

The Potential of Smart Matching Platforms in Teacher Assignment: The Case of Ecuador

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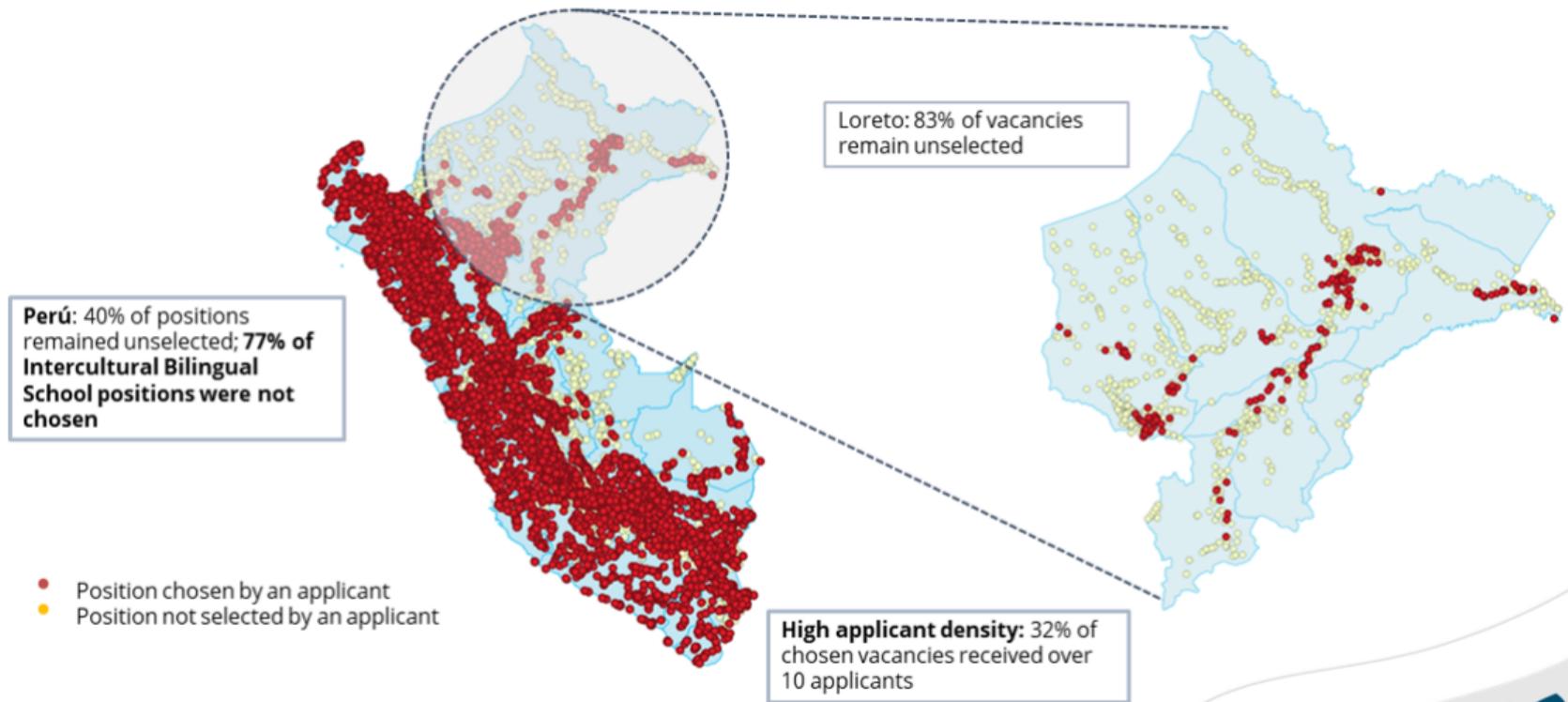
Motivation

1. Making optimal choices is difficult when faced with information frictions:
 - Providing agents with **personalized information** can facilitate the decision-making process
 - Informational interventions are potentially beneficial at the **individual** level and **system** (efficiency) level
2. The effects of informational interventions have been studied in the context of:
 - School selection (Arteaga et al., 2021, Andrabi et al., 2017); Financial choices (Saez, 2009, Duflo and Saez, 2003); Health care (Kling et al., 2012); Consumer behavior (Allcott and Rogers, 2015)
 - → Low-cost and positive impact on the decision-making process, intervention details matter.
3. We explore the role of information in **teacher job markets**:

Teacher hiring and assignment

- Teachers frequently face a complicated application process with limited transparency regarding job openings (Bertoni et al., 2020).
- Teachers often prefer to work close to where they live, in urban areas, or in schools with specific characteristics, such as better infrastructure, more experienced teachers, and more socioeconomically advantaged students (Bertoni et al., 2019, Reininger, 2012).
- Information barriers and teacher preferences can lead to inefficiencies in the job market.
 - Candidates cannot secure a vacancy in more attractive schools
 - Slots in less attractive schools, often vulnerable and remote, go unfilled.

Teacher assignment processes are inefficient



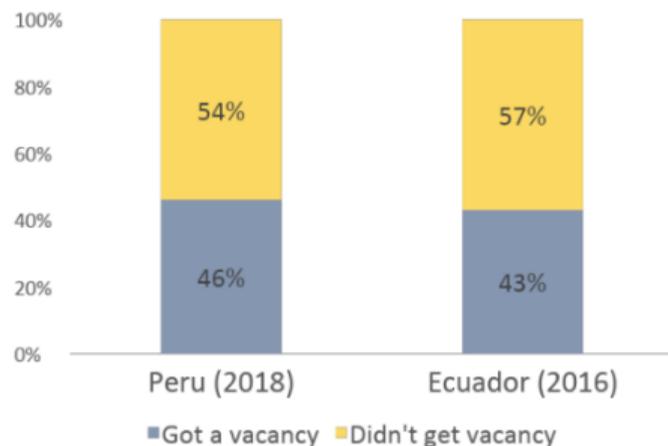
Source: [Bertoni et al., 2022](#).



Teacher assignment processes are inefficient

- High percent of applicants not assigned (over 50%)

Distribution of teaching candidates with and without a position after applying to a vacancy

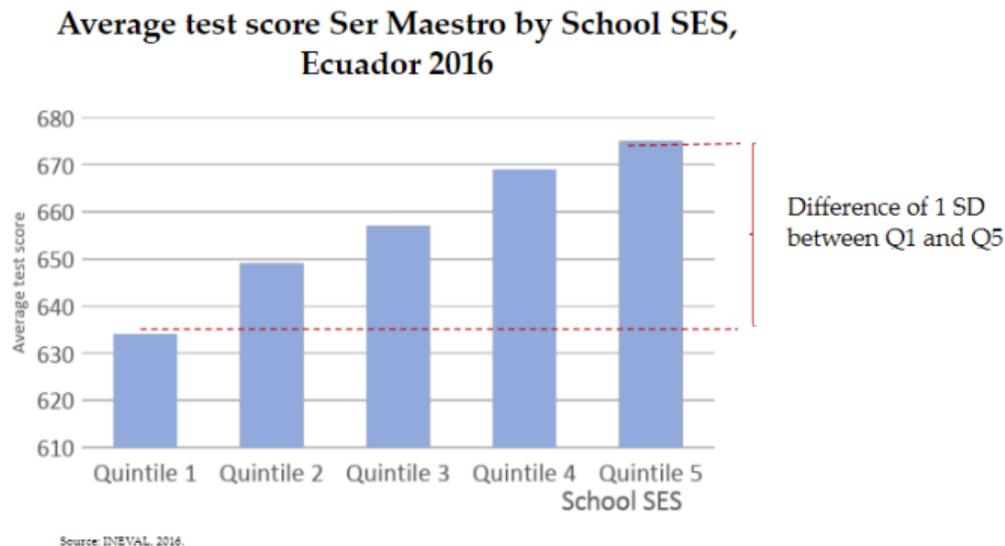


Source: Ministry of Education of Ecuador and Peru.

→ A high percentage of applicants who pass the selection process and select a vacancy, end up without a position and have to re-apply in the following contest.

Teacher assignment processes lead to inequalities

- Disadvantaged schools struggle to attract qualified candidates, often resorting to temporary hires



→ The higher the school's SES, the higher teachers' content knowledge.

Government policies to improve efficiency and equity in teacher assignment

- Monetary incentives to work in disadvantaged schools
 - Some evidence in Peru (Bobba et al., 2021) and Chile (Elacqua et al., 2022) on retaining high-performing teachers.
 - Expensive
- Low-cost non-monetary interventions on teacher preferences
 - Behavioral nudges that focus on extrinsic and intrinsic motivations in Peru increased probability of including rural schools in choice set and assignment (Ajzenman et al., forthcoming)
 - Intervention that highlighted hard-to-staff teacher vacancies on the job platform in Ecuador increased share of applicants that included these schools in portfolio and probability of assignment (Ajzenman et al., 2021)

Teacher selection and assignment in Ecuador

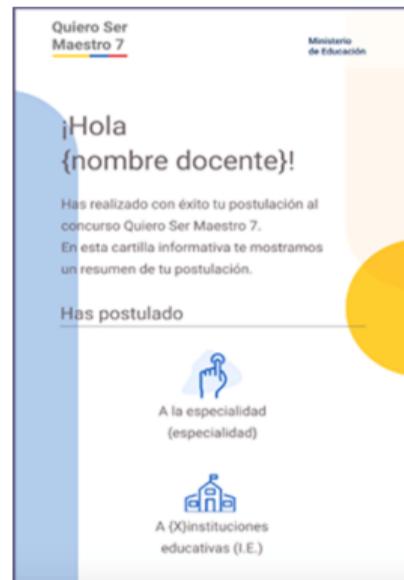
- We test a low-cost intervention that provides teachers with information aimed at increasing their chances of securing a position, and seeks to improve system-level assignment outcomes (i.e. better scores of assigned teachers, number of filled positions)
- The intervention was implemented in Ecuador as part of the *Quiero Ser Maestro* (QSM) program, which assigns teachers to schools through a centralized choice and assignment system
- Since 2013, the Ministry of Education has selected teacher candidates and assigned them to vacancies through a centralized process
 - Three phases:
 1. Psychological and knowledge exam (70)
 2. Credentials and mock class (30): **only 27% of 129,114 applicants passed**
 3. Eligible candidates rank up to 5 vacancies and are assigned by an algorithm with properties similar to a DA, which takes into account scores and preferences
 4. 10 day application period, 2 day validation stage to modify preference list.

Intervention

Personalized report

The intervention consisted of providing teachers with a personalized report (19,190), via WhatsApp and email, that included a summary of their application right after the application and right before the start of the validation period.

Included location, distance from home, number of applicants, number of vacancies.



Warning and recommendations

Some of the applicants (those at risk of non-assignment, 5,757) received, in addition to the summary, a warning and a list of recommended schools similar to those in the summary section (the treatment).

Risky applicants

We generated 200 assignment simulations to determine the proportion of simulations in which applicants were not assigned. Risky applicants were those not assigned in 30% of the simulations (same cutoff value as Arteage et al., 2021), generating a sharp discontinuity.

¡Mejora tus posibilidades de ganar una vacante!



Las I.E a las que postulaste son altamente competitivas porque fueron seleccionadas por aspirantes con más altos puntajes que tú.



Para aumentar las posibilidades de ser asignado, te recomendamos que consideres otras instituciones donde podrías tener mayores posibilidades de obtener una vacante.

Recuerda que los días 06 y 07 de agosto, durante el periodo de validación, puedes modificar tu postulación.

Note on recommendations

Risky applicants were pointed towards vacancies where the score of other applicants was below their own. We did not consider the general equilibrium concern that some schools might end up congested if they were recommended to many applicants. We did include many diverse recommended alternatives, so as to reduce the risk of generating excessive congestion at highly demanded vacancies.

Revista instituciones educativas que te puedan interesar



Estas son algunas I.E. donde podrías tener más posibilidades de ser asignado ya que, hasta el momento, tienen más vacantes en tu especialidad o tienen postulantes con menor puntaje que tú.

Nº	(School name)	🔍
(Provincia) (Comuna) (Parroquia)		
Distancia del centro poblado más cercano: - Metro(s)		
Tipo de sostenimiento: (Tipo de sostenimiento)		
Número de estudiantes: (XXX)		
Número de vacantes: (XXX)		
Nº	(School name)	🔍
Nº	(School name)	🔍
Nº	(School name)	🔍

Empirical Strategy

To explore the impact of providing teachers at risk of non-assignment with information we rely on a regression discontinuity strategy.

$$Y_i = \beta_0 + \beta_1 T_i + h(z_i) + \varepsilon_i \quad (1)$$

Y_i represents the choice of an applicant.

β_1 is the estimator of the treatment effect of the information intervention on that choice.

h is a continuous function of z_i . We specify h as linear and quadratic following Gelman and Imbens (2019).

▸ Data used

▸ Summary statistics

Validity of the RD

Tests

- Covariate tests [▶ See test](#)

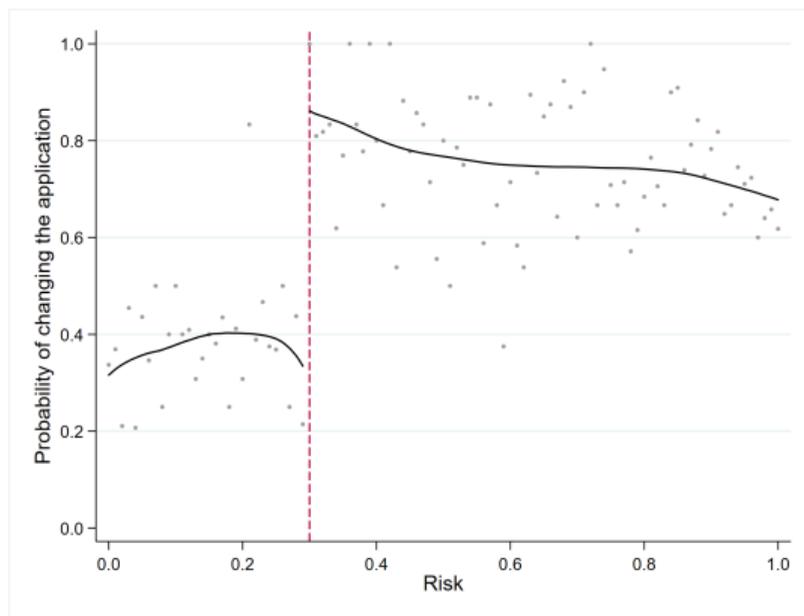
We test the balance on covariates on either side of the threshold by using the covariates as outcomes.

- Placebo test [▶ See test](#)

We check whether there is any significant effect when we know that there should not be, we use arbitrary fake cutoffs at the 0.5 and 0.2 non-assignment risk levels.

Results: Probability of changing the application

Treated teachers are more likely to modify their application and to be assigned to a vacancy.



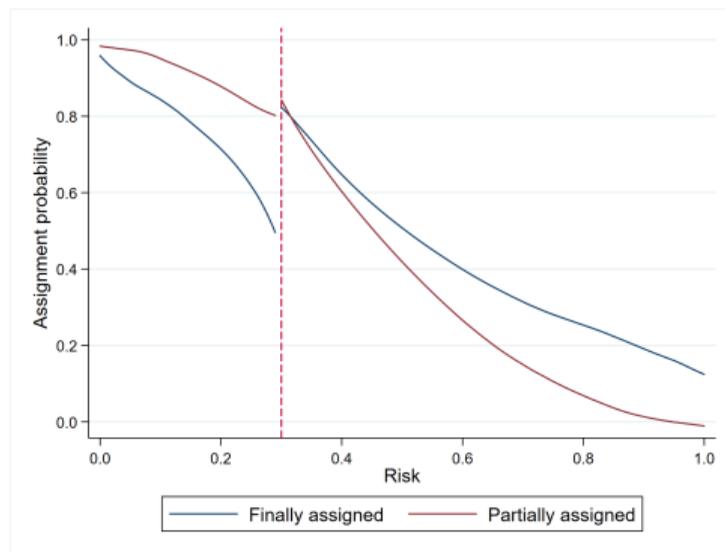
Estimations: Receiving the warning increased the likelihood that applicants would change their application by 52% and add a recommendation from the list by 43%.

Results: Other outcomes

	(1)
Panel A. Any modification	
RDD estimate	0.519*** (0.130)
Left BW	0.069
Right BW	0.069
Total observations in BW	170
Panel B. Add any	
RDD estimate	0.591*** (0.114)
Left BW	0.090
Right BW	0.090
Total observations in BW	216
Panel C. Add any from recommendations	
RDD estimate	0.427* 0.248
Left BW	0.064
Right BW	0.064
Total observations in BW	75
Panel D. Assigned	
RDD estimate	0.371*** (0.124)
Left BW	0.101
Right BW	0.101
Total observations in BW	248
Panel E. Assigned in recommendation	
RDD estimate	0.347*** (0.084)
Left BW	0.148
Right BW	0.148
Total observations in BW	241

Results: RD on assignment probability comparing partial and final applicants

Equilibrium result: Drop in assignment probability for applicants on the left of the discontinuity (both close and far), and an increase among applicants on the right of the discontinuity

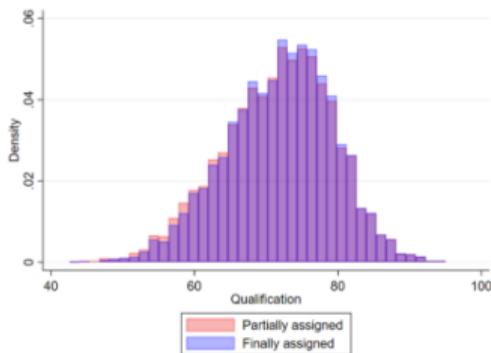


Note: Partial applicants correspond to applications previous to the validation period and final applicants correspond to application post changes in the validation period.

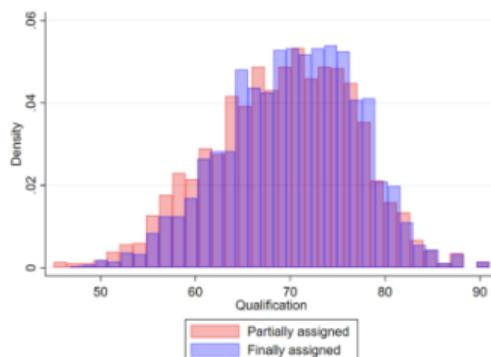
System-level descriptive results: Number and quality of reassigned teachers

Increased the number of applicants and overall assignment scores (the general quality of assigned teachers, .23 SD of evaluation scores)

((a)) All vacancies assigned pre- and post-validation



((b)) All vacancies assigned to different applicants pre- and post-validation



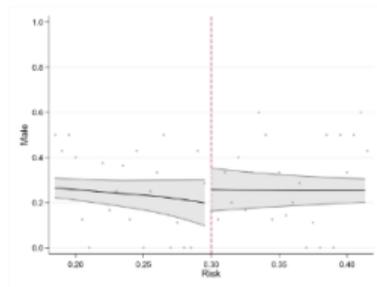
Note: Figure (a) presents the distribution of scores for vacancies that had someone assigned both pre- and post-validation. Figure (b) presents only the vacancies where the assigned teacher is different in the post-validation assignment.

Conclusion and discussion

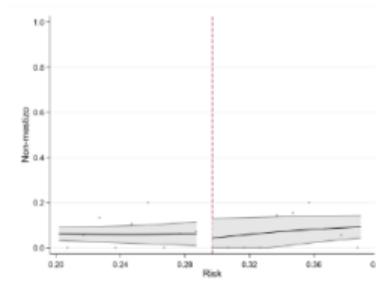
1. We show the effectiveness of a low-cost information intervention in the context of Ecuador's centralized teacher assignment system
2. The results are robust to different specifications and lead us to conclude that the intervention positively impacted the individual chance of assignment to a school of interest
3. The results suggest a positive general equilibrium effect by improving both the average scores of teachers who obtained an assignment and total assignments
4. This study is important for policy because teachers are the most expensive and valuable educational input and they have an impact on short and long term outcomes.
5. Centralized choice and assignment system similar to the QSM contest provide a unique opportunity to interact with applicants and offer personalized feedback, future work may consider GE effects and the mechanism's rules (expanding portfolio) and using new technologies (ex. recommendation engines, AI-power bots) to engage with teachers during the process.

Covariate tests

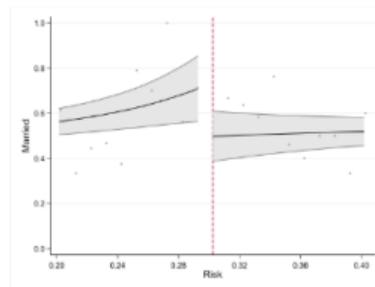
((a)) Male



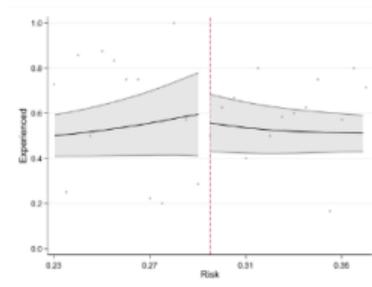
((b)) Married



((c)) Non-mestizo

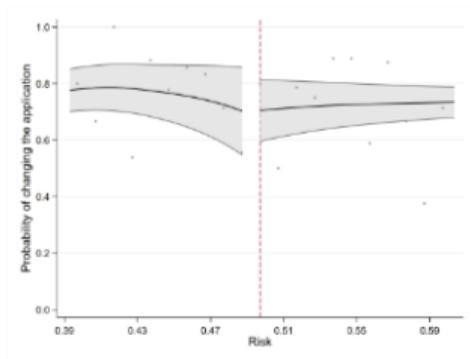


((d)) Experienced

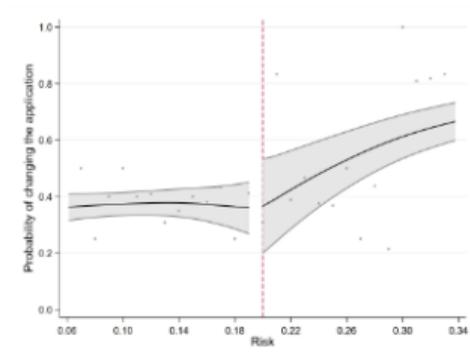


Placebo tests

((a)) Probability of changing the application with fake cutoff at risk level 0.5



((b)) Probability of changing the application with fake cutoff at risk level 0.2



▶ Return

- Administrative data from the registration and application process of the QSM contest.
 1. Candidates' socio-demographic characteristics
 2. Location
 3. Area of specialization
 4. Score on the merits and opposition phase by category
 5. Ranked school preferences

- School level data.
 1. School location
 2. Specializations offered
 3. Available vacancies

▶ Return

Summary statistics

	(1)	(2)	(3)	(4)	(5)
	All eligible applicants	Partial applicants	Compliers	Treated compliers	Control compliers
Total	22015	19190	3653	2392	1261
Share female	0.72	0.73	0.74	0.77	0.69
Share non-mestizo	0.09	0.09	0.10	0.09	0.11
Share married	0.55	0.55	0.57	0.58	0.55
Share with master degree	0.07	0.07	0.09	0.07	0.12
Share with more than 5 years of experience	0.43	0.44	0.52	0.48	0.60
Share in the most common specialty	0.22	0.22	0.29	0.29	0.29
Share in the most common province	0.14	0.15	0.16	0.14	0.19
Mean age	38.57	38.69	38.70	38.69	38.70
Mean score	64.62	64.69	67.15	64.64	71.91

Note: Eligible applicants are the teachers who passed the merits and public examination phase. Partial applicants are the teachers who had a personalized report available, that is the ones who applied before the validation period and applied to specialties with at least 80 registered and 20 partial applicants. Compliers are the ones who opened the personalized report. The most common specialty is basic general education from second to seventh grade. The most common province is Guayas.

▶ Return