

Entry rules and fairness in regulated professions: A quasi-Experimental study of a bar exam reform [★]

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ABSTRACT

Occupational licensing at the local market level often coexists with labor mobility across local markets. This study examines the legal profession, specifically how a district-specific bar exam impacts occupational licensing and labor mobility across districts. Licensing regulation brings unintended consequences: extreme heterogeneity across districts in licensing exam difficulty, unfair admission procedures, and inefficient mobility of exam candidates and workers. We leverage a policy change in the grading procedure of the exam, transitioning from grading within the local district to grading in a randomly assigned different district, and find that exam fairness is substantially restored following this reform. A theoretical model of occupational licensing, labor mobility, and strategic interaction among licensing boards supports our findings. This study provides the first evidence of regulatory competition driven by such interactions. Understanding how to regulate these uneven standards in bar exams can help inform the regulation of other professions where fairness and efficiency in professional licensure are critical issues.

1. Introduction

Currently, approximately a quarter of workers in the EU and the US are required by law to hold a professional license (Kleiner and Krueger, 2013; Koumenta and Pagliero, 2019; Blair, 2022). The entry into licensed professions is typically conditional on educational qualifications and the passing of an entry exam, which is of 10 administered by the professional association of the regulated profession. Although this type of regulation can benefit consumers in reducing asymmetric information (Akerlof, 1970; Leland, 1979) by shielding them from potential professional incompetence, it can also reduce competition and increase the wages of licensed workers' (i.e. prices), thus reducing allocative efficiency (Smith, 1776; Friedman and Kuznets, 1954). This paper shows that the combination of occupational regulation at the local market level and labor mobility can generate extreme heterogeneity in admission outcomes across markets, unfair admission procedures, and inefficient worker mobility.

In the EU, hundreds of professions are licensed according to country-specific laws. At the same time, most licensed professions are characterized by intense labor mobility that, together with cross-country mobility of individuals, is one of the cornerstones

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of the EU treaty. For example, physicians, nurses, architects, dentists, veterinarians, and many other professionals are subject to country-specific entry exams and automatic recognition of their professional titles across EU member states. Similarly, their mobility is regulated by country-specific regulations and EU directives. Given the importance of the subject, harmonization of requirements and mutual recognition of professional licensing qualifications is high on the policy agenda in the EU.

In the US, state licensing regulations for many professions coexist with the general principle of labor mobility across states.¹ For example, nurses can pass an entry exam in one state, and then move to a large number of other states (the nurse Licensure Compact). After passing the state bar exam, lawyers can move on the basis of bilateral agreements between states. Teachers, dentists and many other professionals can also move across states subject to recognition of their state credentials.² Occupational licensing regulations are also significant because they are subject to antitrust liability. In the US, the Federal Trade Commission has been particularly vigorous in applying antitrust legislation to occupational licensing boards.³

While abundant anecdotal evidence highlights the importance of local occupational regulation combined with labor mobility, there is a lack of theoretical or empirical studies on its effects. One reason is the heterogeneity of labor market regulation across countries, making comparisons difficult.⁴ In this paper, we overcome this issue focusing on a specific labor market in a specific country: the Italian market for lawyers. This market's uniform admission policies and procedures allow for straightforward comparisons of entry standards. While the Italian market for lawyers operates under a homogeneous national legal framework, labor market regulations, and language, making it an ideal case study for empirical analysis, there are significant local variations in the grading standards and operations of licensing boards. Our goal is to provide general insights into the effects of local occupational licensing regulations and labor mobility, which are likely relevant in many other markets subject to similar regulations.

The Italian bar exam consists of a written and an oral component. Exams are administered in each of 26 districts using identical written questions nationwide. However, grading standards may vary significantly across districts, as local professional associations are responsible for grading the exams. After passing the bar exam, newly licensed lawyers are free to practice in any district, creating heterogeneity in entry barriers and labor mobility across local markets.⁵

In the early 2000s, differences in pass rates across districts in the Italian market for lawyers raised concerns about exam fairness. A striking example of this situation is the case of the then Italian Minister of School and Education, who in 2001 chose to take the bar exam in Reggio Calabria (in the South) rather than in her home district in the North. Notably, pass rates in Reggio Calabria were much higher, about 93%, compared to districts like Brescia (31%) and Milan (28%). This disparity, coupled with the revelations of systematic cheating scandals in other southern Italian districts where nearly all candidates passed due to dictation of answers by examiners, highlighted the urgent need for reform.⁶

In 2003, the grading procedures changed. Starting with the 2004 examination, written exams were no longer graded locally; instead, each district's exams were sent as a whole to another district, randomly selected each year after administration of the exam. Randomizing the grading at the district level is not only an interesting and unusual policy experiment, but it also provides a convenient source of exogenous variation that can be used to separately identify the severity of grading standards (the source of differences in entry barriers across districts) from differences in the quality of candidates.

Exploiting district-level data from the Italian bar exam between 1998 and 2012, we document extreme heterogeneity in pass rates across districts and years, with rates ranging from 16 to 96 percent. This variation primarily reflect differences in grading standards rather than candidate quality, as similarly qualified candidates were evaluated inconsistently across districts. We estimate that up to 49 percent of candidates experienced unfair treatment across districts, i.e. they either passed the exam despite performing worse than someone who failed in another district, or failed despite performing better than someone who passed elsewhere. Given the heterogeneity of grading standards, exam candidates have an incentive to move to districts with easier exams and then return as licensed lawyers. Since such mobility is costly, differences in grading standards generate inefficiencies in the form of socially wasteful relocation decisions that do not reflect underlying productivity or preferences. Moreover, this practice leads to allocative inefficiency across districts, as candidates who would not have passed locally obtain licenses elsewhere, weakening the link between local demand conditions and the quality and composition of legal services.

We show that these results are consistent with a general model of the incentives provided by local regulation and labor mobility. The model shows that strategic interaction among licensing boards contributes to heterogeneity in admission standards (with higher

¹ State-based licensing requirements make it difficult for workers to practice across state lines. This creates the need for mutual licensing-recognition agreements, so that workers can relocate without having to requalify.

² In the US, occupational licensing has become an important bipartisan topic in policy debates. For example, a 2015 report published by the Obama White House called for a review of the costs and benefits of occupational licensing regulations. In July 2017, Alexander Acosta, US Secretary of Labor under the Trump administration, also recommended a thorough review of these regulations. More recently, in 2021, President Biden signed an executive order to promote labor market competition, which includes efforts to eliminate unnecessary occupational licensing, further underscoring the bipartisan support for reforming occupational licensing practices—a commitment that the second Trump administration continues to pursue.

³ In the 2015 North Carolina Board of Dental Examiners v. Federal Trade Commission case, the US Supreme Court determined that state licensing boards controlled by market participants and not directly supervised by the state are not immune from federal antitrust scrutiny. For a summary of recent developments in antitrust enforcement in this area, see [Stutz \(2017\)](#) and [Kwoka et al. \(2019\)](#).

⁴ For example, in the market for lawyers, bilateral agreements across US states are heterogeneous and difficult to study systematically. In Europe, occupational licensing regulations are different across states, reflecting differences in legal institutions, laws, languages, and culture ([Pagliero and Timmons, 2013](#)).

⁵ Although the differences in entry barriers are large, they are limited to differences in the severity of grading procedures.

⁶ See, e.g., https://www.corriere.it/cronache/08_settembre_04/stella_dbaef098-7a47-11dd-a3dd-00144f02aabc.shtml

standards in richer markets), unfair exams, and inefficient mobility. As workers try to arbitrage differences in work amenities across markets, local professional associations lose control of the labor supply in their own market. In this context, the entry requirements in one market have consequences in other markets, thus forcing professional associations to interact with one another in setting entry requirements. The model also provides other predictions, which are then tested with the data.

A long and distinguished literature studies the effects of occupational licensing on prices (see Kleiner, 2000; Pagliero, 2019, for a review), mobility (Holen, 1965; Federman et al., 2006), and the quality of the goods and services provided (Maurizi, 1974; Kleiner and Kudrle, 2000; Angrist and Guryan, 2004; Larsen, 2013). Most empirical studies assume regulation is exogenously determined and exploit cross sectional (or time series) variability, or some specific feature of licensing regulations, to identify the effects of regulation. A more recent literature has started investigating the behavior of licensing boards, and attempts to document how entry regulations, restrictions to mobility, and the list of activities reserved to each profession are endogenously determined (see, for example, Pagliero, 2011, 2013; Kleiner et al., 2016). This paper follows the tradition and takes advantage of an important policy change (as well as specific features of licensing regulations) to identify key parameters. However, it also contributes to the second strand of the literature, as the focus is on understanding the behavior of licensing boards, how they choose the grading standards, and interact with each other. Moreover, this study is the first to use a quasi-experimental approach to analyze these dynamics, providing more robust and credible estimates of the effects of occupational licensing regulations.

The paper is organized as follows. Section 2 describes the institutional details of the Italian market for lawyers. Section 3 describes the data and provides preliminary evidence of grading heterogeneity and labor mobility. In Section 4 we present the results of our empirical analysis. Section 5 investigates the mechanism that generates the observed differences in grading standards and that explains our results. Section 6 concludes.

2. Occupational licensing in the Italian legal profession

The legal profession in Italy is a typical licensed profession. Lawyers must be listed in the official register maintained by a local bar association, which receives extensive legal prerogatives from national law. Each bar association comprises all lawyers registered there and elects a council and a chairman. These bodies are responsible for managing the register and overseeing the professional conduct of their members. Additionally, they resolve disputes between lawyers or between lawyers and their clients, and wield disciplinary powers, such as the ability to suspend or expel members from the register.

Beyond these regulatory functions, bar associations play an active role in organizing legal aid services, coordinating continuing legal education, and administering the bar exam. They collect annual membership dues and operate with administrative autonomy. In most districts, dues are structured as flat annual fees that are not directly tied to lawyers' income. However, a larger number of registered lawyers results in greater overall revenue, which can be used to fund services such as legal aid, training programs, and administrative staff. Moreover, the size of a district bar can influence its institutional prestige and weight within national deliberative bodies. As a result, local bar associations have a financial and reputational interest in sustaining a sizable and active membership base.

These responsibilities give bar associations a direct interest in both the quality and number of lawyers entering the profession. On the one hand, they may seek to preserve the reputation and earnings of incumbent members by limiting low-quality entry; on the other, they benefit from maintaining a steady flow of new lawyers to support their financial base and institutional relevance. This dual role creates an incentive structure that balances exclusivity with sustainability, shaping how bar associations may behave in setting or influencing entry standards.

National laws also define the criteria for entering the profession. Aspiring lawyers are required to complete a five-year university law degree and a two-year internship in a law office under the guidance of an experienced lawyer. Following their internship, they must pass a bar exam that typically takes one year to complete. Candidates can only take the exam in the district where they are registered and where they completed their internship, a restriction aimed at curbing mobility and limiting arbitrage opportunities across different districts. However, candidates are free to choose the district for their internship, which indirectly allows them to select where they will take the bar exam.⁷

The bar exam includes both written and oral components. Access to the oral exam is contingent upon passing the written exam, which is held annually in December at each of the 26 district appeal courts. The written exam occurs simultaneously across all districts using identical questions. Upon passing, candidates then proceed to the oral exam, usually the following Autumn, in the same district.

Before 2004, the written exams were graded locally, even though the questions were identical across districts. Local grading committees-comprising lawyers, judges, and law professors-handled the evaluations. In 2004, following the Castelli reform (Law 180/2003), a new regulation was implemented.⁸ Each year, the Ministry of Justice partitions districts into groups of 3 to 8, with the composition and size varying annually but generally including districts with similar applicant numbers. Each district's grading committee is then randomly assigned to grade papers from another district within the same group.⁹ This reform only changed the grading procedures for the written exams; candidates continue to take the oral exam in the district where they wrote the written exam.

⁷ Since 2003, to further discourage mobility, trainees who move to a different district during their training period must take the exam in the district where they completed the majority of their training.

⁸ See Law 180/2003, <http://www.camera.it/parlam/leggi/03180l.htm>

⁹ The number of graders in each district depends on the number of candidates in that district, hence the law requires to group districts with similar number of candidates to avoid excessive workloads on graders.

Table 1
Summary statistics.

Variable	Obs	Mean	Std. Dev.	Min	Max
Overall pass rate	390	0.39	0.15	0.16	0.96
Pass rate (written)	390	0.45	0.17	0.16	0.99
Pass rate (oral)	390	0.87	0.12	0.35	1.00
Passers / lawyer	390	0.14	0.14	0.03	1.36
Takers / lawyer	390	0.33	0.18	0.11	1.69
Takers	390	1292	1108	100	6317
Passers	390	496	460	28	2965
Lawyers	390	4674	4500	381	23,341
Wages	312	40,115	14,541	20,325	83,773

Notes: This table reports summary statistics for the total number of aspiring lawyers registered in all districts taking and passing the Italian bar exam. Passing the written exam is a prerequisite for taking the oral exam. "Lawyers" refers to the total number of lawyers registered in each district in a given year. The data include observations from 26 districts spanning from 1998 to 2012.

Once candidates pass the oral exam, they are free to register and practice in any local bar association. Despite local exams being pivotal in the admission process, the labor market for lawyers in Italy is national. This setup reflects the evolution of the legal profession since Italian unification in the 19th century, which, while establishing a common labor market, allowed for persistent heterogeneity in institutions and legal traditions at the local level.¹⁰ This heterogeneity, coupled with the option to take the exam in a district different from the one of practice, creates a distorted incentive. Candidates, fearing failure in their own district, might find it profitable to take the exam in an easier district and return post-certification.

3. Data

Having established the institutional context of the Italian legal profession and its examination system, we now describe the data used in our analysis. We collected information on the number of candidates taking and passing the written and oral exams in each district from 1998 to 2012.¹¹ This data includes pass rates for both the written and oral examinations, as well as the overall pass rate (i.e., the percentage of candidates who pass both exams). We complemented this with data from administrative records on the number of lawyers in each district and year.¹² We also use administrative data on lawyer earnings provided by Cassa Forense. These data report average annual income by district for registered lawyers and are available from 2001 onwards, covering a subset of the period analyzed in the rest of the paper. Due to their shorter time span, these data are used primarily to validate the model's predictions regarding regional wage dynamics following the reform.

Economic and demographic variables (population density, real GDP per capita, unemployment rate) at the district level over the same period were obtained from the National Institute of Statistics (*ISTAT*).

Table 1 provides summary statistics. The data reveals significant disparities in the pass rate, the number of candidates taking the exam, and the number of successful candidates. Overall pass rates (the proportion of candidates passing both components of the exam) range between 16 and 96 percent, with averages for the written and oral components at 45 and 87 percent, respectively, and an overall average pass rate of 39 percent.¹³

The number of successful candidates varies between 3 and 136 percent relative to the total number of lawyers in each district. This variation partly reflects the disparities in the number of candidates per district, which ranges between 11 and 169 percent of the total lawyers. This discrepancy in pass rates is the primary motivation behind candidates strategically selecting the district in which to take the exam.

4. Results

4.1. Preliminary evidence

To provide preliminary evidence of strategic mobility, we report in Fig. 1 the correlation between the "excess supply" of candidates per district i in year t – as defined by the following equation:

¹⁰ See Tacchi et al. (2002) for a detailed history of the legal profession in Italy.

¹¹ Source: Ministry of Justice, https://www.giustizia.it/giustizia/it/mg_12_1_2_3_2.wp. The city of Bolzano is excluded from the sample as it is subject to different rules. Since candidates can take the exam in German as well as in Italian, they are always graded by a local committee.

¹² The Social Security Office (Cassa Nazionale Forense) provides data on the number of lawyers in each local register.

¹³ The dataset includes over 500,000 exam participants. The average exam session involves about 1200 candidates, with approximately 33,000 candidates taking the bar exam annually. The total figure includes repeaters, although specific data on multiple attempts per candidate are not available. We observe the district where each candidate takes the exam, but not the district responsible for grading.

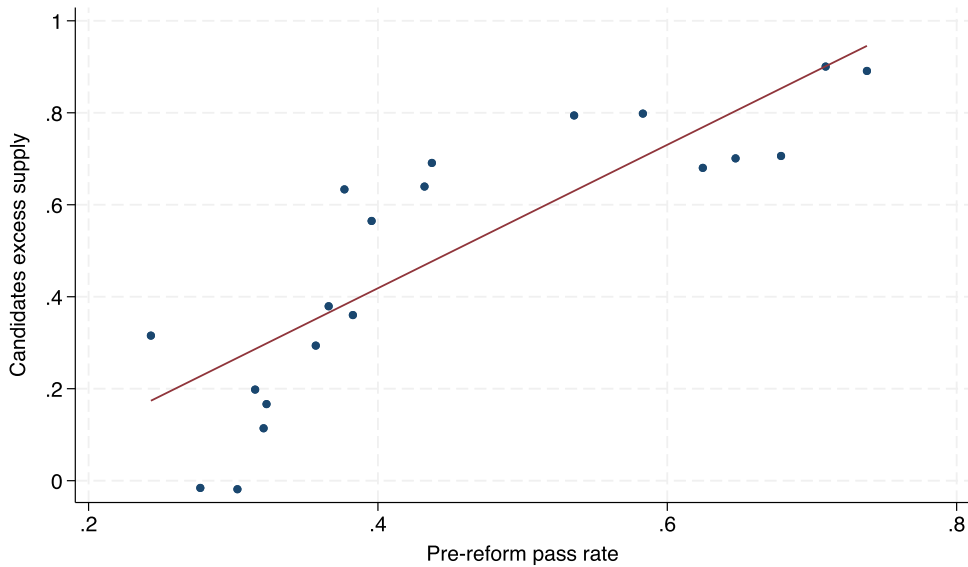


Fig. 1. Excess supply of candidate lawyers and exam pass rate.

Notes: The figure shows the binned scatterplot between the excess supply of candidate lawyers (see eq.(1)) and the pre-reform exam pass rate (see Table 2). Each bin represents the value at the 5th percentile intervals of the distribution.

$$Excess\ Supply_{it} = \frac{Passers_{it} - New\ registered\ lawyers_{it}}{Passers_{it}}, \tag{1}$$

and the pre-reform exam difficulty reported in Table 2. The indicator defined by (1) represents the share of individuals who passed the exam in a given district but did not register there as lawyers. A higher value should reflect a greater incidence of candidates taking the exam in more lenient districts with the intention of returning to register elsewhere-exploiting differences in grading standards rather than settling in the exam district.

To construct a measure of exam difficulty for each district, we estimate a structural model that disentangles candidate quality from grading standards using observed pass rates and the random assignment of grading districts after the reform. The model assumes that candidate performance on the written and oral exams follows a bivariate normal distribution, with district-specific grading thresholds determining whether a candidate passes. Using maximum likelihood, we estimate both the average quality of candidates in each district and the grading standards applied before and after the reform. We then use these estimates to compute the probability that a candidate of average national ability would fail the exam in each district. This probability serves as our district-level measure of exam difficulty. Full details of the estimation and identification strategy are provided in the Appendix (Section A.1).

Districts with higher pre-reform exam pass rates experienced a systematic oversupply of lawyer candidates throughout the entire period covered by our analysis. These districts also tended to show a larger gap between the number of exam passers and the number of new lawyers registering locally. This pattern suggests that more lenient districts may have attracted a disproportionate number of candidates who did not ultimately remain there, raising the possibility of strategic mobility. Table 2 also shows two clear patterns. First, the average exam difficulty increases after the reform, suggesting that candidates faced a higher likelihood of failing the exam under the new grading system. Second, there is a noticeable reduction in the variance of exam difficulty across districts, with previously lenient districts (such as Napoli, Bari, and Catanzaro) moving closer to the national average. These patterns are consistent with the reform’s intended effect of harmonizing grading standards across districts and limiting the advantage of choosing a more lenient exam location.

Further evidence of strategic mobility among aspiring lawyers is the correlation between exam takers and passers and exam difficulty. To quantify the scale of entry pressure across districts, we compute two ratios: passers/lawyers and takers/lawyers. In both cases, the denominator refers to the total number of lawyers already registered in the district in a given year. These metrics capture the inflow of exam candidates (takers) and those who pass (passers) relative to the existing size of the profession.¹⁴ We adopt this measure to illustrate how some bar associations were exposed to very large cohorts of potential new entrants relative to their existing membership base. Fig. 2 illustrates this relationship: the top panel shows the correlation between the number of exam takers per lawyer in a district and the pre-reform pass rate, while the bottom panel shows the same correlation for the number of exam passers. In some districts, the number of exam takers or passers in a single year exceeds 50 percent of the total number of registered lawyers. Without mobility across districts, such figures would be unrealistically high-particularly in districts with high pass rates,

¹⁴ While these ratios do not have an intuitive benchmark (unlike, for example, newly registered lawyers per retiree), values exceeding 50%-as observed in some southern districts-highlight the potential institutional and market impact of high pass rates.

Table 2
Ranking of districts by exam difficulty.

Rank	District	Exam difficulty	District	Exam difficulty
	(before the reform)	(before the reform)	(after the reform)	(after the reform)
1	Trieste	0.79	Trieste	0.78
2	Cagliari	0.77	Torino	0.76
3	Milano	0.76	Brescia	0.74
4	Trento	0.75	Trento	0.74
5	Brescia	0.73	Milano	0.73
6	Perugia	0.71	Firenze	0.73
7	Torino	0.70	Perugia	0.72
8	Bologna	0.69	Campobasso	0.70
9	Firenze	0.68	Potenza	0.69
10	Genova	0.67	Genova	0.69
11	Ancona	0.66	Venezia	0.68
12	Caltanissetta	0.65	Cagliari	0.68
13	Roma	0.62	Bologna	0.68
14	Catania	0.62	Ancona	0.67
15	Venezia	0.62	L'aquila	0.66
16	L'aquila	0.60	Caltanissetta	0.66
17	Lecce	0.55	Reggio Calabria	0.66
18	Palermo	0.53	Messina	0.66
19	Campobasso	0.48	Roma	0.63
20	Potenza	0.47	Napoli	0.63
21	Messina	0.47	Salerno	0.59
22	Salerno	0.34	Catania	0.59
23	Napoli	0.31	Bari	0.57
24	Reggio Calabria	0.31	Catanzaro	0.56
25	Bari	0.30	Lecce	0.55
26	Catanzaro	0.30	Palermo	0.54
Average		0.54		0.65

Notes: This table reports the ranking of districts by estimated exam difficulty. See Section A.3 in the Appendix for details on the estimation procedure.

which often coincide with economically developing regions of the country, where there is no obvious economic justification for a disproportionate inflow of legal professionals. Moreover, in the absence of mobility, these patterns would be inconsistent with the number of law school graduates and the observed growth of the legal profession. Additional evidence is provided in Fig. 3, which shows the correlation between the pre-reform pass rate (x-axis) and the change, before and after the reform, in the number of exam takers (top panel, y-axis) and exam passers (bottom panel, y-axis). Consistent with the hypothesis that candidates were strategically choosing more lenient districts before the reform, we observe that the most lenient districts experienced a clear decline in both exam takers and passers after the reform. This provides preliminary evidence that the reform effectively reduced grading disparities across districts.

4.2. Fail rates and strategic mobility

As anticipated, law graduates can choose where to do their two-year internship and take the bar exam. Although it would be natural for a lawyer to take the exam in the same district where they completed their internship, three main factors explain the presence of strategic mobility. First, as shown in Fig. 1, districts with historically high pass rates attract more exam takers (per licensed lawyer). Second, without mobility across districts, the number of exam takers and passers would be unrealistically high in many districts with high pass rates, which often coincide with economically developing regions of the country—an economic condition that cannot justify attracting more legal professionals. As illustrated in Fig. 2, the number of takers and passers in one year can exceed 50 percent of the total number of lawyers. Without mobility, these figures would not align with the number of law school graduates and the observed growth of the profession. Third, as shown in Figs. 3 and 4, and Tables 2, the number of takers and passers decreased in districts that had a high pre-reform pass rate, consistent with the effects of an increase in exam difficulty in those districts.

We explore the correlation between pass rates and the number of passers and takers in Table 3 (columns 1–4). The estimating equation is the following:

$$Y_{it} = \beta_0 + \beta_1 \text{Fail Rate}_{it} + X'_{it} \beta_2 + \varepsilon_{it} \quad (2)$$

where Y_{it} is an outcome and X_{it} a vector of fixed effects or other controls that differs across specifications (different columns of Table 3).

Districts with higher fail rates consistently exhibit fewer passers and takers, alongside a lower excess supply of lawyers. This relationship remains robust to the inclusion of district-level controls—GDP per capita, unemployment rate, and population density.

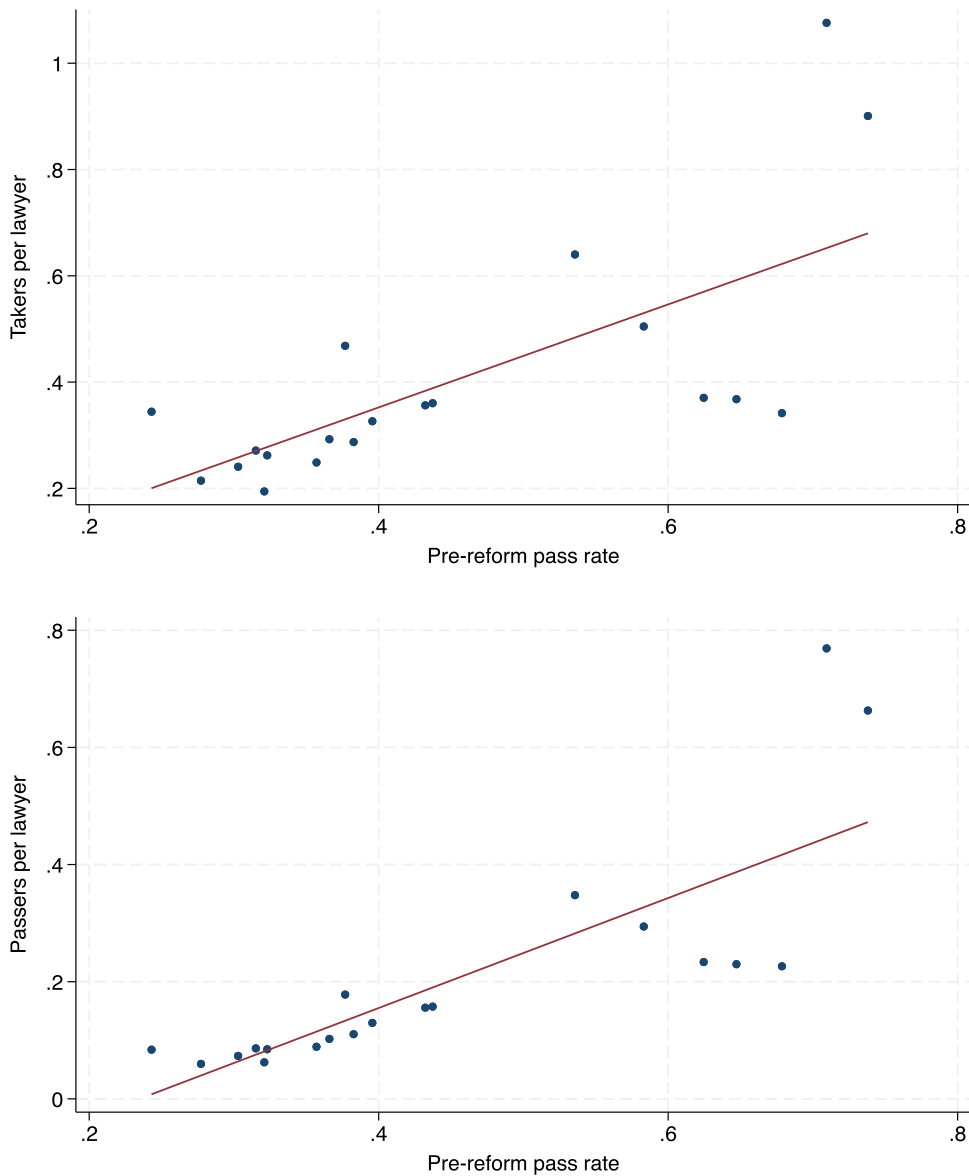


Fig. 2. Exam takers, passers, and exam difficulty.

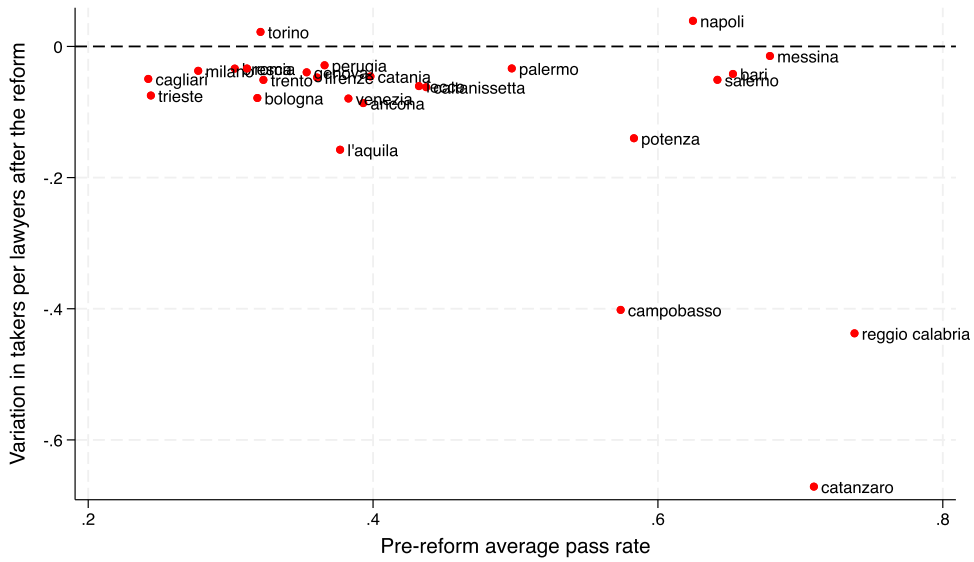
Notes: Binned scatterplots of exam takers and passers per lawyer vs. pre-reform pass rate. The top panel displays a binned scatterplot illustrating the relationship between the number of exam takers per lawyer and the pre-reform pass rate. The bottom panel presents a binned scatterplot showing the relationship between the number of exam passers per lawyer and the pre-reform pass rate. Each bin represents the value at the 5th percentile intervals of the distribution.

These results support the idea that more lenient districts attract more candidates and produce more passers, often beyond what local legal markets can absorb.

To measure this imbalance, we construct a district-level measure of excess supply, defined by Eq. (1). This number represents the proportion of passers who do not enter the legal profession in the same district.¹⁵ This metric captures the intensity of strategic exam-taking behavior-i.e., passing the exam in one district and registering elsewhere. As shown in columns 5-6, excess supply is strongly negatively correlated with the fail rate: it is highest in more lenient districts (predominantly in the South) and lowest or even negative in stricter districts (mostly in the North), where the number of registrations sometimes exceeds the number of passers.

¹⁵ Excess supply is computed considering that the written exam takes place in December and the entire process takes about one year. If the exams start in year t , most candidates will register in October-December of year $t + 1$ and January-February of year $t + 2$. Late registration can result from delays in the registration process or a deliberate choice by the candidate, as full annual membership fees are due upon registration. In computing excess supply, we consider the average number of passers among candidates who started the process 1 and 2 years earlier.

(a) Change in grading standards on exam takers, by district



(b) Changes in grading standards on exam passers, by district

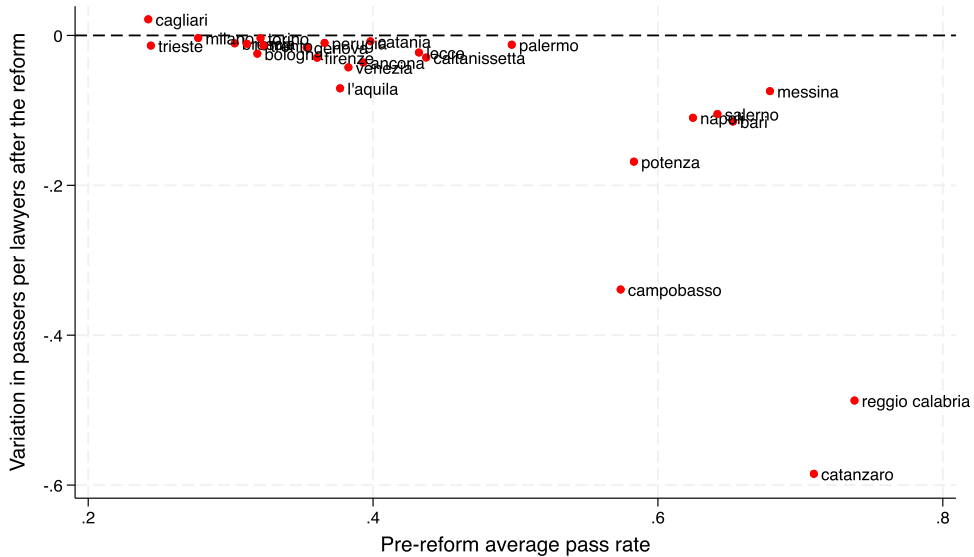
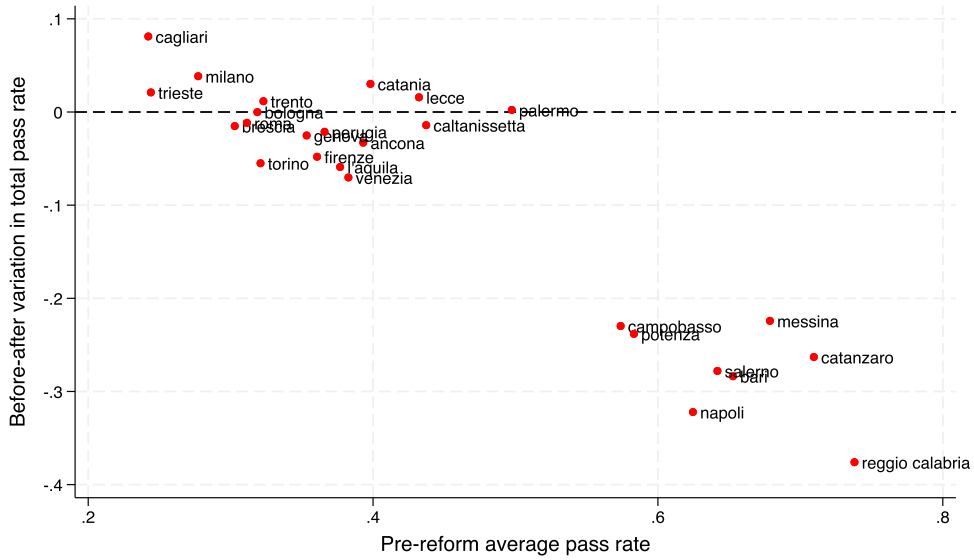


Fig. 3. The effect of the reform on grading standards.

Notes: The figure illustrates the changes in average grading standards before and after the 2003 reform. The top panel displays the correlation between the variation in the number of exam takers per lawyer and the pre-reform pass rate, by district. The bottom panel displays the correlation between the variation in the number of exam passers per lawyer and the pre-reform pass rate, by district.

Finally, columns 7-8 present results for average income among registered lawyers by district. Although the coefficients in Table 3 are imprecisely estimated, the sign is negative, suggesting that years with higher fail rates are associated with lower incomes within districts. While this appears at odds with the model’s mechanism, we caution against interpreting this as a causal relationship. Even after including district and year fixed effects, variation in grading stringency over time may reflect unobserved local conditions - such as changes in candidate pools or residual examiner behavior - which can confound the relationship between entry standards and

(a) Changes in grading standards



(b) Changes in grading standards for the oral exam

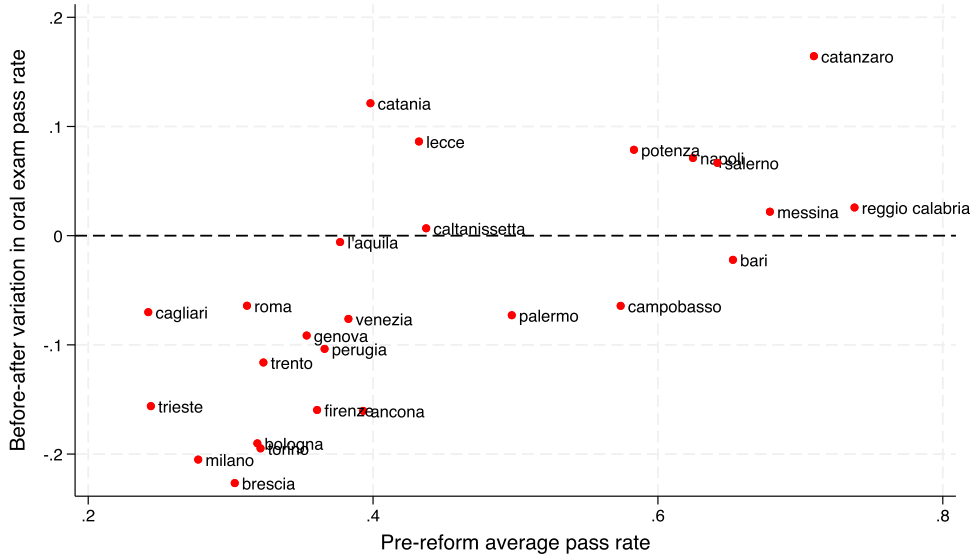


Fig. 4. Estimated change in grading standards for written and oral exams.

Notes: The figure shows the estimated changes in grading standards before and after the 2003 reform. The top panel illustrates the correlation between the variation in the overall pass rate before and after the reform and the average pre-reform pass rate, by district. The bottom panel presents the same correlation but focuses exclusively on the oral exam.

wages. For this reason, we place greater weight on the post-reform wage responses, which are more plausibly driven by exogenous institutional changes and better suited for testing the model’s predictions.

An alternative approach to examine these correlations involves using exam difficulty (as reported in Table 2) as a proxy for fail rates. Although related, fail rates and exam difficulty measure different aspects: fail rates are observed for each exam and are influenced by both the grading standards set by licensing boards and the ability distribution of candidates, whereas exam difficulty is calculated solely based on the estimated grading standards for a given quality distribution. Variability in exam difficulty is a model-

Table 3
Impact of exam difficulty on passers, takers, and excess supply.

VARIABLES	(1) Takers/ Lawyers	(2) Takers/ Lawyers	(3) Passers/ Lawyers	(4) Passers/ Lawyers	(5) Excess supply	(6) Excess supply	(7) Income	(8) Income
Fail Rate	-0.167*** (0.059)	-0.108** (0.051)	-0.505*** (0.049)	-0.446*** (0.039)	-0.589*** (0.065)	-0.608*** (0.069)	-631.792 (806.383)	-716.501 (853.666)
Constant	0.434*** (0.038)	0.262 (0.189)	0.451*** (0.032)	0.312** (0.137)	0.808*** (0.038)	0.538 (0.415)	40,509*** (491.9)	53,625*** (6,007.4)
Observations	390	390	390	390	364	364	312	312
Controls	no	yes	no	yes	no	yes	no	yes
District FE	yes	yes	yes	yes	yes	yes	yes	yes
Year FE	yes	yes	yes	yes	yes	yes	yes	yes

Notes: This table reports results from OLS regressions of various outcomes on the district-level fail rate. Columns 1-2 show the number of exam takers per lawyer; columns 3-4 show the number of passers per lawyer; columns 5-6 report the excess supply of lawyers, defined as the share of passers who do not register in the same district; and columns 7-8 report the average income of registered lawyers in the district. Control variables include real GDP per capita (2009 euros), unemployment rate, and population density. All regressions include district and year fixed effects. The sample includes 26 districts from 1998 to 2012. Income data are available from 2001 to 2012. Robust standard errors in parentheses.

based measure constructed solely from estimated grading thresholds, holding candidate quality constant. Variability in exam difficulty reflects underlying differences in grading standards across districts, which existed both before and after the reform. However, the 2003 reform-by randomizing the grading of the written exam-helps us better identify these differences by separating candidate quality from grading discretion. Since the results using exam difficulty closely align with those based on fail rates, we have omitted them from the main text to maintain focus.

Taken together, these results show that exam difficulty affects the mobility of exam candidates and licensed lawyers. Since mobility is costly, differences in exam difficulty may lead to significant inefficiency.¹⁶

To illustrate this point, we simulate a simple counterfactual scenario using the district-level estimates of exam difficulty (Table 2) and the regression results in Table 3, column 6. Specifically, we consider the 14 districts with below-average difficulty prior to the reform (defined here as those with difficulty scores below 0.65), and assume their exam difficulty increased by 10 percentage points. Conversely, we assume the remaining 12 districts reduce their difficulty by 12 percentage points. Based on the estimated coefficient on fail rate in column 6 (-0.608), these adjustments would lead to a reduction in excess supply of approximately 6.08 percentage points in the more lenient districts and a corresponding increase of 7.30 percentage points in the stricter districts.

Given that the average excess supply in the first group is 47% and close to zero in the second group (0.26%), this shift would substantially reduce geographic imbalances in registration behavior. It would also leave the national number of passers roughly unchanged, given the near symmetry of the adjustment in opposite directions and the coefficient on passers in column 3 of Table 3. These results suggest that even modest harmonization in grading standards across districts could affect the career paths of thousands of candidates-reducing distortions caused by strategic mobility while maintaining aggregate access to the profession.

Section A.2 in the Appendix shows that there are no systematic differences in candidate quality between the districts. Therefore, a policy change that enhances the quality of the marginal candidate passing the exam would lead to a higher average quality of passers and a less unfair exam. This is exactly what the 2003 reform aimed to achieve.

4.3. The effect of the 2003 grading reform

4.3.0.1. *Pass Rates.* We now analyze the impact of the 2003 reform on pass rates across different districts. Initial (reduced-form) evidence emerges from analyzing pass rates before and after the reform, as illustrated in Figs. 3 and 4. Fig. 3 depicts the correlation between the number of exam takers (top panel) and exam passers (bottom panel) per lawyer, and the pre-reform pass rate, by district. Fig. 4 shows instead the correlation between the change in pass rates observed after the reform (top panel: total pass rate; bottom panel: oral exam pass rate), and the pre-reform average pass rate by district. Both figures indicate that the reform significantly reduced overall pass rates in southern districts, while pass rates in northern districts remained relatively unchanged.¹⁷

Table 4 presents the estimated coefficients from difference-in-differences regressions examining the impact of the 2003 reform on various outcome variables. The estimating equation is the following:

$$Y_{it} = \beta_0 + \beta_1(\text{Pre-reform Pass Rate}_i \times \text{Post2003}_t) + X'_{it}\beta_2 + \gamma_i + \delta_t + \varepsilon_{it} \tag{3}$$

¹⁶ For example, there are costs associated with searching for a suitable mentor and then a new law firm after passing the exam. Additionally, moving across districts post-exam means losing the benefits of the network created during the training period.

¹⁷ Notably, southern districts experienced an increase in the pass rate among candidates who successfully passed the written exam, potentially as a compensatory measure. We explore this mechanism further in the following Section 5.

Table 4
Impact of the 2003/s reform (Exam and labour market outcomes).

	Exam outcomes						Labour-market outcomes			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Pass Rate	Pass Rate	Takers/Lawyers	Takers/Lawyers	Passers/Lawyers	Passers/Lawyers	Excess Supply	Excess Supply	Income	Income
Pre-reform Pass Rate × Post2003	-0.794*** (0.000)	-0.933*** (0.000)	-0.522* (0.065)	-0.529** (0.048)	-0.721*** (0.002)	-0.710*** (0.001)	-0.425*** (0.000)	-0.540*** (0.000)	340.784 (0.841)	251.152 (0.889)
Constant	0.601*** (0.000)	1.293*** (0.001)	0.472*** (0.000)	0.879** (0.032)	0.335*** (0.000)	0.846*** (0.005)	0.566*** (0.000)	0.617 (0.281)	40,001.7*** (0.000)	52,335*** (0.000)
Obs.	390	390	390	390	390	390	364	364	312	312
Controls	no	yes	no	yes	no	yes	no	yes	no	yes
District s.e.	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes

Notes: Table reports results from reduced-form regressions where the main regressor is the interaction between the continuous pre-reform pass rate and a post-2003 dummy. Outcomes are pass rate, takers/lawyers, passers/lawyers, excess supply, and income. Control variables include real GDP per capita (2009 euros), unemployment rate, and population density of the district where the exam is taken. Standard errors clustered by district.

where the primary independent variable is the interaction between a post-reform dummy, taking a value of 1 for years following the reform and 0 otherwise, and the pre-reform average pass rate, X_{it} is a vector of controls that varies across different specifications of (3) (i.e., different columns of Table 4. In odd columns, X_{it} is empty. In even columns, X_{it} includes controls that vary within district over time (i.e., real GDP per capita, unemployment rate, and population density). γ_i and δ_t are respectively district and time fixed effects. The interaction term captures the differential impact of the reform on districts' Pass Rates (columns 1–2), Takers per Lawyer (columns 3–4), Passers per Lawyer (columns 5–6), and Excess Supply of candidates (columns 7–8), contingent on their pre-reform pass rates. The results consistently show a significant reduction in these outcome variables, suggesting a substantial influence of the reform induced by the exogenous change in grading standards. Notably, all coefficients for the interaction term are negative and statistically significant, indicating a reduction in pass rates, the number of takers and passers per lawyer, and excess supply following the reform. These findings are robust to the inclusion of control variables – real GDP per capita (in 2009 euros), the unemployment rate, and population density. The post-reform changes are interpreted as causal effects of the reform, under the assumption that, absent the reform, trends in the outcome variables would have continued similarly across treated (high pre-reform pass rate) and control (low pre-reform pass rate) groups, an assumption that we verify in Fig. 6.

To dynamically analyze the effect of the reform, we refer to Fig. 5. Each dot represents the average observation for each year relative to the year of the reform, with error bars indicating the 95% confidence intervals. The x-axis shows the "Years Since the Reform," with year 0 marking the year the reform was implemented. The y-axis represents the difference between the average pass rates of treated districts (i.e., with pre-reform pass rates in the highest tertile) and control districts (i.e., with pre-reform pass rates in the lowest tertile), calculated with respect to the second tertile of the distribution. The dashed line at year 0 marks the timing of the reform.

The graph shows a significant shift in pass rate differences following the reform's implementation. The introduction of the reform led to a marked reduction in the difference in pass rates between the treated and control groups, implying a reduction in the pass rate of the treated group. This indicates that the reform successfully addressed the previously uneven grading standards, leading to a more uniform evaluation process across different districts.

Another perspective on the reform's effects is provided in Fig. 6. The left panel reports the evolution of pass rates for districts with high (red) and low (blue) pre-reform pass rates, estimated using a linear-trends specification over the period 1998-2012. The right panel presents the corresponding evolution of average lawyer income for the same groups of districts.

Before the reform, both groups display parallel trends in pass rates and incomes, suggesting the absence of systematically diverging pre-existing dynamics. This supports the validity of the parallel trends assumption (Borusyak et al., 2024) and indicates that post-reform differences are unlikely to be driven by differential underlying trends.

After the reform, pass rates in districts that were initially more lenient decline sharply relative to the control group.¹⁸ Over the same period, average incomes in these districts increase and gradually converge toward those of stricter districts. This pattern is consistent with the reform reducing excess entry in previously lenient markets, thereby easing local congestion and raising earnings. While income responses are more gradual and noisier than pass-rate adjustments, the joint evolution of quantities and earnings is in line with the mechanism emphasized in the paper, whereby changes in grading standards affect local labor market outcomes through entry.

4.3.0.2. Wages. To explore the effect of the reform on wages, we refer to the event study plot in Fig. 7. Each point represents the average difference in annual income between treated and control districts by year relative to the reform, with treated districts being those in the lowest tertile of pre-reform exam difficulty and control districts those in the highest tertile. The x-axis shows the number of years since the reform, and the y-axis indicates the income differential, in euros. The vertical dashed line marks the year of the

¹⁸ In the raw data, pass rates in southern (treated) districts converge toward those observed in northern (control) districts.

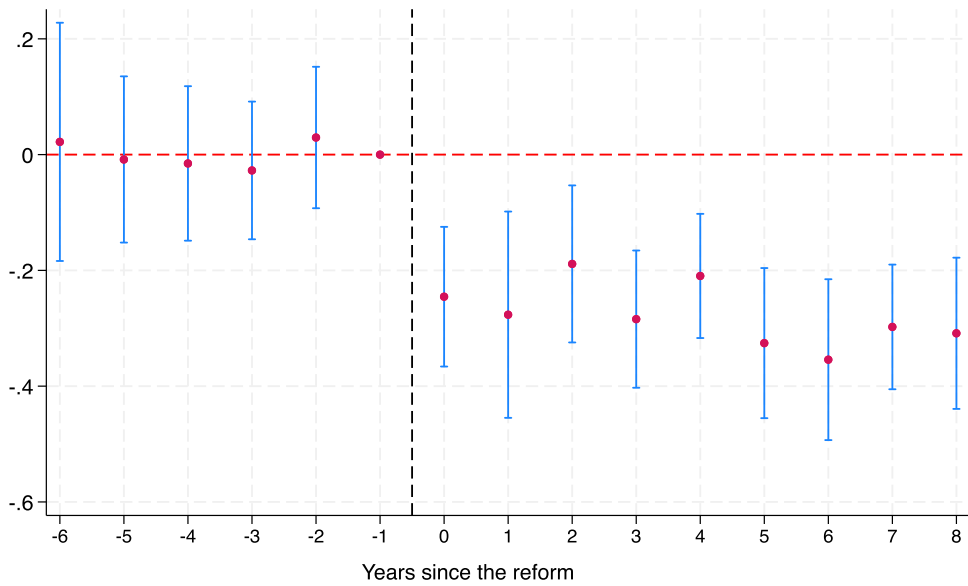


Fig. 5. Changes in pass rates after the reform.

Notes: This figure illustrates the impact of the reform on pass rate differences across districts. Each dot represents the estimated β_k coefficient of the equation $PassRate_{it} = \beta_0 + \sum_{k=-6}^{+8} \beta_k Year_{t_0+k} \times Treated_i + \delta X_{it} + \varepsilon_{it}$, that is the average pass rate for each year relative to the year of the reform, with error bars indicating the 95% confidence intervals. The x-axis shows the “Years Since the Reform,” with year 0 representing the year the reform was implemented. The y-axis represents the difference between the trends in pass rates between treated districts (with pre-reform pass rates in the top tertile) and control districts (with pre-reform pass rates in the lowest tertile). The term X_{it} includes district i characteristics at time t . The dashed line at year 0 marks the timing of the reform.

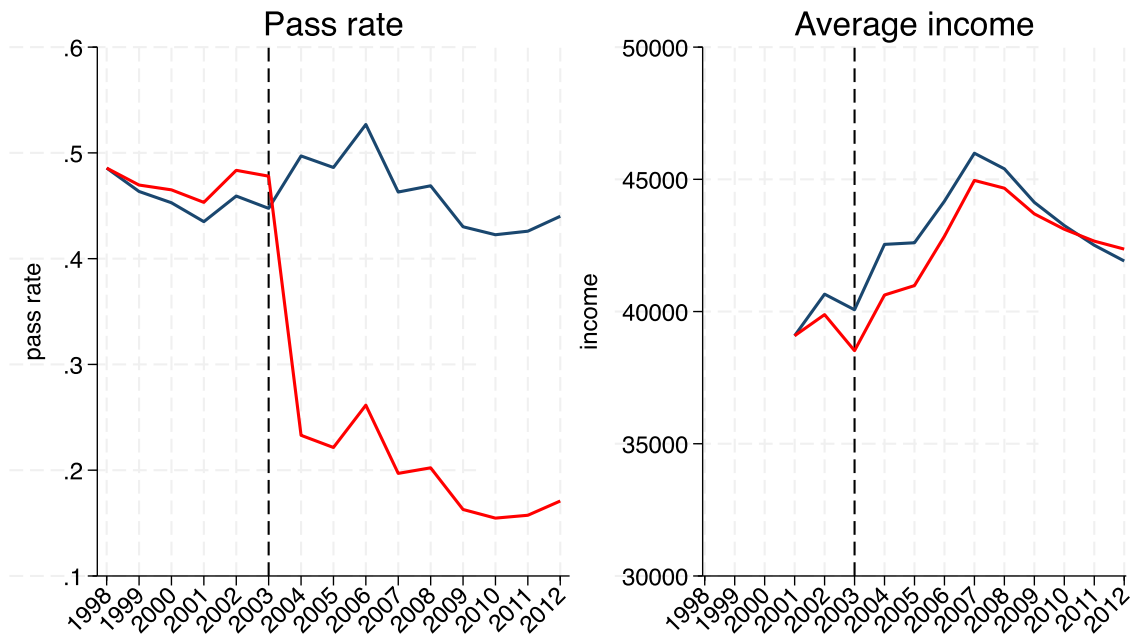


Fig. 6. Parallel trends.

Notes: This figure assesses the parallel-trends assumption over 1998–2012 by comparing districts in the top pre-reform tertile (red, “treated”) with those in the bottom tertile (blue, “control”). The x-axis reports years; the y-axis reports pass rates (left panel) and income/wages (right panel). The dashed vertical line marks the last pre-treatment year (one period before treatment begins). Each panel plots year-by-year fitted values from Stata’s linear-trends diagnostic underlying estat ptrends, which augments the DID specification by allowing the treated group to have a different linear time trend than the control group in the pre-treatment period (and, separately, in the post-treatment period) via $treated \times time$ interactions.

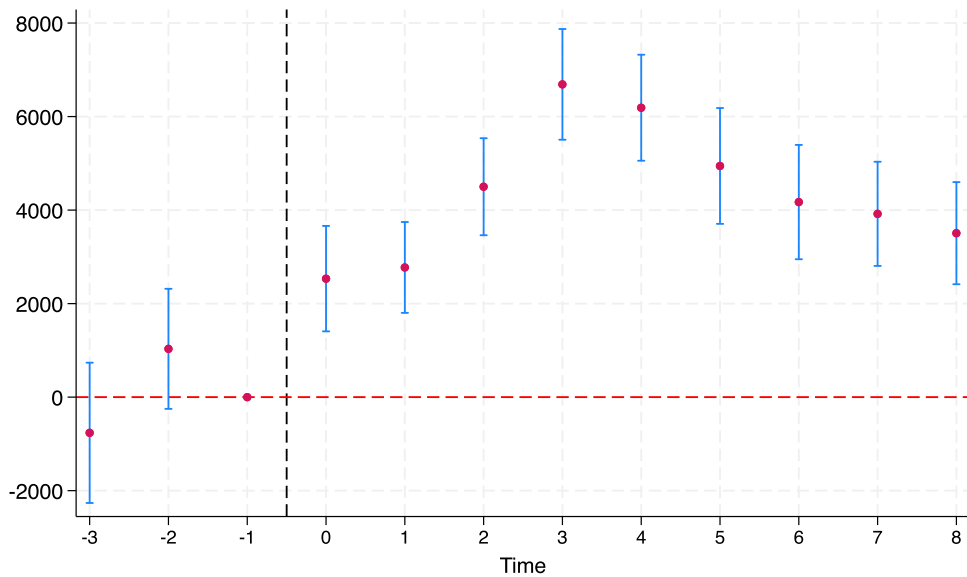


Fig. 7. Changes in income after the reform.

Notes: This figure illustrates the impact of the reform on income differences across districts. Each dot represents the estimated β_k coefficient of the equation $Income_{it} = \beta_0 + \sum_{k=-3}^{+8} \beta_k Year_{t_0+k} \times Treated_b + \delta X_{it} + \varepsilon_{it}$, that is the average observation for each year relative to the year of the reform, with error bars indicating the 95% confidence intervals. The x-axis shows the “Years Since the Reform,” with year 0 representing the year the reform was implemented. The y-axis represents the difference in average income between treated districts (with pre-reform exam difficulty in the lowest tertile) and control districts (with exam difficulty in the highest tertile). The term X_{it} includes district i characteristics at time t . The dashed line at year 0 marks the timing of the reform.

reform’s implementation. The figure shows a clear upward trend in income differences after the reform, suggesting that average earnings rose more in districts where grading standards were tightened.¹⁹ This pattern is consistent with the idea that reducing entry through stricter grading mitigated excess supply and improved labor market outcomes for newly registered lawyers in those districts.

The observed wage patterns help clarify the role of labor demand and mitigate concerns that our findings could be driven by labor supply differences. Wages are persistently higher in northern districts, reflecting stronger demand for legal services and higher entry barriers. After the reform, income tended to increase in the southern districts where pass rates declined most-consistent with a supply-side contraction that reduced entry and raised earnings through movement along the local labor demand curve. While supply-side stories (e.g., idiosyncratic preferences or compensating differentials) could explain some regional variation, they are unlikely to account for the sharp changes in income following a reform that altered grading incentives rather than mobility constraints. Moreover, if high pass rates in the south were simply intended to offset supply shortages, we would expect to see rising employment alongside higher wages post-reform, consistent with movement along a labor supply curve. Instead, we observe the opposite: average wages in the south increase while the number of new registrations declines. This pattern suggests movement along a labor demand curve rather than a supply shortage, reinforcing the view that demand-side mechanisms and strategic grading behavior are the primary drivers of the observed outcomes. Furthermore, most passers from lenient districts register elsewhere, and pre-reform southern wages remain low.

The observed post-reform increase of wages in the South, however, does not necessarily imply an improvement in the position of local bar associations. As membership dues are paid on a per-lawyer basis and are largely independent of individual earnings, a contraction in the number of registered members can reduce total revenues and institutional influence even when average wages rise. This helps explain why licensing boards may view reductions in entry as costly despite higher earnings for incumbent lawyers. More broadly, it motivates modeling the objective of bar associations as depending on both wages and employment, rather than on wages alone.

These patterns support our model’s central mechanism: bar associations respond to local demand by strategically managing entry, and the reform restructured these incentives by standardizing grading. Importantly, the model does not require wage increases in high-demand districts for strategic interaction to arise; its main implication concerns the elimination of inefficient entry and mobility incentives.

¹⁹ One possible concern is that this wage increase could be driven by compositional changes – i.e., higher-ability candidates entering certain districts post-reform. However, our selection model (see Appendix A.1) suggests limited evidence of systematic sorting based on grading standards, and the estimated selection terms (ϕ_1 and ϕ_2) are statistically insignificant. This supports the interpretation that the wage increase is primarily driven by tighter entry restrictions rather than changes in candidate quality.

5. The mechanism: Why do grading standards differ?

In this section, we investigate the mechanisms behind our results. We examine a model that captures the key features of this market: (i) local exams, where licensing boards determine the severity of grading standards; and (ii) labor mobility, which allows lawyers to freely move across districts after admission. The model demonstrates that differences in grading standards, inefficient mobility, and unfair treatment naturally emerge in equilibrium as a result of the interactions among licensing boards.

5.1. The model

Consider two districts denoted by $i \in \{1, 2\}$.²⁰ Each market is characterized by a demand for licensed workers.²¹ District 1 is the low-demand market and District 2 is the high-demand market. For ease of interpretation, District 1 can be thought of as a southern district, with lower demand for legal services and more lenient grading, while District 2 represents a northern district, typically wealthier and more selective in its entry standards. There is a large number of potential entrants in each market who need to take an entry examination. Their quality is described by a distribution of types F_i .²²

The objective of licensing boards is to exploit their market power to increase the total surplus accruing to their members, which may include both higher wages and higher employment levels (i.e., the wage bill), relative to the competitive benchmark. The more rigid the demand function within a district, the more licensing boards will be able to exploit their market power and increase the salary of their members. Although these features are not explicitly captured by the model, this strategy reflects licensing boards' dual incentives: protecting the interests of incumbent lawyers (e.g., through restricted entry) while ensuring adequate service provision and financial sustainability through a sufficient number of qualified entrants. Licensing boards regulate entry by choosing the grading standards or, equivalently the pass rate n_i , $0 \leq \min_i \leq n_i \leq \max_i \leq 1$, where \min_i and \max_i capture the possibility of institutional constraints on the set of feasible pass rates in each district.²³

Each district i has its own labor demand D_i , representing the negative relation between the desired wage \bar{w}_i , and the desired pass rate \bar{n}_i . Licensing boards choose n_i to maximize $\Pi_i(\bar{n}_i)$, a continuous and globally concave function with maximum in \bar{n}_i^* .²⁴ For example, consider the case in which the objective function is producers' surplus, or, more realistically, a weighted sum of producers' surplus and total welfare.²⁵ Independently of the weight of producers' surplus, $w_i(\bar{n}_i^*)$ will be higher in the market with more rigid demand, which is realistically the one with richer consumers, or a higher prevalence of business customers.²⁶

Fig. 8 shows the labor demands, the desired wage \bar{w}_i^* , and entry \bar{n}_i^* without mobility. If there is no mobility of workers between markets, each board will set the grading standard such that $n_i = \bar{n}_i^*$. If there is mobility, instead, the admitted workers will move towards the district with higher wage until wages are equalized ($w_1(\bar{n}_1) = w_2(\bar{n}_2) = w^*$ in Fig. 8). This wage is too high from the point of view of the poor district and too low from the point of view of the rich district. Therefore, the low-demand district has an incentive to increase entry and the high-demand to decrease it, thereby distorting entry standards.

Hence, the number of workers in each market is an increasing function of the total number of admitted workers, $\bar{n}_i = f_i(n_i + n_j)$. This generates strategic interaction between licensing boards, as pass rates become strategic substitutes. The optimal pass rate of district i is a linear function of n_j ,

$$n_i = f_i^{-1}(\bar{n}_i^*) - n_j, \tag{4}$$

unless it is constrained by the minimum or maximum possible pass rate.²⁷ Fig. 9 describes the best reply functions. The licensing board in District 1, with lower desired wage $w_1(\bar{n}_1^*)$, will have a higher best reply.²⁸

This scenario is analogous to a Cournot competition, where each licensing board chooses the optimal pass rate level. In the unique Nash equilibrium, the pass rate in the high-demand district equals \min_2 (a corner solution), while the pass rate in the low-demand

²⁰ The results of the model extend to a model with N districts (discussed in the Appendix).

²¹ This is the only assumption required to drive the results.

²² For simplicity, we assume that F_i is exogenous (candidates cannot choose the district in which they want to take the exam). Exam candidates wish to enter the regulated market because regulation restricts supply and increases wages relative to the outside option salary in a competitive market (normalized to zero).

²³ We assume that there is a single exam and a unidimensional distribution of types, but it is easy to account for the existence of written and oral components of the exam.

²⁴ The structure of the model is similar to an oligopoly game à la Cournot. However, the objective functions of licensing boards depend on the number of workers \bar{n}_i effectively working in each market in equilibrium, not directly on the number of workers admitted in each district (i.e., the pass rate n_i). Hence, the nature of the incentives (and the resulting equilibrium) is different from that of a Cournot model.

²⁵ See Pagliero (2011) for a detailed discussion of this point and an empirical analysis of the objective function of licensing boards.

²⁶ If the demand function is linear ($w = a - bn$) and k denotes the weight of producers' surplus, then $\Pi(n_i) = k[(a - bn - w_0)n] + (1 - k)[(2a - 2w_0 - bn)n/2]$, with $0 \leq k \leq 1$ and where w_0 denotes the competitive lawyer wage in the absence of regulation. Hence, $w^* = a - \frac{(a-w_0)}{1+k}$, which is increasing in a . Markets with higher demand have a higher w^* . In general, with non-linear demand functions, $\Pi(n_i) = k[(w(n) - w_0)n] + (1 - k)[\int_0^n w(x) - w_0 dx]$, and the relative markup induced by regulation is inversely proportional to the demand elasticity, $\frac{w^* - w_0}{w^*} = \frac{k}{\epsilon_{n,w}}$. This is the equivalent of the Lerner Index in the theory of monopoly pricing.

²⁷ Note that the best reply is linear even if the demand functions are not linear.

²⁸ The inequality $w_1(\bar{n}_1^*) < w_2(\bar{n}_2^*)$ implies that the intercept of the best reply function for district 1 is larger, $f_1^{-1}(\bar{n}_1^*) > f_2^{-1}(\bar{n}_2^*)$. Given that the slope is equal to 1, the best reply of district 1 must then be higher.

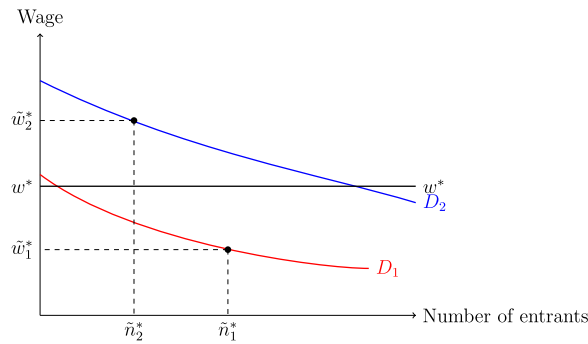


Fig. 8. The market of licensing boards.

Notes: This figure shows the labor demands, the desired wage \bar{w}_i^* , and entry \bar{n}_i^* without mobility. If there is mobility wages are equalized at w^* . In equilibrium, there is too little entry from the point of view of the high-demand district, which will have an incentive to increase the pass rate. The opposite is true for the low-demand district.

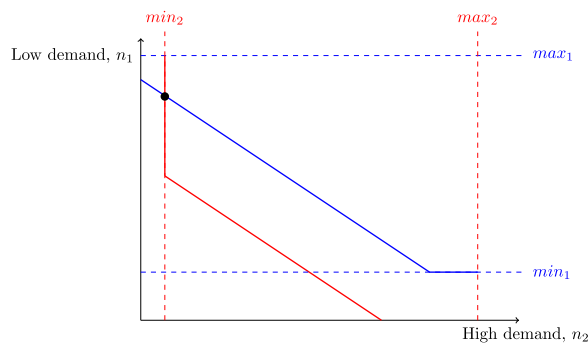


Fig. 9. Equilibrium admissions.

Notes: Figure shows an equilibrium in which the high-demand district is constrained to its minimum possible pass rate.

district is so high that it attracts a substantial number of workers, achieving the preferred wage. Therefore, this strategic interaction creates heterogeneity in pass rates across districts, which are negatively correlated with demand.²⁹

In equilibrium, differences in pass rates suggest that the exam is unfair, treating identical individuals differently. Therefore, strategic interaction can explain the persistent heterogeneity and unfair nature of entry standards documented in Section 4.2. Moreover, in an equilibrium where mobility is allowed, some professionals admitted in the low-demand market move to the high-demand market. Hence, the model generates an excess supply of lawyers in the low-demand district and mobility across districts.

5.1.0.1. *Efficiency.* In our model, entry restrictions are inefficient. The first best would be to abolish the licensing exams.³⁰ Mobility of workers (and therefore competition among licensing boards) partially solves this problem and improves efficiency relative to a situation in which mobility is not allowed, since it increases entry at the aggregate level.³¹ However, the model shows that this competition comes at the cost of a very unfair exam. Moreover, the welfare gains from increased entry should be weighed against the costs of the (inefficient) additional mobility generated by competition, which can be substantial (as shown in Section 4.2).³²

5.2. A policy reform and additional implications

Consider now a policy that reduces the maximum pass rate, which is binding only on the low-demand district (Fig. 10). This is an interesting thought experiment, since the 2003 reform had exactly this effect in the Italian market for lawyers. As discussed in

²⁹ The board in district 1 effectively controls the market salary, by admitting more workers than necessary to achieve the preferred wage. Depending on the level of max_1 , an equilibrium can arise where the low-demand district is constrained by max_1 and the high-demand district by min_2 (see Fig. 10).

³⁰ Pagliero (2011) describes and estimates a model of licensing with asymmetric information on the quality of the service provided in which a licensing exam can potentially increase social welfare. The results support the capture theory view of licensing.

³¹ In the stylized model, we assume a single national wage and perfect labor mobility to simplify the analysis and focus on strategic interactions among licensing boards. In practice, mobility is imperfect, and wages vary across regions due to both demand-side differences and mobility frictions. These frictions partially limit candidate responses to grading standards, but do not eliminate the strategic incentives faced by local boards.

³² Therefore, the case for abolishing the entry exam remains strong, even with mobility and competition. Minimum quality standards in the profession could alternatively be achieved by setting minimum standards for law schools, thus limiting incentives to restrict entry.

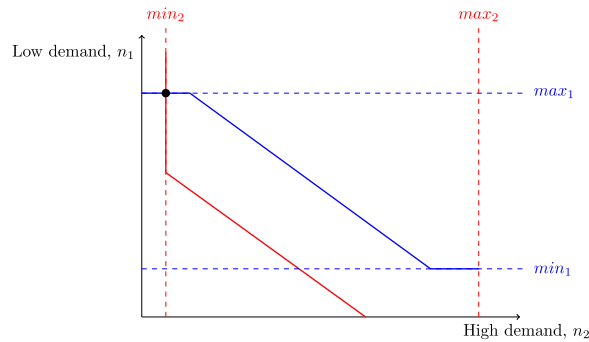


Fig. 10. Equilibrium admissions with two binding constraints.

Notes: Figure displays an equilibrium in which the high-demand district is constrained by its minimum possible pass rate and the low-demand district by its maximum pass rate.

Section 4.3, the randomization of the grading district made the written exam substantially more difficult in districts with pre-reform high pass rates, specifically districts in the south, as these districts began to be matched with districts in the north. Since passing the written exam is a necessary condition for taking the oral exam, the reform implicitly placed a ceiling on the overall pass rate in southern districts.

In our model, this policy implies reduced variability in pass rates and less unfair exams, explaining the observed reduction in unfair treatment documented in **Section 4.3**. Moreover, the model predicts that the high-demand district benefits from the lower pass rate in the low-demand district, since it limits entry into the profession and increases equilibrium wages. The opposite effect is observed in the low-demand district. This equilibrium adjustment implies that the reform should be predominantly supported by the high-demand districts. This aligns with the fact that the reform was proposed and supported by the Northern League, a party that openly represents the interests of the north, where most high-demand districts are located.³³

A central question raised by the reform is how districts would have adjusted their grading standards in the absence of strategic interaction. In a non-strategic world, where districts do not internalize how their grading affects candidate mobility or the relative attractiveness of their jurisdiction, we would expect them to maintain their pre-reform grading practices. This is especially likely if adjusting standards entails administrative or political costs, or if preferences over grading are purely institutional and independent of candidate flows. In that scenario, high-pass-rate (i.e., low-standard) districts would continue to apply lenient criteria even when grading exams from elsewhere, and low-pass-rate (i.e., high-standard) districts would continue to grade strictly. This static behavior would imply little to no adjustment in either written or oral exam standards following the reform.

However, this is not what we observe. Following the reform, grading patterns change markedly. Districts that had previously maintained high pass rates - typically associated with lenient grading - tightened their written grading thresholds when they began evaluating candidates from other districts. At the same time, they relaxed the standards on the oral exam, which remained under local control. In contrast, districts that previously had strict standards further increased the selectivity of their oral exams. These asymmetric responses are not consistent with the non-strategic counterfactual but are in line with what one would expect if districts were reacting strategically to institutional changes that altered their ability to control access.

Our stylized model captures this dynamic. Although the model describes the incentives of licensing boards in terms of overall pass rates, districts can achieve any given pass rate by selecting different combinations of grading standards across the two components of the exam. Consider a reform that reduces the written exam pass rate for low-demand districts (as was the case in 2003). These districts still benefit from increasing their overall pass rate and will therefore attempt to mitigate the loss of control by relaxing their oral exam grading standards. This aligns with **Fig. 4**, which shows a drop in oral grading standards for low-demand districts. Conversely, the reform increases the written exam pass rate in high-demand districts, reducing their ability to screen candidates at that stage. These districts compensate by tightening the oral exam, as shown in panel (b) of **Fig. 4**, where high-demand districts significantly increase their oral grading standards.

Importantly, in the absence of strategic interaction, we would not expect these adjustments to occur. The fact that grading standards shift in the post-reform period, despite the associated institutional and reputational costs, suggests that licensing boards are responding to the policies of other districts. Our model replicates the observed equilibrium behavior only when it allows districts to react strategically to each other.

5.2.0.1. Complementary reasons for heterogeneous standards. The media and the press repeatedly suggested that the bar exam was unfair to aspiring lawyers, advancing two main explanations. First, based on anecdotal evidence (and perhaps some prejudice) about corruption in the south, it was suggested that this was the reason for the lower standards there. Second, it was proposed that bar

³³ Mr. Castelli, the proposer of the new legislation and former Minister of Justice, was a prominent figure in the Northern League.

associations in the south indirectly benefited from lower standards, as they attracted a large number of exam candidates, thereby increasing the demand for hotels, restaurants, and transportation services during the examination period.³⁴

While these factors may play a role, they are ad hoc in nature, assuming rather than explaining a preference for lower standards in the south. Nevertheless, they can be modeled as additional components of the objective function of the licensing boards, generating the difference in preferred wage $w_i(\tilde{n}_i^*)$ between districts.

An important question is whether the observed heterogeneity in grading standards and exam outcomes can be explained solely by differences in local demand. While regional demand conditions—such as stronger markets for legal services in the north—clearly contribute to variation in entry barriers, our findings suggest that this explanation alone is insufficient. The evidence points to strategic interaction among licensing boards as a key mechanism. Following the reform, southern districts, which had previously applied more lenient standards, raised their written exam thresholds once they lost control over grading, while simultaneously lowering their oral thresholds. Northern districts, by contrast, kept their written standards relatively stable but increased the selectivity of their oral exams. This pattern suggests strategic substitution across exam components aimed at maintaining desired pass rates despite institutional changes. Moreover, after the reform, pass rates converged and candidate mobility declined, consistent with an environment in which districts should respond to one another's behavior.

Although litigation rates are higher in the South (Buonanno and Galizzi, 2014), suggesting a greater volume of legal disputes, this does not necessarily imply stronger economic demand for legal services. Consistent with our model, the evidence of lower wages in southern districts indicates that effective demand remained weaker, reinforcing the incentives for southern bar associations to maintain more lenient entry standards before the reform.

These dynamics are also reflected in our structural model, which can match the observed patterns when licensing boards are allowed to (and should) react to grading policies in other districts. Taken together, this provides robust evidence that decentralized licensing systems can generate interdependent behavior across jurisdictions, with implications for both efficiency and fairness in access to the profession.

6. Conclusion

This paper demonstrates that the combination of local licensing regulations and labor mobility across markets results in extreme heterogeneity in admission outcomes, unfair admission procedures, and inefficient mobility of workers. We provide evidence that strategic interaction among licensing boards may explain why these characteristics of regulated markets can lead to such outcomes.

While the reform we study increased average exam difficulty, it also reduced disparities in grading standards and significantly curtailed strategic mobility. This suggests that centralized or randomized grading mechanisms—rather than restrictions on candidate mobility—may be more effective in improving both fairness and allocative efficiency. We refer to “unfairness” in a procedural sense: the unequal treatment of similarly qualified candidates depending on where they take the exam. Such inequities can reduce total welfare when they distort entry, discourage qualified candidates, or induce strategic migration unrelated to market demand.

From a policy perspective, this analysis suggests that harmonizing requirements and achieving mutual recognition of professional licensing qualifications may be challenging due to the differing incentives of local professional associations to set distinct entry standards. However, reforms that align grading incentives across jurisdictions, without limiting candidate choice, may help resolve such distortions. While our findings highlight both the distortions of decentralized grading and the benefits of centralized standardization, we do not attempt a full welfare evaluation of the reform. Assessing the net impact on efficiency and equity would require quantifying hard-to-measure gains, such as fairness and professional quality, relative to costs like reduced local autonomy and employment. A full assessment of these trade-offs falls beyond the scope of this paper.

Our findings shed light on a relatively understudied type of regulatory competition. Given the significant role of labor mobility across countries and the large proportion of licensed workers in modern economies, understanding the impact of this kind of regulatory interaction is crucial. The insights gained from studying the regulation of bar exams can inform approaches to standardizing entry requirements across other professions, enhancing both fairness and efficiency in professional licensure at a broader scale.

Conflict of interest and Acknowledgements

The authors have no conflicting interests to declare. All authors equally contributed to conceptualization, methodology, data analysis, writing, and validation of this manuscript.

CRedit authorship contribution statement

Paolo Buonanno: Writing – review & editing, Writing – original draft, Supervision, Methodology, Investigation, Formal analysis, Data curation, Conceptualization; **Mario Pagliero:** Writing – review & editing, Writing – original draft, Supervision, Methodology, Investigation, Formal analysis, Data curation, Conceptualization; **Marcello Puca:** Writing – review & editing, Methodology, Investigation.

³⁴ It is unlikely that examiners directly benefit from lower standards and more exam candidates. In fact, exam fees are paid to the central government and do not vary across districts. Moreover, examiners are not compensated based on the number of exams graded.

Data availability

Data will be made available on request.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Appendix A. Heterogeneous and unfair grading standards

A.1. Estimation of grading standards and quality of candidates

Section 4.3 shows that grading standards for the written exam vary significantly across districts following the reform. However, it does not address potential differences in candidate ability across districts, nor does it discuss variations in grading standards for the oral exam during the pre-reform period. In this section, we introduce an econometric model that correlates grading standards, candidate quality, and exam outcomes. Within this framework, data on pass rates and the randomization of the grading district distinctly identify grading standards (for both the written and oral exams) and candidate quality. Under certain assumptions, it is also possible to estimate grading standards and candidate ability prior to the reform, enabling us to examine changes in the behavior of licensing boards as a result of the reform.

We start by modeling how differences in (unobserved) candidates' ability across districts generate differences in (observed) exam outcomes. We assume that a candidate's quality is assessed by licensing boards using two performance measures, q_w and q_r , corresponding to the written and oral components of the exam. In each examination, the distribution of candidate performance is

$$\begin{pmatrix} q_w \\ q_r \end{pmatrix} = m_i + \begin{pmatrix} e_w \\ e_r \end{pmatrix}; \tag{A.1}$$

with

$$\begin{pmatrix} e_w \\ e_r \end{pmatrix} \sim N \left(\begin{bmatrix} 0 \\ 0 \end{bmatrix}, \begin{bmatrix} 1 & \rho \\ \rho & 1 \end{bmatrix} \right) \tag{A.2}$$

where parameter m_i denotes the mean quality of candidates in district $i \in \{1, \dots, I\}$ and N denotes the bivariate normal distribution. Parameter ρ allows for correlation between the two performance measures. In the period before the reform, a candidate passes the written component if $q_w > w_i$ and the overall exam if $q_w > w_i$ and $q_r > r_i$, where w_i and r_i are the grading standards (chosen by licensing board i) in the written and oral exams, respectively. Fig. A.1 describes the exam outcomes depending on exam performance. Area A (dark gray) corresponds to candidates failing the written exam, Area B (light gray) corresponds to candidates passing the written exam but failing the oral, and Area C (white) corresponds to candidates passing both components of the exam.

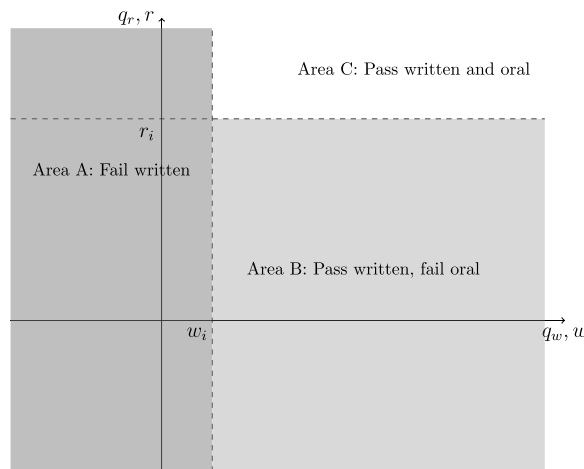


Fig. A.1. Empirical model of the admission process.

Notes: Figure shows exam outcomes as a function of grading standards for a population of exam candidates with a performance distribution described by (A.1).

In the period after the reform, the written exam in district i is graded by district j , so that a candidate passes the written exam if $q_w > w'_j$ and the overall exam if $q_w > w'_j$ and $q_r > r'_i$, where w'_j and r'_i denote the grading standards after the reform. If it is not

possible to partition districts into subsets that grade exams independently (as is the case in our data), then the parameters m_i , w_i , w'_i , r_i , r'_i , and ρ are identified (after normalizing the mean quality of candidates in one district, $m_1 = 0$).³⁵

The parameters are identified jointly by pass rates, randomization of the grading district, and the functional form of the performance distribution. The intuition is that, given the normalization $m_1 = 0$, pass rate data identify the grading standards in district 1. Then, the repeated randomization of the grading district sequentially identifies the grading standards and the mean quality in the other districts. The remaining parameter ρ is identified by the functional form assumption.

The model allows for different grading standards in each district before and after the reform. In general, we expect w_i to be different from w'_i , as a result of the different environments in which licensing boards operate.³⁶ Still, the model places some restrictions on their behavior. In particular, the parameters w_i and r_i (w'_i and r'_i) are assumed to be constant during the years before (after) the reform. Hence, the model captures the average licensing board behavior before and after the reform, but not the transition process or the year-to-year variability in exam difficulty.³⁷

A potentially more restrictive assumption is that the quality m_i is time invariant. It is possible that the reform affected the mean quality of candidates in each district. Although mobility of bar exam candidates is limited (due to the rules applying to the two-year apprenticeship period), the same pool of exam candidates may sort differently across districts as a consequence of the new standards w'_i and r'_i . If we allowed for arbitrary values of quality before (m_i) and after (m'_i) the reform, then only m'_i , w'_i , r'_i , and ρ would be identified, since there is no randomization in the pre-reform period. Most of the empirical analysis would still be possible in this case (and our results would not change), but we would not be able to assess the impact of the reform.

However, it is possible to allow for the endogeneity of candidates' quality. Consider the case in which the quality of candidates is a linear function of grading standards,

$$m_i = \mu_i + \varphi_1 r_i + \varphi_2 w_i, \tag{A.3}$$

before the reform, and

$$m'_i = \mu_i + \varphi_1 r'_i + \varphi_2 E(w'_{-i}), \tag{A.4}$$

after the reform, where $E(w'_{-i})$ denotes the expected grading standard in the written exam for candidates taking the exam in district i .³⁸ If the mean and variance of the quality distribution of bar exam candidates at the national level is stable, then the parameters w_i , r_i , w'_i , r'_i , ρ , and $(\mu_i, \varphi_1, \varphi_2)$ are identified.

We estimate the parameters of the model by maximum likelihood for two empirical specifications.³⁹ The first assumes that quality is constant, $m_i = \mu_i$. The second assumes that the mean quality of candidates before and after the reform is given by (A.3) and (A.4) respectively. Since the results do not vary depending on the specification used, we will report the results of the second, more general, specification.⁴⁰

A.2. Heterogeneity of grading standards

Table A.1 reports the estimation results. The correlation in candidate ability on the written and oral components of the bar exam is positive and precisely estimated ($\rho = 0.438$). φ_1 and φ_2 in Eq. (A.4) are positive, but small in magnitude and not significantly different from zero. Although not reported for brevity, estimation results obtained before and after the reform indicate that the estimated grading standard w , based on the effect on the number of takers per lawyer and passers per lawyer, was significantly higher in northern districts compared to southern districts. This correlation decreases after the reform, as southern candidates face higher standards, while northern districts do not substantially alter their grading standards.

³⁵ The proof is reported in Appendix A.4. We observe the outcomes of the randomization for many years. This information can be summarized by a matrix that links the grading district to the district in which the written exam took place. This matrix describes a connected graph in which it is not possible to partition districts into subsets that grade exams independently.

³⁶ The reform may affect licensing boards incentives. This is because w_i is used to grade written exams coming from district i , w'_i is used to grade written exams from another district randomly matched with i . Similarly, we expect r_i to be different from r'_i . Before the reform the grading standard r_i is set in conjunction with w_i , while after the reform the pass rate of the written exam is determined by the grading standard of another district.

³⁷ The assumption that r'_i is fixed within the period after the reform implies that district i cannot react to the year-to-year variability in the identity of the grading district j . While this assumption is somewhat restrictive, procedures for evaluating oral exams and selecting examiners cannot be easily changed on a yearly basis. Moreover, while the reform was a major change that could change the long-run flow of new lawyers in the market, the random year-to-year variability in the grading standards w used by other districts is unlikely to affect the long-run flow of new entrants into the profession.

³⁸ Written exams are graded by some random district other than i . Candidates do not know the grading district or the group assignment before taking the exam.

³⁹ The contribution to the likelihood of one observation in our data set (one examination in one specific district) is

$$L = Pr(q_{w_i} < w, m_i)^{n_1} Pr(q_{w_i} > w, q_r < r, m_i)^{n_2} Pr(q_{w_i} > w, q_r > r, m_i)^{n_3} \tag{A.5}$$

where n_1 is the number of candidates failing the written exam, n_2 the number of candidates passing the written exam but failing the oral, and n_3 is the number of candidates passing both components.

⁴⁰ Other specifications are possible, but the small differences between the results obtained using these two specifications suggest that changes in the functional form used to control for the possible endogeneity of quality do not lead to significant changes in the results.

Table A.1
Estimated grading standards and mean quality of candidates in each district.

Panel 1										
	coeff.	s.e.								
ρ	0.438	0.016								
φ_1	0.017	0.204								
φ_2	0.037	0.056								
Panel 2										
City	w	s.e.(w)	r	s.e.(r)	w'	s.e.(w')	r'	s.e.(r')	m	m'
Ancona	0.224	0.185	-1.142	0.189	0.225	0.066	-0.381	0.067	0	-0.002
Bari	-0.688	0.128	-2.098	0.132	-0.149	0.065	-1.484	0.072	-0.268	-0.233
Bologna	0.280	0.166	-0.969	0.167	0.218	0.065	-0.337	0.067	-0.121	-0.126
Brescia	0.388	0.190	-0.893	0.194	0.595	0.065	-0.149	0.069	-0.066	-0.076
Cagliari	0.566	0.140	-1.157	0.152	0.414	0.065	-0.786	0.070	-0.105	-0.122
Caltanissetta	0.183	0.084	-1.014	0.112	0.318	0.072	-1.030	0.096	0.100	0.097
Campobasso	-0.322	0.111	-1.110	0.115	0.405	0.069	-0.735	0.080	-0.069	-0.051
Catania	-0.112	0.041	-0.470	0.050	-0.068	0.065	-0.991	0.070	-0.083	-0.074
Catanzaro	-1.192	0.133	-0.910	0.134	-0.715	0.065	-1.796	0.079	-0.100	-0.049
Firenze	-0.059	0.111	-0.210	0.111	0.148	0.065	0.137	0.066	-0.045	-0.037
Genova	0.217	0.137	-0.983	0.142	0.407	0.065	-0.538	0.070	-0.087	-0.090
L'aquila	0.076	0.089	-1.301	0.098	0.064	0.065	-1.137	0.073	-0.191	-0.189
Lecce	-0.230	0.069	-0.749	0.077	0.130	0.065	-1.467	0.072	-0.163	-0.151
Messina	-0.376	0.054	-1.017	0.064	-0.062	0.065	-1.045	0.077	0.164	0.184
Milano	0.412	0.146	-0.471	0.146	0.272	0.065	-0.005	0.066	-0.019	-0.030
Napoli	-0.769	0.050	-1.430	0.056	-0.333	0.065	-1.846	0.075	-0.308	-0.273
Palermo	-0.099	0.139	-1.418	0.143	0.073	0.065	-0.879	0.068	-0.052	-0.042
Perugia	0.344	0.142	-0.875	0.152	0.312	0.070	-0.452	0.076	0.063	0.055
Potenza	-0.374	0.085	-0.999	0.094	0.002	0.071	-1.724	0.120	-0.003	0.015
Reggio Calabria	-0.727	0.037	-1.600	0.050	-0.251	0.065	-1.882	0.103	-0.036	-0.002
Roma	0.068	0.102	-0.907	0.103	0.248	0.065	-0.650	0.067	-0.298	-0.296
Salerno	-0.775	0.035	-1.112	0.042	-0.301	0.065	-1.284	0.074	-0.232	-0.195
Torino	0.234	0.155	-0.607	0.156	0.301	0.065	-0.043	0.067	-0.081	-0.085
Trento	0.473	0.174	-0.989	0.209	0.498	0.071	-0.442	0.095	0.064	0.051
Trieste	0.584	0.159	-0.610	0.166	0.322	0.070	-0.138	0.076	-0.023	-0.041
Venezia	-0.017	0.105	-0.695	0.106	0.058	0.065	-0.396	0.067	-0.137	-0.130

Notes: Table reports estimation results of model (A.1), where the mean quality of candidates in each district is given by (A.3) and (A.4) in the period before and after the reform respectively. The table also reports the estimated grading standards in each district for the written (w and w') and oral exams (r and r'). Standard errors are computed using the Hessian matrix. The data include observations for 26 districts in the 1998–2012 period.

These results are in line with the reduced form results reported in Section 4.3. However, three new conclusions can be drawn. First, the differences in pass rates across districts are mainly determined by large differences in the severity of the grading standards (not by candidate ability). Second, northern districts tend to have higher grading standards (in written and oral exams). Third, grading standards change dramatically after the reform. After the reform, southern districts increased their standards for the written exam and decreased their standards for the oral exam. Northern districts kept the same standards for the written exam, but increased them for the oral exam. In Section 5, we show that these results can be explained by the incentives generated by regulation.

A.3. Exam difficulty and unfair grading standards

How much do grading standards vary from the point of view of exam candidates? Since w , r , and the randomization of the grading district jointly determine pass rates, it is difficult to compare the overall severity of grading standards across districts and the magnitude of changes over time. In order to construct summary measures of the candidates' expected grading standards in each district, we consider a hypothetical district with a bi-normal distribution of ability (A.1) with mean \hat{m} equal to the average estimated ability (weighted by number of takers) and correlation $\hat{\rho}$ equal to the estimated correlation. We then define

$$Exam\ Difficulty_{i,t < 2004} \equiv 1 - Pr(q_w > \hat{w}_{i,t < 2004}, q_r > \hat{r}_{i,t < 2004}, \hat{m}, \hat{\rho}), \tag{A.6}$$

which is the counterfactual fail rate in district i implied by the estimated grading standards w_{it} and r_i before the reform, and

$$Exam\ Difficulty_{i,t \geq 2004} \equiv 1 - Pr(q_w > E(\hat{w}_{i,t \geq 2004}), q_r > \hat{r}_{i,t \geq 2004}, \hat{m}, \hat{\rho}), \tag{A.7}$$

where the expected grading standard $E(\hat{w})$ is used (instead of district-specific estimates) to account for candidates' uncertainty about the grading district after the reform.

Table 2 reports the exam difficulty for each district. On average, difficulty increases after the reform from 0.54 to 0.65. This is caused by a large increase for districts with easier exams and implies a significant reduction in the heterogeneity of exam difficulty across districts.

A.4. Identification with exogenous quality

If it is not possible to partition districts into subsets that grade exams independently, then the parameters $m_i, w_i, w'_i, r_i, r'_i$ and ρ of the model in Section A.1 are identified (after normalizing the mean quality of candidates in one district, $m_1 = 0$).

Consider first the period after the reform. In district 1, $m_1 = 0$, hence w'_j and r'_1 are identified by the proportion of candidates passing the written and oral exam in district 1 (which correspond to areas A, B, and C in Fig. A.1) for any given ρ . Consider now districts $k(j)$, also graded by j in other years. Since w'_j is known, the pass rate data identify $r'_{k(j)}$ and $m'_{k(j)}$. Consider now districts $h(k(j))$ that grade essays coming from districts $k(j)$ in some year. Since there is no subset of districts grading exams independently from the others, the set of districts $h(k(j))$ is different from the set of districts $k(j)$. Since we know $m'_{k(j)}$ we can recover the thresholds w' and r' for districts $h(k(j))$. Iterating this procedure identifies all the parameters $w', r',$ and m . Once m is known, parameters w and r can be recovered for the period before the reform. Finally, given $w, r,$ and m , differences across districts in the ratio of pass rates in the written and oral components of the exam (corresponding to the ratio of the areas A, B, and C in Figure 1) identify ρ because of the functional form of the distribution of ability.

A.5. Identification with endogenous quality

Consider now the case in which the mean quality of candidates before and after the reform is given by (A.3) and (A.4) respectively. If the mean and variance of candidates' quality distribution (at the national level) is not affected by the reform, then the parameters $w'_i, r'_i, w_i, r_i, \rho,$ and $(\mu_i, \varphi_1, \varphi_2)$ are identified.

The randomization of the grading district, the stability of the quality distribution, and functional form assumptions jointly identify the parameters. The argument goes as follows. Consider first the case of two districts $i = 1, 2$ and $\varphi_1 = \varphi_2 = \varphi$. As argued above, the mean quality of candidates m'_i and the parameters $w'_i, r'_i,$ and ρ are identified using the data from the period after the reform. Consider now the period before the reform. The data on pass rates identify $d_{wi} \equiv w_i - m_i$ and $d_{ri} \equiv r_i - m_i$. Hence, $m_i = m'_i + \varphi(d_{ri} + m_i + d_{wi} + m_i)$ for $i = 1, 2$. If the mean quality of candidates is not affected by the reform, then $M = m_1\pi_1 + m_2\pi_2$, where π_i is the observed proportion of candidates taking the exam in district i . Using the constraint on the mean quality and the two equations for m_i , one can solve for $m_1, m_2,$ and φ . The argument extends to the case of n districts, as the $n + 1$ parameters can be obtained as the solution of a system of $n + 1$ equations. The argument also extends to the case in which $\varphi_1 \neq \varphi_2$. Having one additional parameter, we then utilize the constraints on the mean, $M = \sum_{i=1}^n \pi_i m_i$, but also the constraint on the variance of the quality distribution, $V = \sum_{i=1}^n \pi_i [(m_i - M)^2 + 1]$. These correspond to the mean and variance of the mixture distribution that results at the national level. These two equations, together with the expressions for m_i , can be used to solve for the $n + 2$ unknown parameters.

Appendix B. The model

B.1. Equilibrium with linear demand

In this section, we explicitly solve the model in the special case of linear demand, $w_i = a_i - b_i \bar{n}_i$. Mobility implies that the equilibrium salary is the same in the two districts, hence

$$a_1 - b_1 \bar{n}_1 = a_2 - b_2 \bar{n}_2. \tag{B.1}$$

Using the fact that $n_1 + n_2 = \bar{n}_1 + \bar{n}_2$, we obtain

$$\bar{n}_1 = \frac{a_1 - a_2}{b_1 + b_2} + \frac{b_2(n_1 + n_2)}{b_1 + b_2}, \tag{B.2}$$

which is a special case of $\bar{n}_i = f_i(n_i + n_j)$. If licensing board 1 wants to achieve its desired salary $w_1(\bar{n}_1^*)$, it needs to admit

$$n_1 = \bar{n}_1^* \frac{b_1 + b_2}{b_2} - \frac{a_1 - a_2}{b_2} - n_2 \tag{B.3}$$

candidates. This is a special case of the best reply (4). The best reply of district 1 is higher than that of district 2 if and only if the intercept is larger,

$$\bar{n}_1^* \frac{b_1 + b_2}{b_2} - \frac{a_1 - a_2}{b_2} > \bar{n}_2^* \frac{b_1 + b_2}{b_1} - \frac{a_2 - a_1}{b_1}, \tag{B.4}$$

then,

$$a_1 - b_1 \bar{n}_1^* < a_2 - b_2 \bar{n}_2^*, \tag{B.5}$$

and

$$w_1(\bar{n}_1^*) < w_1(\bar{n}_2^*). \tag{B.6}$$

Hence, the best reply of district 1 is higher if and only if the desired salary is lower. District 1 is the 'low-demand' district. The equilibrium is described in Fig. 9.

B.2. Equilibrium with n districts

The model extends to a market with N districts. Assume that districts can be ranked by $w_1(\tilde{n}_1^*) \leq w_2(\tilde{n}_2^*) \dots \leq w_N(\tilde{n}_N^*)$.⁴¹ The best reply functions are $n_i^* = f^{-1}(\tilde{n}_i^*) - n_{-i}$, where n_{-i} is the mass of candidates admitted in districts other than i . In equilibrium, districts are split into three groups based on their preferred salary. The richest districts choose $n_i = \min_i$, the marginal district $n_i = \min\{n_i^*, \max_i\}$, and the poorest districts choose $n_i = \max_i$.⁴²

Consider now a policy that introduces a maximum pass rate (\max). Since the new constraint is binding for some districts, pass rates for these will fall, leading to a higher equilibrium wage. If N is sufficiently large, this implies that the identity of the marginal firm changes. In particular, a higher-demand firm becomes marginal. For this district, the new policy implies an increase in pass rate from \min_i to $\min\{n_i^*, \max_i\}$. Districts that have higher demand than this new marginal district remain constrained at \min_i , with no change in pass rate. Districts that have lower demand than the old marginal district are constrained at the lower between \max_i and \max . Among these districts, some will certainly lower their pass rates, since the reform introduces a new binding constraint for some districts.⁴³ Districts in between the old and the new marginal (if there are any) will behave similarly to the new marginal, increasing their pass rates from \min_i to \max_i .

Hence, the model implies a positive correlation between changes in pass rate and demand at the district level. This generalizes the results of the two player game, in which the high-demand district benefited from the reform. Second, the average change in pass rate is expected to be negative for districts with lower demand than the marginal and not significantly different from zero for districts with higher demand than the marginal. Third, since the constraint \max limits the variability in grading standards, the exam is expected to become less unfair. Finally, the increase in wages implies that licensing boards in high-demand districts obtain a salary that is closer to their preferred salaries, while those in low-demand districts face a salary further away from their preferred salary. Hence, the introduction of a maximum pass rate \max is expected to be supported by the high-demand districts, and opposed by the low-demand ones.

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⁴¹ For simplicity, further assume that the \max_i and the \min_i for each district are ordered such that $\min[\max_i] > \max[\min_i]$.

⁴² This is also the unique equilibrium outcome.

⁴³ However, it is possible that some other districts, those with lower \max_i and thus lower pass rates before the reform, are not affected.