools may not have technical know-how to produce higher quality service
    - Importance of pedagogical or management skills

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Overview

What we do

- Provide (unconditional) cash grants of Rs.50,000 ($500) to rural private schools in Pakistan (15% of median annual revenue).
- Very little monitoring, regulation, standards and no additional help in training or educational investments
- Village-level treatment with varied financial saturation: Vary grant coverage level from LOW SATURATION (only one private school in village) to HIGH SATURATION (all private schools in village), noting that there are 3.3 private schools in the average village
- Villages and schools experimentally assigned

What we find

- Schools in LOW SATURATION increase enrollment, but not test scores or price
  - Most invest in infrastructure
- Schools in HIGH SATURATION increase enrollment (less than in low intensity), test scores and price
  - Invest in infrastructure AND in teachers
- Results highlight how impact of financing is contingent upon design and market structure
- Use model to show how this differential impact is due to nature of market competition

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Outline

- Theory
- Data
- Results
- Conclusion

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How does the provision of grants in this context change the market equilibrium

- Approach: Build quality into canonical model of capacity constraints (Kreps and Scheikman 1983) to generate predictions under low and high saturation and then test these predictions against our experiment

- Theory hinges on 3 main intuitions
  - The first is the *nature of the trade-off between capacity and quality*
  - The second is the *notion of the price war and how it plays out*
  - The third is the idea of a *rationing rule* and what it implies

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Theory Overview

- PLAYERS: Schools and households
- ACTIONS: Schools choose capacity, quality and price. Households choose whether to attend school, and if so, which school to attend
- PAYOFFS: Schools maximize profits; households maximize utility
  - Can incorporate certain type of social behavior among school owners, such as intrinsic utility from having children in school
- TIMING: Schools choose capacity and quality and then price
  - Note that price discrimination is competed out in oligopoly in simple settings; we don't see much in the data (Andrabi et al. 2016)
- TWIST: Schools face credit constraints
- **Trade-off**: Invest in capacity but risk price competition versus invest in quality at higher costs but decreased risk of price competition
- **Main Result**: As financial saturation increases, investing in capacity makes price war more likely and schools will be "more likely" to invest in quality

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Intuition

- Give money to one school
  - School can expand without poaching from other school
  - This allows it to increase revenues from new students
- Give money to all schools
  - If all schools expand, too few students to compete over and therefore price competition
  - Bertrand-like equilibrium with lower prices for all
  - If instead, expand quality, can escape the price war
- Trade-off between capacity and quality more likely to favor quality when all schools can expand

- **Theorem**: If treated school in low saturation invests in (high) quality, then there exists an equilibrium of the high saturation arm in which at least one school invests on quality. The converse is not true.

Details

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Predictions of Theory

- Greater enrollment increase per school in low saturation
- Increase in quality and prices more likely in high saturation
- Greater (private) profit in low saturation

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Sample

- Villages with at least 2 private schools in a single district in Punjab, Pakistan
- Identified through National Education Census (2005), verified through field visits
- Of 334 eligible villages (42% of all villages in district), randomly chose 266 villages based on power calculations with 855 schools
- Mean village has 2.45 public schools, 3.3 private schools and 524 children enrolled in private schools
- Mean private school enrollment is 164, with fees of Rs.238.4 ($2.8) per month and monthly revenues of Rs.40,400 ($400)
- Considerable heterogeneity due to random sample from population
  - Fees range from Rs.81 (5^{th} %tile) to Rs.502 (95^{th} %tile)
  - Enrollment ranges from 45 (5^{th} %tile) to 353 (95^{th} %tile)

Sample

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Notation

- **Control:** Villages with no grants (249 schools in 77 villages)
- **Low-Saturation Village**: We gave the grant to only one private school, randomly selected from among all private schools in the village (114 villages)
- **High-Saturation Village**: We gave the grant to all the private schools in the village (228 schools in 75 villages)
- **Treated Low-Saturation**: The treated school in the low-saturation villages (114 schools in 114 villages)
- **Untreated Low-Saturation**: The schools that were *not* treated in the low-saturation villages (264 schools in 114 villages)

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Results (1): "First Stage" Grant usage

- No evidence of substitution, either in school or household accounts of school-owner

	Spending	School funding sources (Y/N)		HH borrowing (Y/N)			HH Loan Value
	(1) Fixed	(2) Self-financed	(3) Credit	(4) Any	(5) Formal	(6) Informal	(7) Any
High	34950.439***	-0.001	0.002	-0.010	0.020	-0.033	1063.026
	(9915.07)	(0.01)	(0.01)	(0.05)	(0.02)	(0.05)	(15092.81)
Low Treated	30719.202**	0.003	-0.006	-0.039	0.010	-0.053	17384.174
	(11883.92)	(0.00)	(0.01)	(0.05)	(0.02)	(0.05)	(29982.80)
Low Untreated	5086.919	-0.006	-0.011	-0.005	0.035*	-0.055	13611.930
	(10107.93)	(0.01)	(0.01)	(0.04)	(0.02)	(0.04)	(21581.81)
Baseline	0.161***	-0.000	-0.017	0.080**	0.208***	0.003	0.064*
	(0.04)	(0.00)	(0.01)	(0.04)	(0.05)	(0.04)	(0.03)
R-Squared	0.11	0.02	0.02	0.04	0.14	0.02	0.03
Obs	794	795	795	784	784	784	784
Test pval (H=0)	0.00	0.84	0.88	0.83	0.23	0.47	0.94
Test pval (LT = 0)	0.01	0.45	0.68	0.45	0.64	0.27	0.56
Test pval (LT = H)	0.73	0.31	0.56	0.60	0.65	0.69	0.60
Midline Control Mean	63117.10	1.00	0.02	0.30	0.06	0.25	44782.73

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Results summary: Main outcomes

Treatment Arm	Enroll ment	School Closure	Posted Fees	Posted Monthly Revenues	Collected Monthly Revenues	Fees based on collection	Test Scores
Treated Low Saturation	+22***	-.09***	+0	+9327**	+6992**	-8	-0
High Saturation	+9	-0	+19**	+5005*	+4642*	29.5	+0.17**
Untreated Low Saturation	-0	-0	-0	-0	+0	-0	+0
Baseline/Control (School Level)	164	13.7	238	38654	38654	238	-0.21

Tables

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What did schools do? (1)

	Spending	Number purchased		Facility present (Y/N)			Other
	(1) Amount (PKR)	(2) Desks	(3) Chairs	(4) Computers	(5) Library	(6) Sports	(7) # Rooms Upgraded
High	25460.31***	5.97***	3.76***	0.20***	0.11***	0.10**	0.70***
	(8787.82)	(1.63)	(1.40)	(0.05)	(0.04)	(0.04)	(0.26)
Low Treated	19251.19**	8.71***	6.13**	0.17***	-0.03	-0.03	0.47
	(8702.52)	(2.45)	(2.76)	(0.06)	(0.05)	(0.04)	(0.40)
Low Untreated	-1702.36	1.31	0.87	0.04	-0.03	0.02	0.16
	(8376.89)	(1.40)	(1.19)	(0.04)	(0.04)	(0.03)	(0.26)
Baseline	0.09***	0.10*	0.12*	0.26***	0.32***	0.23***	0.71***
	(0.03)	(0.05)	(0.07)	(0.04)	(0.04)	(0.05)	(0.06)
R-squared	0.06	0.09	0.08	0.20	0.20	0.11	0.57
Obs	798	810	811	822	822	822	822
Test pval (H=0)	0.004	0.000	0.008	0.000	0.006	0.020	0.008
Test pval (LT = 0)	0.03	0.00	0.03	0.01	0.58	0.49	0.24
Test pval (LT = H)	0.50	0.31	0.45	0.60	0.01	0.01	0.59
Baseline Mean Depvar	57258.48	14.59	10.92	0.39	0.35	0.19	6.36

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What did schools do? (2)

	School Costs (monthly)		Teacher Roster		Teacher Salaries (monthly)		
	(1) Total	(2) Wage Bill	(3) Total	(4) Num New	(5) All	(6) New	(7) Existing
High	3,147.48*	2,741.83*	0.42	0.46**	519.52**	580.05**	492.01*
	(1,894.67)	(1,510.50)	(0.32)	(0.18)	(257.94)	(265.80)	(284.29)
Low Treated	-1,127.41	-838.26	0.32	0.27	-175.63	-89.45	-223.10
	(1,716.66)	(1,520.25)	(0.33)	(0.24)	(273.11)	(406.49)	(246.45)
Low Untreated	-302.25	65.14	0.25	0.25	194.48	89.47	253.39
	(1,374.56)	(1,106.67)	(0.29)	(0.18)	(202.53)	(236.07)	(201.69)
Baseline	0.88***	0.85***	0.77***				
	(0.07)	(0.08)	(0.05)				
R-Squared	0.69	0.63	0.50	0.19	0.20	0.23	0.20
Observations	1,470	1,470	1,590	1,645	11,725	3,903	7,818
# Schools (Rounds)	797 (2)	797 (2)	816 (2)	840 (2)	802 (2)	723 (2)	793 (2)
Mean Depvar	25,387.0	19,491.2	6.7	2.0	2,676.6	2,665.5	2,681.9
Test pval (H=0)	0.10	0.07	0.19	0.01	0.05	0.03	0.08
Test pval (L^t=0)	0.51	0.58	0.33	0.25	0.52	0.83	0.37
Test pval (L^t=H)	0.05	0.05	0.78	0.45	0.04	0.13	0.04

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Two ways to approach policy

- The policy **is** the grant (McKenzie 2017)
  - Evaluate giving grant to 3 villages in low-saturation model versus 1 village in high-saturation model
- The policy is a **loan-loss guarantee**: If you lend in the high saturation model, I will cover any losses you face due to additional default
  - Using the increased closure rates in high compared to low saturation, appropriately accounting for loan tenure, we calculate the value of the loan-loss guarantee at Rs.17,363 over a 2-year period
- In both cases, we can try and compare test-score increases or, more ambitiously, consumer surplus

LLG Computation

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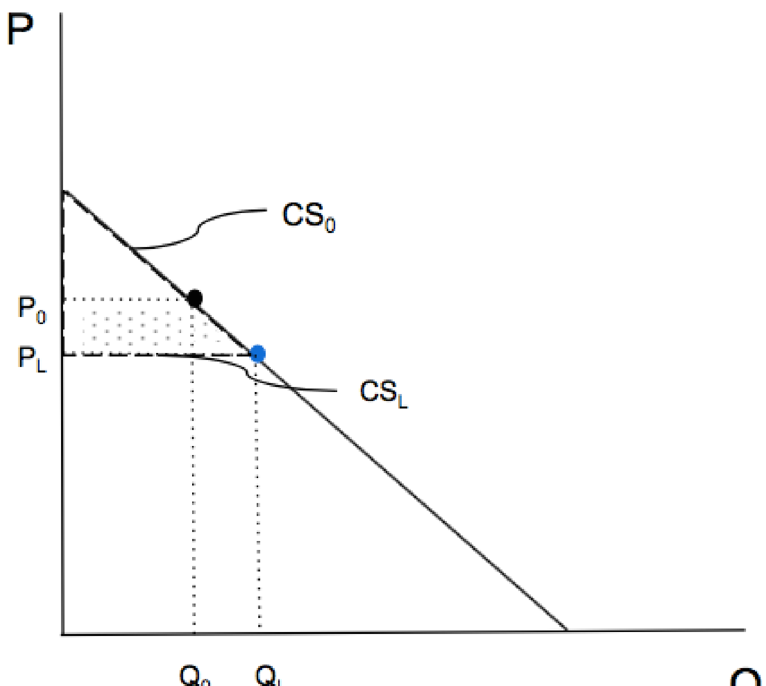
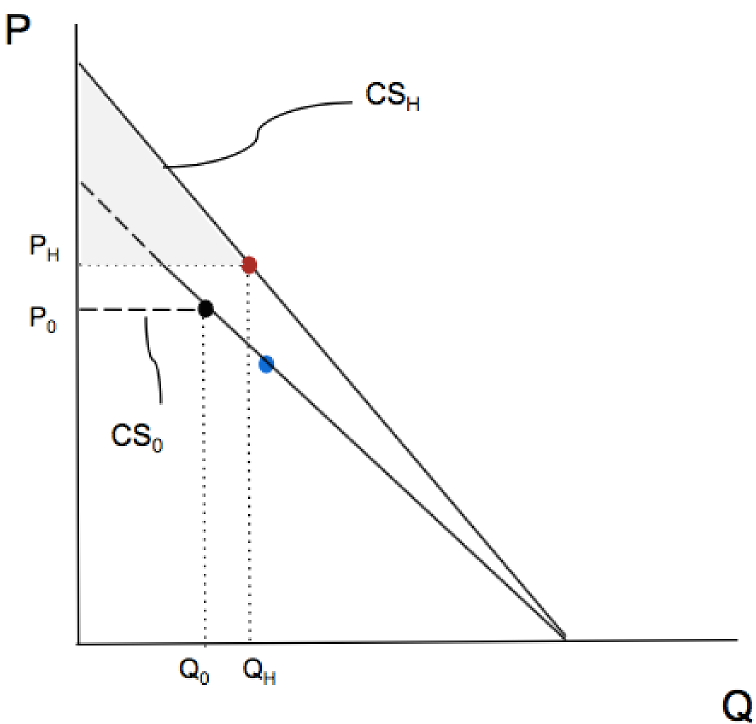
Consumer Surplus

- Typically hard to do when price increases because quality also increases
- We can make progress under some assumptions reasonable in our setting

Low-saturation



High-saturation



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School Owners, Teachers and Consumers

	In PKR			Standard Deviations
Group	Owners	Teachers	Parents	Children
L^t	10,918	-2,514	4,080	61.1
H	5,295	8,662	7,560	117.2

- Returns to school owner higher under L but benefits for parents (consumer surplus) and children (test score gains) higher under H
- Teachers also benefit under H
- Lenders may prefer L, but arguably society may prefer H
- To incentivize H, provide loan loss guarantee to lenders
- Consumer surplus benefits of doing so 3X expected payout

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Conclusions

- Capital infusions improve education market functioning and education market behaves as theory predicts with financial saturation
- Substantial gains to by providing capital without training, regulation or oversight
  - School owners profits imply IRR above market rates for both high and low saturation arms—above 100% for low saturation
  - This establishes a benchmark for potential returns from a *randomly selected rural private school*
- But, nature of financing critical for social impact
  - Unlike venture capitalism, social impact is about increasing welfare of consumers, not profits for the investor
  - The high saturation arm decreases potential profits, but enables higher welfare (and test scores) through a geographically targeted model of lending

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Appendix Slides

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Theory: Numerical Example

- SCHOOLS
  - Low quality costs \$0, High quality costs \$4 fixed investment
  - Additional capacity (desks and chairs) cost \$1 per child
- PARENTS: Homogeneous with \$3 WTP for low quality and \$4 for high quality
  - Market size fixed at 26 children
- BASELINE: Schools produce low quality with capacity of 10 children
- BASELINE EQUILIBRIUM: Both schools charge \$3 and earn \$3 profit per child for a total profit of \$3*10=\$30
  - They would like to cut the price and earn more money, but they don't have more capacity

Implies

- UNCOVERED MARKET: 6 children who would like to attend but there is no capacity

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Experiment: High versus Low Saturation Grant

- In Low Saturation, 1 School receives $5
- Profit is Revenue + $5 –Cost of Investment
- *Expand Capacity:* At $1 per child, can enroll 5 more children and earn $15 more, for total profit of $45
- *Increase Quality:* Purchase higher quality for $4, buy 1 additional chair and charge $4. With 11 children, profit = $44
- $\prod$(Capacity investment)> $\prod$(quality investment)

- In High Saturation, both schools receive $5
- *Expand capacity:* Both schools spend $5 on desks and chairs. Can enroll 10 more children, but only 6 children in the "uncovered market". This triggers price competition.

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Theory: Price war

- **Lemma:** No pure strategy Nash Equilibria
- $3 not an equilibrium price: Can charge $3-e, and get 15 children, while other school gets only 11 (true for ANY price > $0)
- But $0 is not an equilibrium price either, since can charge 0+e, and get 11 children for positive profit > zero profit
- Therefore, only equilibrium is in mixed strategies
- Randomize between $3 and lower bound $2.2
  - At $3, other school randomizing between $3 and $2.2 and I am being undercut for sure. I will get residual demand of 11 and a profit of $33
  - In mixed strategy NE, I should be indifferent between any two prices. Let lower bound = x. Then, if school charges x, it undercuts the other school for sure and gets 15 children with profit = 15*x. So, 15*x=$33, or x = $2.2
- Schools indifferent between any two prices in this range
- Profit of each school is $33 compared to low intensity of $45

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Theory: "Price War" mixed strategy

- <u>Equilibrium:</u> One school expands quality with associated profit of \$44, other expands capacity by 5 children with profit of \$45
- **Intuition**: Additional \$ = {extra \$ from existing students X # existing students} + {extra \$ from new students at existing price}
  - As long as you can get many more new students at existing price, you should do this
  - But if you have to poach, price competition reduces profits: Better to `increase quality and charge more from existing students

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Theory: High versus Low Saturation

- Constructed example highlights how investment strategies can differ depending on market saturation.
  - Other examples where schools invest in quality even in low-saturation, or capacity even in high-saturation.
- What *cannot* be done is to construct an example where school invests in quality in low saturation but no school invests in quality in high saturation.
  - This is the sense in which we use `more likely' in the theorem
- **Theorem:** Consider a cost of high quality, w. Then, if it is optimal for a school in Low saturation to invest w, it is also optimal for a school in High saturation to invest w. Further, there are always parameters such that it is optimal for schools in high saturation to invest in quality but **not** optimal for schools in low saturation to invest in w.

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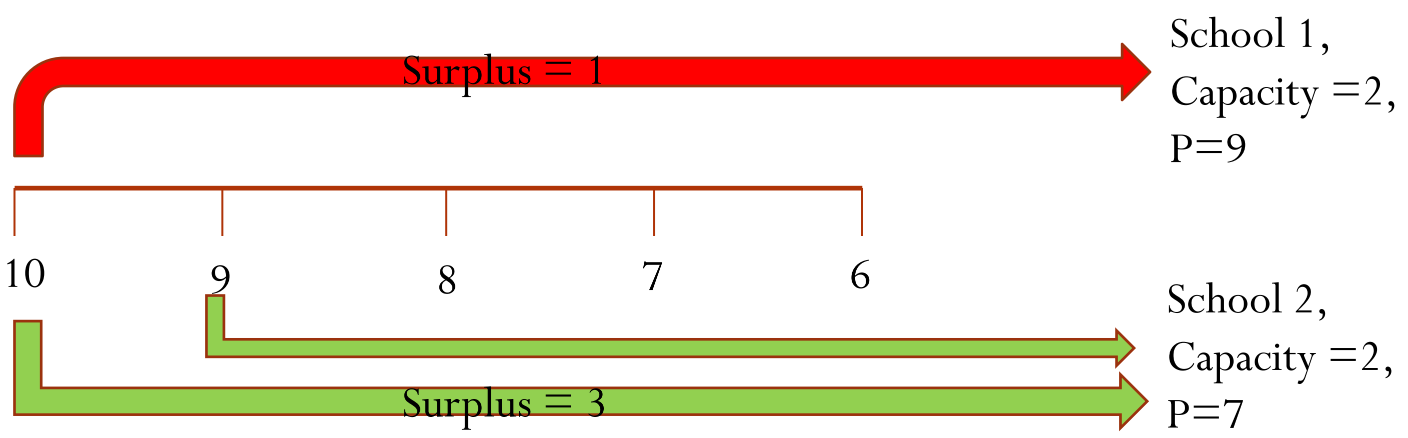
Theory: Consumer Heterogeneity

- If heterogeneity among consumers, WTP of the marginal consumer lower than that of average consumer
- **Rationing Rule**: Consumers choose in order of maximal surplus (Kreps-Scheinkman 1983)



Rationing rule implies existence of Nash Equilibrium

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Theory: Consumer Heterogeneity

- School 1 capacity = 2
- Second table shows NE prices when school 2 capacity increases from 1 to 6
  - Note: No 'uncovered' market (students who want to enroll but have no space at existing price) since can increase the price as demand downward sloping
- Up to capacity 6 for school 2, unique NE that prices at WTP of marginal consumer

At capacity 6, P*=3 no longer Nash

School 2 increases profits by charging 5 since 5x4=20>6x3=18

But 4 is not equilibrium either, as 4-e gets 6 students for profit 4x6=24

Then, for School 2 Capacity > 5, price competition in mixed strategies

But capacity 5 is precisely the Cournot best response to School 1 capacity = 2

Consumer	Valuation of low quality
A	10
B	9
C	8
D	7
E	6
F	5
G	4
H	3

School 2 CAP.	NE price	School 2 profits
1	8	8
2	7	14
3	6	18
4	5	20
5	4	20
6	Mixed	

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Theory: Consumer heterogeneity with quality

- Alternately, if one school chooses high quality and the other low quality, this product differentiation relaxes price competition
- Suppose School 2 again has a capacity of 6 while School 1 has a capacity of 2, but now School 2 chooses high quality with valuations as in table
  - Unique NE is School 1 charges 3 (consumers G and H) and School 2 charges 9(Consumers A through F). We prove that the mixed strategy case now disappears
- **Lemma**: Existence of pure-strategy NE if firms can invest in quality
  - **Intuition**: Mixed-strategy NE follows because of discontinuities in the profit function: When both firms have the same quality, if one price undercuts the other, they take all consumers up to their capacity. Quality re-introduces "smoothness" in the profit function and restores the pure strategy NE.

Consumer	Valuation of low quality	Valuation of high quality
A	10	20
B	9	18
C	8	16
D	7	14
E	6	12
F	5	10
G	4	8
H	3	6
I	2	4
J	1	2

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Summary Statistics

Variable	(1) Mean	(2) 5th pctl	(3) 25th pctl	(4) Median	(5) 75th pctl	(6) 95th pctl	(7) Standard Deviation	(8) N
Panel A: Village level Variables								
Number of public schools	2.45	1.0	2.0	2.0	3.0	5.0	1.03	266
Number of private schools	3.33	2.0	2.0	3.0	4.0	7.0	1.65	266
Private enrollment	523.52	149.0	281.0	415.5	637.0	1,231.0	378.12	266
Panel B: Private School level Variables								
Enrollment	163.6	45.0	88.0	140.0	205.0	353.0	116.0	851
Monthly fee (PKR)	238.4	81.3	150.0	201.3	275.0	502.5	166.1	851
Monthly revenue (PKR)	40,181.1	4,943.0	13,600.0	26,485.0	44,400.0	117,655.0	54,883.9	850
Monthly variable costs (PKR)	25,387.0	3,900.0	9,400.0	16,200.0	27,200.0	79,000.0	30,961.1	848
Annual fixed expenses (PKR)	78,860.9	0.0	9,700.0	33,000.0	84,000.0	326,000.0	136,928.2	837
School age (No of years)	8.3	0.0	3.0	7.0	12.0	19.0	6.7	852
Number of teachers	8.2	3.0	5.0	7.0	10.0	17.0	4.8	851
Monthly teacher salary (PKR)	2,562.8	1,000.0	1,500.0	2,000.0	2,928.5	5,250.0	3,139.5	768
Number of enrolled children in tested grade	13.1	1.0	5.0	10.0	18.0	34.5	11.7	420
Number of tested children	11.7	1.0	4.0	9.0	16.0	31.5	10.6	420
Average test score	-0.21	-1.24	-0.59	-0.22	0.15	0.84	0.64	401

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Balance, Attrition and Take-up

- Balance: Both across villages and schools in distribution and ordinal tests
- Attrition: 5% in first year, 10% by end
  - Robustness of results to attrition shown in paper
- Take-up: 94% (96% for low and 93% for high saturation)
  - Reasons for not taking-up discussed in paper
- Survey included baseline, 3 "thick" rounds post treatment, 2 "thin" rounds post-treatment

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Experiment Protocols: Survey Timeline

Round	Dates	Months after treatment	Outcomes
Baseline	May-August 2012	-	Enrollment, Fees, Revenues, Costs, Child tests*, Teacher roster*
Treatment	Sep-Dec 2012	-	
1	May 2013	8	Enrollment, Fees, Revenues, Costs, Child tests, Teacher roster
2	Nov 2013	14	Enrollment, Fees, Revenues
3	Jan-Feb 2014	16	Enrollment, Fees, Revenues, Child tests
4	May 2014	20	Enrollment, Fees, Revenues
5	Nov 2014	26	Enrollment, Fees, Revenues, Costs, Child tests, Teacher roster

*Surveys that collect these outcomes were administered to only a random half of the sample at baseline.

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Results: Enrollment and Fees

	Enrollment (All)			Closure	Enrollment (Open)	Posted Fees			Collected Fees
	(1) Year 1	(2) Year 2	(3) Overall	(4) Overall	(5) Overall	(6) Year 1	(7) Year 2	(8) Overall	(9) Per Child
High	8.86	9.12	9.01	-0.02	8.95*	17.68**	21.04**	18.83**	29.48
	(5.38)	(7.99)	(6.04)	(0.03)	(5.10)	(7.63)	(10.27)	(7.88)	(20.15)
Low Treated	18.83***	26.02***	21.80***	-0.09***	11.57	1.93	-2.51	0.51	-7.69
	(7.00)	(10.01)	(7.73)	(0.03)	(7.63)	(7.93)	(9.43)	(7.48)	(12.42)
Low Untreated	-0.31	1.00	0.31	-0.03	-2.43	0.07	-0.38	-0.00	3.37
	(5.09)	(7.23)	(5.51)	(0.03)	(5.41)	(6.24)	(9.13)	(6.49)	(10.45)
Baseline	0.78***	0.72***	0.75***		0.73***	0.83***	0.82***	0.83***	0.63***
	(0.04)	(0.06)	(0.05)		(0.05)	(0.04)	(0.04)	(0.04)	(0.04)
R-Squared	0.69	0.53	0.62	0.05	0.63	0.71	0.73	0.72	0.14
Observations	2,454	1,605	4,059	855	3,599	1,563	749	2,312	2,949
# Schools (Rounds)	827 (3)	826 (2)	836 (5)	855 (1)	742 (5)	796 (2)	749 (1)	800 (3)	782 (4)
Mean Depvar	163.6	163.6	163.6	0.1	171.5	238.1	238.1	238.1	238.1
Test pval (H=0)	0.10	0.25	0.14	0.60	0.08	0.02	0.04	0.02	0.14
Test pval (L^t=0)	0.01	0.01	0.01	0.01	0.13	0.81	0.79	0.95	0.54
Test pval (L^t=H)	0.15	0.10	0.10	0.04	0.72	0.06	0.01	0.02	0.08

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Results: Revenues

	Overall Posted Revenues (monthly)			Overall Collected Revenues (monthly)		
	(2) Full	(3) Top Coded 1%	(4) Trim Top 1%	(5) Full	(6) Top Coded 1%	(7) Trim Top 1%
High	5,484.4	5,004.5*	4,771.6**	4,400.0	4,642.0*	3,573.4*
	(3,532.4)	(2,602.0)	(2,203.3)	(3,589.0)	(2,413.2)	(1,933.3)
Low Treated	10,665.6**	9,327.2**	8,254.0**	7,923.7*	6,991.8**	5,399.5*
	(4,882.8)	(3,976.0)	(3,711.7)	(4,623.2)	(3,252.5)	(2,896.0)
Low Untreated	-549.8	-684.5	328.7	494.4	430.9	737.6
	(2,750.1)	(2,345.6)	(1,887.7)	(2,560.2)	(2,225.9)	(1,711.9)
Baseline	1.0***	1.0***	0.9***	0.8***	0.9***	0.7***
	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)
R-Squared	0.65	0.65	0.58	0.55	0.62	0.53
Observations	2,459	2,459	2,423	3,214	3,214	3,166
# Schools (Rounds)	832 (3)	832 (3)	820 (3)	831 (4)	831 (4)	820 (4)
Mean Depvar	40,181.0	38,654.1	36,199.2	30,865.0	30,208.8	27,653.0
Test pval (H=0)	0.12	0.06	0.03	0.22	0.06	0.07
Test pval (L^t=0)	0.03	0.02	0.03	0.09	0.03	0.06
Test pval (L^t=H)	0.35	0.32	0.37	0.52	0.52	0.55

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Results: Revenues (open schools only)

	Overall Posted (monthly)			Overall Collected (monthly)		
	(1) Full	(2) Top Coded 1%	(3) Trim Top 1%	(4) Full	(5) Top Coded 1%	(6) Trim Top 1%
High	5,471.4	4,872.2*	4,543.6**	4,748.8	4,775.2**	3,593.5*
	(3,432.9)	(2,498.8)	(2,094.2)	(3,482.7)	(2,425.1)	(1,871.3)
Low Treated	8,589.9*	7,287.7*	6,271.1*	5,600.5	4,747.5	3,191.9
	(4,988.8)	(4,032.3)	(3,742.7)	(4,804.2)	(3,349.9)	(2,964.8)
Low Untreated	-1,239.5	-1,434.3	-405.0	-119.6	-298.1	6.9
	(2,843.0)	(2,378.4)	(1,847.0)	(2,753.9)	(2,364.5)	(1,765.4)
Baseline Posted Revenues	1.0***	1.0***	0.9***	0.8***	0.9***	0.7***
	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)
R-Squared	0.66	0.67	0.61	0.57	0.64	0.56
Observations	2,312	2,312	2,276	2,948	2,948	2,900
# Schools (Rounds)	800 (3)	800 (3)	788 (3)	781 (4)	781 (4)	770 (4)
Mean Depvar	40,181.0	38,654.1	36,199.2	30,865.0	30,208.8	27,653.0
Test pval (H=0)	0.11	0.05	0.03	0.17	0.05	0.06
Test pval ($L^t = 0$)	0.09	0.07	0.10	0.24	0.16	0.28
Test pval (L^t=H)	0.57	0.57	0.65	0.87	0.99	0.89

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Test Scores

	School level				Child level
	(1) Math	(2) English	(3) Urdu	(4) Avg	(5) Avg
High	0.16*	0.19**	0.11	0.15*	0.22**
	(0.09)	(0.09)	(0.08)	(0.09)	(0.09)
Low Treated	-0.07	0.08	-0.08	-0.03	0.10
	(0.11)	(0.11)	(0.11)	(0.10)	(0.10)
Low Untreated	0.03	0.06	0.01	0.03	0.01
	(0.08)	(0.08)	(0.07)	(0.07)	(0.08)
Baseline	0.27**	0.43***	0.25**	0.36***	0.63***
	(0.11)	(0.08)	(0.12)	(0.12)	(0.05)
R-Squared	0.18	0.14	0.13	0.16	0.21
Observations	725	725	725	725	12,613
# Schools (Rounds)	725 (1)	725 (1)	725 (1)	725 (1)	719 (1)
Mean Depvar	-0.21	-0.18	-0.24	-0.21	-0.19
Test pval (H=0)	0.08	0.05	0.18	0.07	0.02
Test pval (L^t=0)	0.50	0.43	0.45	0.79	0.33
Test pval (L^t=H)	0.03	0.33	0.07	0.07	0.24

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Public subsidy for high saturation

- Assume schools that closed down would have defaulted on the loan and those that stayed open would have fully paid back the loan.
- Default rate in low-treated is 0.01 and in high-treated is 0.08.
- For a given loan size of 50,000 and annual flat interest rate of 15%, we compute the following expected loss:

	Low	High
Loan size	50,000	50,000
Tenure	1.5	4
Total loan value	61,250	80,000
Expected loss	612.50	6,400
Expected loss * 3 loans	1,838	19,200
Difference	17,363	

- **If offered as loan-loss guarantees, bank indifferent between high and low-intensity approaches.**

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