Occupational Licensing, Labor Mobility, and Discriminatory Entry Standards*

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Abstract

Occupational licensing at the local market level often coexists with labor mobility across local markets. We empirically study a labor market in which a district-specific entry (licensing) examination is coupled with labor mobility across districts. Our analysis exploits a change in the grading procedure of the exam, from grading in the local district to grading in a randomly assigned different district. We document that licensing regulation has unintended consequences: extreme heterogeneity across markets in licensing exam difficulty (up to 50 percent differences in pass rates), discriminatory admission procedures, and inefficient mobility of exam candidates and workers. We present a model of occupational licensing and labor mobility and test its predictions. Our findings provide the first evidence of regulatory competition based on strategic interaction among licensing boards.

Keywords: Regulation, labor market regulation, occupational regulation, licensing, legal market, bar exam.

JEL codes: J08, J44, L84, L50.

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1 Introduction

At present, 22 percent of workers in the EU and 29 percent in the US are required by law to hold a professional license (Kleiner and Krueger, 2013, Koumenta and Pagliero, 2019). Entry into licensed professions is typically conditional on educational qualifications and the passing of an entry exam, which is often administered by the professional association of the regulated profession. While this type of regulation may benefit consumers in reducing asymmetric information (Akerlof, 1970, Leland, 1979), it may also reduce competition and increase prices, thereby reducing allocative efficiency (Friedman and Kuznets, 1954, Smith, 1776).

Most licensed markets are characterized by regulation at the local market level and labor mobility across markets. In the EU, hundreds of professions are licensed in accordance with country-specific local laws. At the same time, mobility of workers across countries is one of the cornerstones of the EU treaty. For example, physicians, nurses, architects, dentists and veterinarians are subject to country-specific entry exams and automatic recognition of their professional titles across EU member states. Lawyers, accountants, electricians, plumbers and many other professionals are similarly subject to country-specific entry exams, and 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.

Also 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 important as 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] This paper

[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 is becoming an important and bipartisan topic in the policy debate. For example, in 2015, a report published by the Obama White House (White House, 2015) called for a review of the costs and benefits of occupational licensing regulations. In July 2017, Alexander Acosta, US Secretary of labor of the Trump administration, also recommended a thorough review of occupational licensing regulations.

[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

shows that the combination of occupational regulation at the local market level and labor mobility can generate extreme heterogeneity across markets in admission outcomes, discriminatory admission procedures, and the inefficient mobility of workers.

While there is abundant anecdotal evidence of the importance of the combination of local occupational regulation and labor mobility, there is a lack of studies (theoretical or empirical) on its effects. One reason is that heterogeneity of labor market regulation across countries makes it difficult to compare labor markets.[4] In this paper, we focus on a specific labor market in a specific country: the Italian market for lawyers. This market features a combination of local entry regulation and labor mobility across local markets. Moreover, each local market follows the same admission policies and procedures, making it particularly easy to compare entry standards. Finally, the Italian market for lawyers is homogeneous across local markets in terms of their legal framework, labor market regulations, and language. These characteristics make the Italian market for lawyers an exceptionally interesting case study, which is particularly well suited for empirical analysis. However, the purpose of the paper is to provide more general insights into the effects of local occupational licensing regulations and labor mobility, which are likely to emerge to some extent in the hundreds of markets subject to this type of regulation.

The Italian bar exam consists of a written and an oral component. Exams are administered in each of 26 districts and exactly the same written questions are used all over country. However, grading standards may vary significantly across districts, since local professional associations are responsible for grading the exams. After passing the bar exam, newly licensed lawyers are free to move across districts and practice wherever they choose. This generates 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 the exam fairness. In 2003, the grading procedures changed. Starting with the 2004 examination, written exams were no longer graded locally, but by a different district, randomly assigned each year after administration of the exam. Randomization of the grading district is not only an interesting and unusual policy experiment, but also provides a

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).

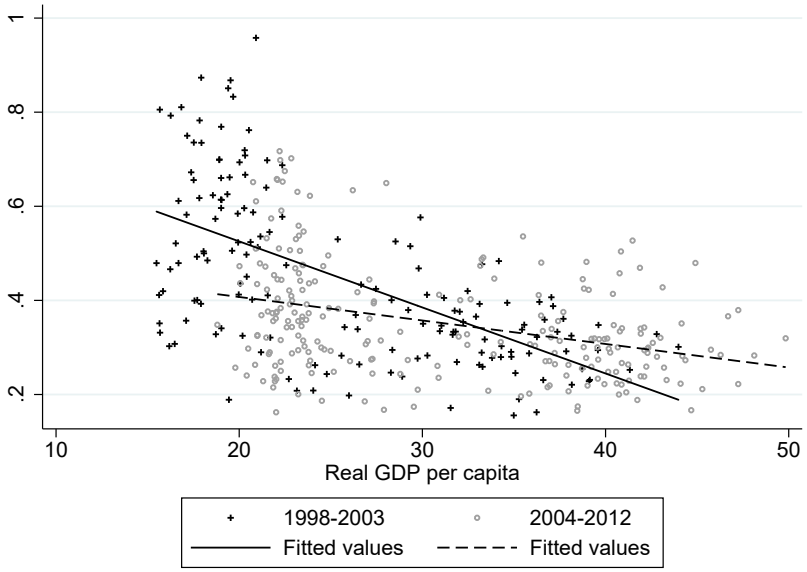
[4]For example, in the market for lawyers, bilateral agreements across US states are heterogeneous and difficult to study systematically. In Europe, occupational licensing regulations are different across states, reflecting differences in legal institutions, laws, languages, and culture (Pagliero and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

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

convenient source of variation that can be used to separately identify the severity of the grading standards (the source of differences in entry barriers across districts) from differences in the quality of candidates.

Exploiting data from the Italian bar exam between 1998 and 2012, we document the existence of extreme heterogeneity across markets in exam pass rates, which vary from 16 to 96 percent. In particular, wealthier districts systematically have lower pass rates (Figure 1). We show that these differences are mainly caused by large differences in grading standards, with identical quality candidates treated differently from district to district. We estimate that up to 49 percent of candidates experienced discrimination.[6] Given the heterogeneity of grading standards, exam candidates have an incentive to move to districts with easier exams, and then to return as licensed lawyers. Since mobility is costly, differences in grading standards lead to inefficient mobility.

Figure 1: Bar exam pass rates.



Notes: Figure displays bar exam pass rates and real GDP per capita (thousands of 2009 euros) in each district and year.

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

[6] In the sense that they either passed the exam despite performing worse than some other candidate who failed in a different district, or they failed the exam despite performing better than some other candidate who passed in a different district.

boards leads to extreme heterogeneity in admission standards (with higher standards in richer markets), discriminatory 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 such a 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. Finally, we show evidence from the US market for lawyers that is consistent with the main predictions of the model and our empirical findings. This suggests that our results are potentially relevant in other contexts as well.

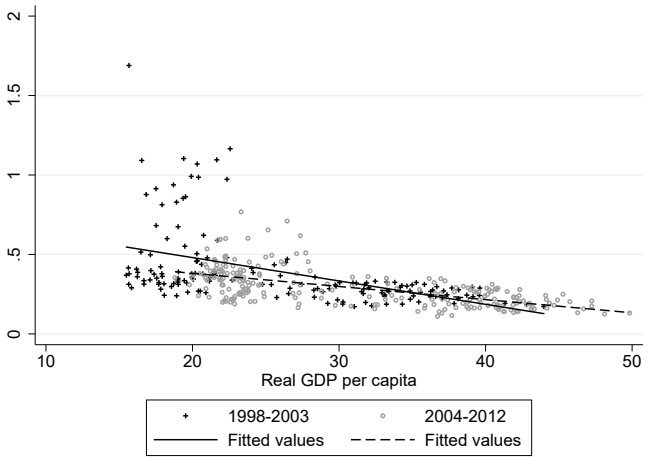
A long and distinguished literature studies the effects of occupational licensing on prices (see Kleiner, 2000, Pagliero, 2019, for a review), mobility (Federman et al., 2006, Holen, 1965), and the quality of the goods and services provided (Angrist and Guryan, 2004, Farronato et al., 2020, Kleiner and Kudrle, 2000, Larsen, 2013, Maurizi, 1974). 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, Kleiner et al. (2016), Pagliero (2011, 2013)). This paper follows the tradition and takes advantage of a 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 grading standards, and interact with each other.

The paper is organized as follows. Section 2 describes the Italian market for lawyers and the data. Section 3 shows that grading standards differ across districts (and over time), leading to discriminatory exam outcomes. Section 4 focuses on mobility of exam candidates and licensed workers. Section 5 investigates the mechanism that generates the observed differences in grading standards, describes the model, and tests its predictions. General results and technical details of the model are relegated to an appendix. Section 6 concludes.

2 Occupational licensing in the Italian market for lawyers

The legal profession in Italy is a typical licensed profession. Lawyers must be listed in the official register that is maintained by a local bar association, to which the national law gives extensive legal prerogatives. The bar associations are made up by all the lawyers in the official register. They elect a council and a chairman, who are legally responsible for the register as well as for the overall professional conduct of their associates. They also settle disputes among lawyers, or between lawyers and their clients, and have some disciplinary authority, such as suspending or expelling lawyers from the official register.

Figure 2: Number of bar exam candidates per licensed lawyer.



Notes: Figure shows the number of bar exam candidates per licensed lawyer and real GDP per capita (thousands of 2009 euros) in each district and year.

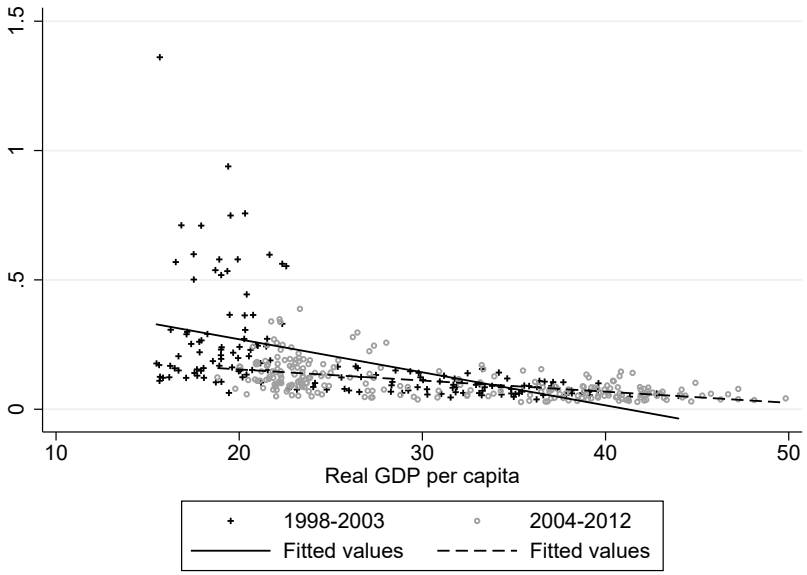
National law also regulates the criteria for entry into the profession. Aspiring lawyers must complete a 5-year university law degree followed by a two-year internship in a law office, where they work with an experienced lawyer. They must then pass the bar exam, which takes approximately one year to complete. Candidates are allowed to take the exam only in the district where they are registered and are doing their internship.[7] The bar exam consists of a written and an oral component. Access to the oral exam is conditional on passing the written exam. The written exam is held annually, usually in December, in each of the 26 district appeal courts.The written exam takes place simultaneously in each district and the same exam questions are used

[7]This is to discourage mobility of exam candidates and limit arbitrage opportunities across exams in different districts. Since 2003, to further discourage mobility, trainees moving to a different district during the training period are required to take the exam in the district in which they have done most of their training.

throughout the country. Conditional on passing the written exam, candidates then take the oral exam, usually in the Autumn of the following year, in the same district.

Before 2004, the written exam was graded in the district where the candidate took the exam. Although exam questions were identical, grading was performed by local grading committees composed of lawyers, judges, and law professors working in the district. As of 2004, new regulations came into force.[8] Each year, districts are partitioned by the Ministry of Justice into groups of 3 to 8 districts. Groups vary year by year in size and composition, but they tend to include districts with similar number of applicants. The grading committee in each district is then assigned to grade the essays coming from another district, randomly drawn from the same group.[9] The reform only affected the grading procedure for the written exam. Candidates still take the oral exam in the same district as the written exam.

Figure 3: Number of bar exam passers per licensed lawyer.



Notes: Figure shows the number of successful bar exam candidates per licensed lawyer and real GDP per capita (thousands of 2009 euros) for each district and year.

After passing the oral exam, licensed lawyers are free to register and practice in the local bar association of their choice. As a consequence, even though local licensing exams play a key role in admission procedures, the labor market for lawyers is a national one. This is the result

[8]The so called Castelli reform, 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.

of how the legal profession has evolved after Italian unification in the 19th century. Although a common labor market was created, the pre-existing heterogeneity in institutions and legal traditions persisted in the form of local bar examinations.[10]

2.1 Data and preliminary evidence

We collected data on the number of participants and successful candidates at the written and oral exams for each district from 1998 to 2012.[11] This data provides information on the pass rates for the written and oral examinations, as well as the overall pass rate (i.e., the percentage of candidates who pass both exams). We complement this with data from administrative records on the number of lawyers in each district and year.[12] Administrative records from the Consiglio Nazionale Forense also provide individual level information on the universe of lawyers in 2017 (over 300,000), including the district in which they practice, the date of first registration (as intern or licensed lawyer), the date of registration in the current district, date and place of birth. This allows us to identify lawyers who moved across districts after their first registration and whether they were born in the same district where they work.[13]

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. There are extremely large differences across districts in pass rate, number of candidates taking the exam, and number of successful candidates. Overall pass rates (the proportion of candidates passing both components of the exam) range between 16 and 96 percent. Pass rates for the written exam range between 16 and 99 percent, and those for the oral between 35 and 100 percent. The average pass rates for the written and the oral components are 45 and 87 percent respectively, with an overall average pass rate of 39 percent.[14]

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

[11] 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] Information from this source is exceptionally detailed, but has the drawback of being available only for lawyers active in 2017. However, the number of registrations from this source is highly correlated with the number of registrations computed using yearly data from the Cassa Nazionale Forense, which does not have this drawback but is available for some years only.

[14] In our sample, over 500,000 candidates took the bar exam. The average exam has about 1,200 candidates and approximately 33,000 candidates take the bar exam each year. The total number of candidates includes

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	1,292	1,108	100	6,317
Passers	390	496	460	28	2,965

Notes: Table reports summary statistics for the number of aspiring lawyers taking and passing the Italian bar exam. Passing the written exam is a necessary condition for taking the oral exam. The number of lawyers is the total number of lawyers registered in each district. The data includes observations for 26 districts from 1998 to 2012.

The number of successful candidates ranges between 3 and 136 percent of the total number of lawyers in each district. This partly reflects the differences in the number of candidates taking the exam in each district, which ranges between 11 and 169 percent of the total lawyers. Pass rates, the number of exam takers, and the number of passers are highly correlated with GDP per capita (Figures 1, 2, 3). The correlation between these variables and GDP per capita was higher before the 2004 reform, but remains significant at the 1 percent confidence level. Table A1 reports regression coefficients. This preliminary evidence raises the question as to whether grading standards are higher in richer districts, thus providing incentives to law school graduates to take the exam in poorer districts before returning to richer districts. This is plausible, since the bar exam is the same, the legal system is the same, and there is no restriction on the mobility of licensed lawyers. Differences in grading standards are the topic of the next section, while Section 4 explores patterns of mobility.

3 Heterogeneous and discriminatory grading standards

3.1 Impact of grading districts on exam outcomes

The cross sectional evidence in Figure 1 is consistent with richer districts applying higher grading standards. However, one cannot rule out that the quality of candidates was higher in poorer districts, partly (or even completely) offsetting the impact of differences in standards. Still, there is a simple way to test the hypothesis that districts apply the same grading standards. Consider the period after the reform. Written exams were randomly allocated to a different

repeaters. We do not have specific information on candidates taking the exam more than once.

grading district. If all districts applied the same grading standards, we would expect pass rates to be uncorrelated with the identity of the grading district.

Table 2 reports the results of regressing exam outcome k, in district i, year t, on characteristics X_{it} of district i, and GDP per capita (X_j) of the grading district j,

$$Exam\ Outcome_{kit} = \alpha_i + \beta_0 X_{it} + \beta_1 X_j + \epsilon_{it}. \quad (1)$$

In columns 1-3, the dependent variable is the pass rate in the written exam. The estimated coefficient β_1 is large, negative, and statistically significant. Adding district fixed effects and additional control variables (GDP per capita, unemployment rate, population density in district i) does not affect the magnitude of the coefficient. This is expected, as grading districts are randomly assigned.

Table 2: Heterogeneous impact of grading district on pass rates (differences in GDP per capita).

VARIABLES	(1) Pass rate written exam	(2) Pass rate written exam	(3) Pass rate written exam	(4) Pass rate	(5) Pass rate	(6) Pass rate
GDP per cap. of grading district	-0.00878 (0.00112)	-0.00897 (0.00125)	-0.00893 (0.00124)	-0.00652 (0.00103)	-0.00650 (0.00100)	-0.00646 (0.000958)
District f.e.		Yes	Yes		Yes	Yes
Controls			Yes			Yes
Obs.	234	234	234	234	234	234
R^2	0.262	0.403	0.463	0.197	0.401	0.460

Notes: Table reports results from OLS regressions of pass rates on GDP per capita (average for the 1998-2012 period, measured in 2009 euros) of the district grading the written component of the exam. Control variables include real GDP per capita (2009 euros), unemployment rate, and population density of the district in which the exam is taken. The data include observations for 26 districts in the 2004-2012 period. Standard errors clustered by district.

This effect carries through to the results of the overall exam, as described in columns 4-6.[15] However, the coefficient is smaller in absolute value than in columns 1-3. This is because the overall outcome of the exam is the result of the interaction of the result in the written and oral exam. The results in Table 2 demonstrate that some districts apply tougher grading standards in the written exam, which cause very significant drops in pass rates. These districts tend to

[15]The results do not change including year fixed effects. The coefficients of the control variables X_{it} are not statistically significant.

be those with higher GDP per capita. A difference in GDP per capita of 20,000 euros implies an 18% change in pass rates on the written exam.[16]

However, we are not interested in estimating the causal effect of any specific variable X_j on exam outcomes.[17] In fact, we also estimate a model in which the matrix X_j includes a full set of fixed effects, one for each grading district. The results (described in Figure 4) confirm that the heterogeneity in grading standards across districts causes large differences in exam outcomes (up to 50% for the written exam and 35% for the overall exam). Districts that cause higher pass rates in the written exam also cause higher overall pass rates.

Finally, the random allocation of grading districts allows for interesting placebo tests, based on the fact that the number of bar exam takers cannot be affected by the identity of the grading district, which is determined only after the written exam. When we regress the number of exam takers on the GDP per capita of the grading district, we find an effect that is not significantly different from zero, although precisely estimated.[18]

3.2 Estimation of grading standards and quality of candidates

Section 3.1 demonstrates that grading standards for the written exam differ significantly across districts in the period after the reform. However, it does not provide evidence on possible differences in candidate ability across districts. Moreover, it does not provide information on differences in grading standards for the oral exam and in the pre-reform period. In this section, we introduce an econometric model that links grading standards, candidate quality, and exam outcomes. In this setting, data on pass rates and the randomization of the grading district separately identify grading standards (for the written and oral exam) and candidate quality. Under some assumptions, it is also possible to recover grading standards and exam ability before the reform, so that we can study how the behavior of licensing boards changed as a consequence of the reform.

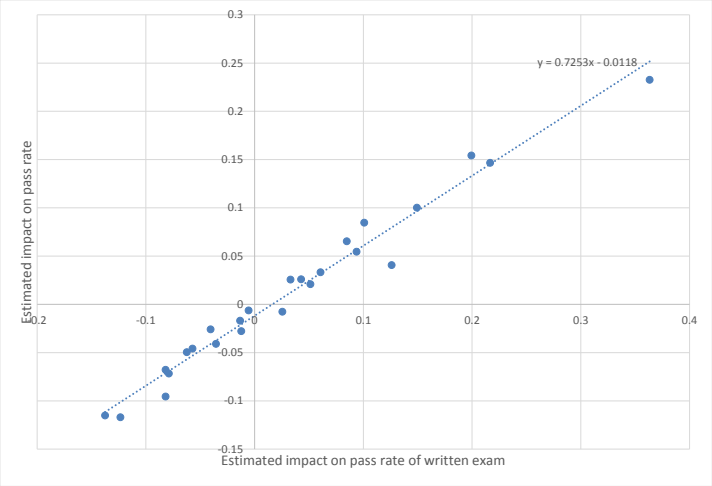
We start by modeling how differences in (unobserved) candidates' ability across districts

[16]The results are robust if we estimate the model for each group (see Table A2). We can also include in the model the interaction between the GDP per capita of grading district j and district of origin i. Interaction effects are small.

[17]For example, richer districts are also those with lower pass rates in the pre-reform period (Figure 1). Hence, we find similar results when the variable X_j is the average pass rate of the grading district in the pre-reform period.

[18]Table A3 reports the results of placebo regressions. When we include indicator variables for each grading city in X_j, no coefficient is statistically significant at the 5 percent confidence level.

Figure 4: Estimated impact of grading districts on pass rates.



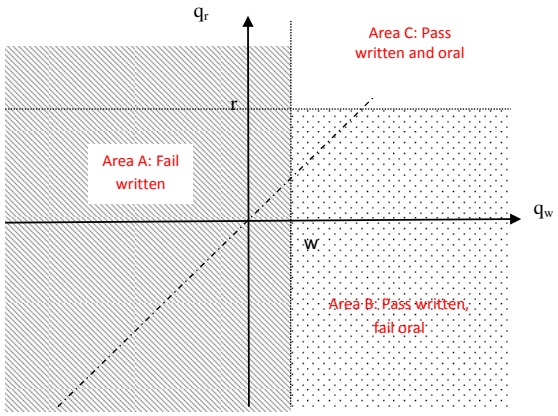
Notes: Figure shows the OLS estimated fixed effects α_j in the regression model $Exam\ Outcome_{it} = \alpha_i + \alpha_j + \epsilon_{it}$, where the dependent variable is the pass rate for the written exam and the overall pass rate. Values for Ancona (the omitted district) correspond to $(0, 0)$.

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

$$\begin{pmatrix} q_w \\ q_r \end{pmatrix} = m_i + \begin{pmatrix} e_w \\ e_r \end{pmatrix}; where \begin{pmatrix} e_w \\ e_r \end{pmatrix} \sim N \left(\begin{bmatrix} 0 \\ 0 \end{bmatrix}, \begin{bmatrix} 1 & \rho \\ \rho & 1 \end{bmatrix} \right) \tag{2}$$

where parameter m_i denotes the mean quality of candidates in district $i = 1, ..., I$ 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. Figure 5 describes the exam outcomes depending on exam performance. Area A corresponds to candidates failing the written exam, area B corresponds to candidates passing the written exam but failing the oral, and area C corresponds to candidates passing both components of the exam.

Figure 5: 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 (2).

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, $m_1 = 0$).[19]

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

[19]The proof is reported in Appendix B. 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.

which licensing boards operate.[20] 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.[21]

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,

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

before the reform, and

$$m_i' = \mu_i + \varphi_1 r_i' + \varphi_2 E(w_{-i}'), \tag{4}$$

after the reform, where $E(w_{-i}')$ denotes the expected grading standard in the written exam for candidates taking the exam in district i.[22] 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

[20] 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.

[21] 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.

[22] 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.

$(\mu_i, \varphi_1, \varphi_2)$ are identified. (Appendix B provides details on identification.)

We estimate the parameters of the model by maximum likelihood for two empirical specifications.[23] 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 (3) and (4) respectively. Since the results do not vary depending on the specification used, we will report the results of the second, more general, specification.[24]

3.3 Heterogeneity of grading standards

Table A4 in Appendix A 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 equation (4) are positive, but small in magnitude and not significantly different from zero. Figure 6a reports the estimated grading standard w before and after the reform for each district. Before the reform, the grading standard w is significantly higher in richer districts than in poorer districts. This correlation decreases after the reform, as poorer districts adopt higher standards, while richer districts do not substantially change their grading standards. Figure 6b shows the change in grading standards for written exams and GDP per capita.[25] These results imply that the reform harmonized the expected grading standard of the written exam.

Figure 7a reports the grading standards r and Figure 7b changes in r between the two periods. On average, r tends to be lower than w, hence the oral exam tends to be easier than the written exam.[26] The grading standard r is much higher in richer districts than in poorer districts. This holds before and after the reform. However, after the reform, poorer districts adopt lower standards, while richer districts adopt higher standards. This leads to

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

$$L = Pr(q_w < w, m_i)^{n_1} Pr(q_w > w, q_r < r, m_i)^{n_2} Pr(q_w > w, q_r > r, m_i)^{n_3} \quad (5)$$

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.

[24] 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.

[25] Since w measures the severity of grading standards of the district effectively grading the written exams, after the reform these grading standards apply to candidates from *other* districts. After the reform, the correlation between per-capita GDP of the district of origin and the grading standard experienced by candidates in the written exam is virtually zero (0.0002), as one would expect on the basis of the randomization of the grading district.

[26] This is perfectly in line with many accounts of bar exam candidates.

larger differences in oral exam standards between rich and poor districts after the reform.

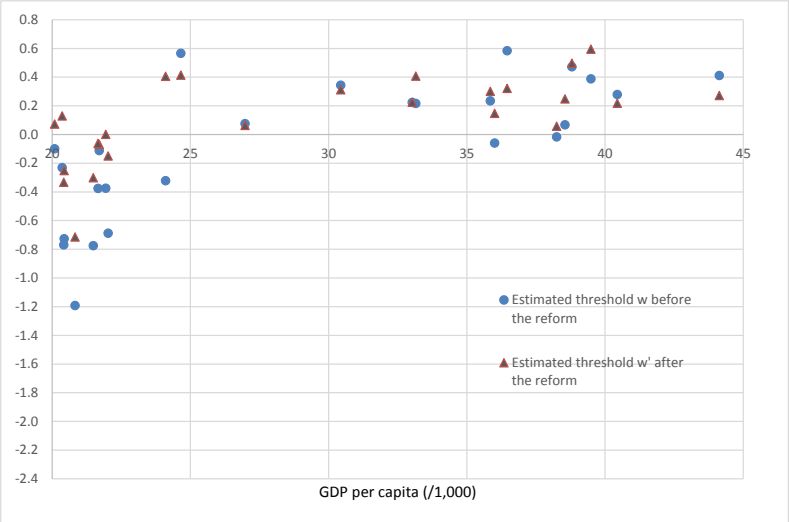
Figure 8 reports the estimated mean ability in each district, using the same scale. This provides an intuitive way of appreciating the smaller range of m relative to w and r. The differences between the periods before and after the reform are very small and not statistically significant.[27] Moreover, there is no significant correlation between estimated mean ability and GDP per capita across districts. While there is some variability in m across districts, this cannot explain the enormous differences in pass rates between rich and poor districts shown in Figure 1.

These results are in line with the reduced form results reported in Section 3.1. However, three new conclusions can be drawn. First, the enormous differences in pass rates across districts are mainly determined by large differences in the severity of the grading standards (not by candidate ability). Second, richer districts tend to have higher grading standards (in written and oral exams). Third, grading standards change dramatically after the reform. After the reform, poorer districts increased their standards for the written exam and decreased their standards for the oral exam. Richer 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.

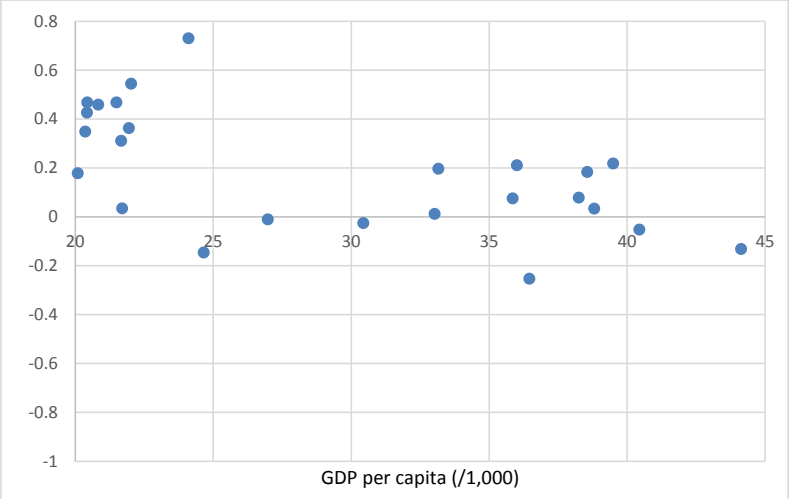
[27] To assess the role played by changes in mean quality, we compute the counterfactual pass rates that would have occurred if the mean quality of candidates in each district had remained constant. We find that these counterfactual pass rates are very similar to the observed ones. The root-mean-square deviation between the two is less than 0.01.

Figure 6: Estimated grading standards for the written exam and GDP per capita.

(a) Grading standards for the written exam.



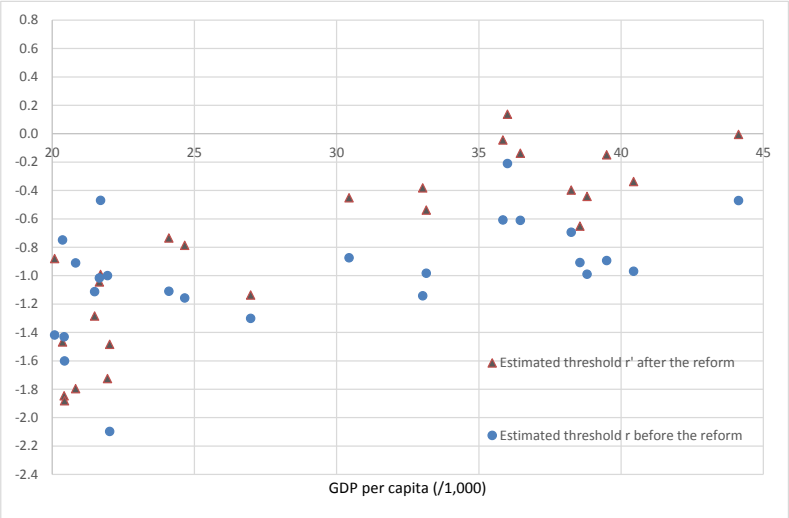
(b) Changes in grading standards for the written exam.



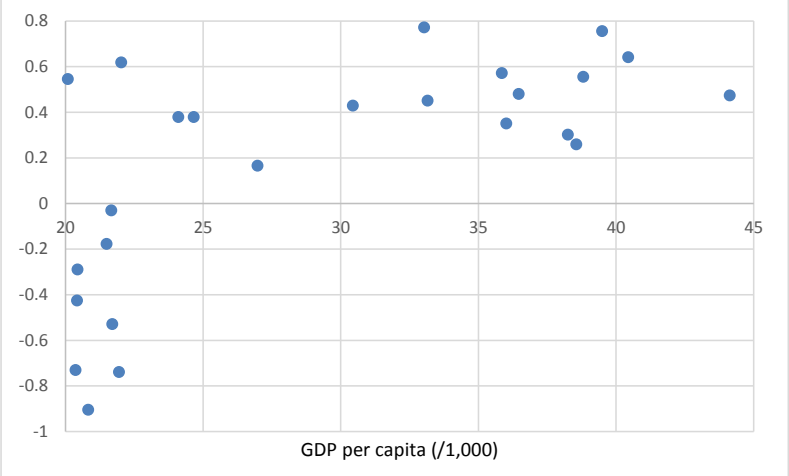
Notes: Figure shows estimated grading standards (w and w') for the written exam for each district and changes between the period before and after the reform (w'-w). GDP per capita is the average real GDP per capita in each district in the sample period (2009 euros).

Figure 7: Estimated grading standards for the oral exam and GDP per capita.

(a) Grading standards for the oral exam.

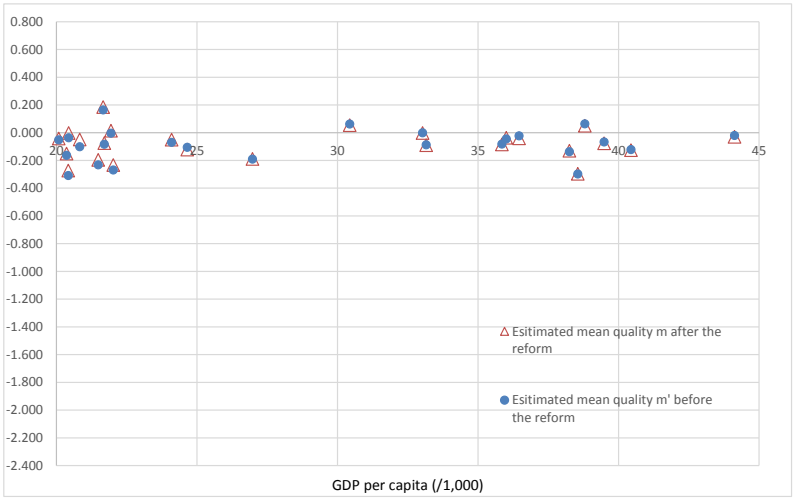


(b) Changes in grading standards for the oral exam.



Notes: Figure shows estimated grading standards (r and r') for the the oral exam for each district and changes between the period before and after the reform (r'-r). GDP per capita is the average real GDP per capita in each district in the sample period (2009 euros).

Figure 8: Estimated mean quality of candidates and GDP per capita.



Notes: Figure shows estimated mean quality of candidates in each district (m and m'). GDP per capita is the average real GDP per capita in each district in the sample period (2009 euros).

3.4 Exam difficulty and discriminatory 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 use Figures 6 and 7 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 (2) 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

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

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

$$Exam\ Difficulty_{i,t\geq2004} \equiv 1 - Pr(q_w > E(\hat{w}_{i,t\geq2004}), q_r > \hat{r}_{i,t\geq2004}, \hat{m}, \hat{\rho}), \tag{7}$$

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 3 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.

Table 3: Ranking of districts by exam difficulty.

Rank	District (before the reform)	Exam difficulty (before the reform)	District (after the reform)	Exam difficulty (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: Table reports the ranking of districts according to the estimated exam difficulty (eq. (6) and (7)), which is the counterfactual fail rate obtained using the estimated grading standards (in Table A4) and a counterfactual average bivariate normal distribution of candidates' performance.

A second way to appreciate the magnitude of the differences in standards across districts is to measure the counterfactual pass rates (CPR) that would occur if the standards of a given district j were used in every district i

$$CPR_{i,t<2004} = Pr(q_w > \hat{w}_{j,t<2004}, q_r > \hat{r}_{j,t<2004}, \hat{m}_i, \hat{\rho}). \tag{8}$$

Considering the two districts with the easiest and most difficult exams before the reform (Bari and Trieste, see Table 3), we find that, if the standards from Bari had been used nationally, 24

percent more candidates (about 7,100 per year) would have passed.[28] Instead, if all districts had used the standards from Trieste, about 25 percent more candidates (7,400) would have failed.[29]

Since all local exams give access to the same labor market, differences in exam difficulty imply different treatment of individuals with identical characteristics. 24 percent of all candidates failed the exam, even though they performed better than some of the candidates admitted in the district with the lowest standards. Another 25 percent of all candidates passed the exam, even though they performed worse than some of the candidates who failed in the district with the highest standards. Hence, 49 percent of candidates experienced discrimination in one sense or the other.[30]

After the reform, if the standards from Palermo, which is the easiest exam after the reform (see Table 3), had been used throughout the country, pass rates

$$CPR_{i,t\geq 2004} = Pr(q_w > E(\hat{w}_{i,t\geq 2004}), q_r > \hat{r}_{j,t\geq 2004}, \hat{m}_i, \hat{\rho}) \tag{9}$$

would have been significantly higher, and 12 percent more candidates would have passed each year (about 4,200 per year). If all districts had adopted the standards from Trieste, pass rates would have been significantly lower, and 14 percent more candidates would have failed each year (about 4,900). This implies that 26 percent of candidates experienced discrimination, about half of those who experienced discrimination before the reform. Hence, the exam became less discriminatory after the reform.

4 Exam difficulty and mobility

Law graduates can choose where to do their two year internship and take the bar exam. Given the heterogeneity of exam difficulty, exam candidates have an incentive to move to districts with easier exams, and then move back as licensed lawyers.

Figures 1-3 suggest the existence of mobility for three main reasons. First, Figures 1-3 show that districts with lower pass rates tend to have fewer takers (per licensed lawyer). Second,

[28] This implies that 45 percent of the individuals who actually failed the exam would have passed.

[29] This implies that 54 percent of individuals who actually passed the exam would have failed.

[30] Since the bar exam provides access to the same labor market, this level of discrimination was often perceived to be unfair by the candidates.

in the absence of mobility across districts, the number of exam takers and passers would be unrealistically high in many of the poorer districts. For example, in Figures 2 and 3, the number of takers and passers in one year can be higher than 50 percent of the total number of lawyers. Without mobility, this would not be consistent with the number of law school graduates and the observed growth of the profession. Third, these figures (and results in Table A1) also show a reduction in the number of takers in poorer districts after the reform, which is consistent with the effects of the estimated increase in exam difficulty in those districts (see Figure 6 and 7, and Table 3).

Table 4: Impact of exam difficulty on passers and takers.

VARIABLES	(1) passers/ lawyer	(2) passers/ lawyer	(3) passers/ lawyer	(4) takers/ lawyer	(5) takers/ lawyer	(6) takers/ lawyer
Exam difficulty$_{t-1}$	-0.665	-0.758	-0.610	-0.737	-0.648	-0.464
	(0.151)	(0.187)	(0.145)	(0.215)	(0.281)	(0.237)
district f.e.		yes	yes		yes	yes
controls			yes			yes
Observations	364	364	364	364	364	364
R-squared	0.430	0.661	0.678	0.276	0.675	0.709

Notes: Table reports results from OLS regressions of number of passers and number of takers (divided by the number of lawyers) on exam difficulty (Table 3). Control variables include real GDP per capita (2009 euros), unemployment rate, and population density of the district in which the exam is taken. The data include observations for 26 districts in the 2005-2012 period. Standard errors clustered by district.

Table 4 reports the estimated impact of exam difficulty on the number of passers and takers. Districts with more difficult exams have systematically fewer passers and takers (columns 1 and 4). This result is robust when we include district fixed effects (columns 2 and 5) and control variables (columns 3 and 6). When fixed effects are included, the impact of exam difficulty is identified because of the changes in exam difficulty induced by the 2003 reform.[31]

We use individual data from administrative records to compute the number of newly registered lawyers in each district. We then compute the excess supply of lawyers

$$Excess\ Supply_{it} = \frac{Passers_{it} - New\ registered\ lawyers_{it}}{Passers_{it}}, \tag{10}$$

which is the proportion of passers who do not enter the legal profession in the same district.[32]

[31] Exam difficulty is lagged by one period, as candidates need to learn about the change in exam difficulty. Results are robust if we use difficulty in year t.

[32] Excess supply is computed taking into account that the written exam takes place in December and the entire process takes about one year. If the exams starts in year t, most candidates will register in October-December

Table 5: The impact of fail rate on excess supply and migration.

VARIABLES	(1) Excess supply	(2) Excess supply	(3) Excess supply	(4) Immigrant ratio	(5) Immigrant ratio	(6) Immigrant ratio	(7) Return migration	(8) Return migration	(9) Return migration
Fail rate$_{i,t-1}$	-1.092	-0.557	-0.585	0.0580	0.0273	0.0185	0.0209	0.0176	0.0129
	(0.143)	(0.0844)	(0.0888)	(0.0151)	(0.0127)	(0.0138)	(0.00830)	(0.00729)	(0.00836)
Observations	338	338	338	364	364	364	364	364	364
R-squared	0.260	0.733	0.767	0.077	0.431	0.539	0.033	0.239	0.333

Notes: Table reports results from OLS regressions of excess supply (eq. 10), immigrant ratio (eq.11), and return migration (eq. 12) on observed fail rate. Control variables include real GDP per capita (2009 euros), unemployment rate, and population density of the district in which the exam is taken. Standard errors clustered by district.

Excess supply is positive and large in districts with lower fail rates (in the south) and about zero (or even negative) in districts with higher fail rates (in the north), where there can be more registrations than passers. Table 5, columns 1-3 reports regression results. The correlation between the fail rate and excess supply is robust, even when including district fixed effects and additional controls.

The results are similar using exam difficulty (as defined in Section 3.4) in the place of fail rates.[33] Table 6, column 1 shows a strong correlation between exam difficulty and excess supply (see also Figure A1 in the Appendix). This is robust including district fixed effects and control variables (columns 2 and 3). The magnitude of this effect is very significant. The coefficient in column 3 implies that increasing by 10 percentage points exam difficulty leads to a 30 percent drop in excess supply.[34] The large impact of exam difficulty on excess supply is consistent with previous results, and suggests that a large number of passers move from districts with easier exams to those with more difficult exams.

To provide additional evidence, we compute the number of newly registered lawyers who were previously registered in a different district (migrant lawyers). We then compute the

$$Migration\ ratio_{it} = Migrant\ lawyers_{it}/Newly\ registered\ lawyers_{it}. \quad (11)$$

of year $t+1$ and January-February of year $t+2$. Late registration can be the result of delays in the registration process or a deliberate choice of 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 before.

[33]The fail rate is observed for each exam, but it is jointly determined by grading standards (chosen by licensing boards) and candidates' ability distribution. Exam difficulty (as defined in Section 3.4) is instead computed using only the estimated grading standards (for a given quality distribution). Variability over time comes from the effect of the 2003 reform.

[34]Measured at the average excess supply (0.26).

Table 6: Impact of exam difficulty on excess supply and migration.

VARIABLES	(1) Excess Supply	(2) Excess Supply	(3) Excess Supply	(4) Migration ratio	(5) Migration ratio	(6) Migration ratio	(7) Return migration	(8) Return migration	(9) Return migration
Exam difficulty$_{t-1}$	-1.506	-0.718	-0.868	0.0847	0.0383	0.0285	0.0198	0.0206	0.0123
	(0.279)	(0.137)	(0.146)	(0.0254)	(0.0164)	(0.0244)	(0.0114)	(0.0111)	(0.0160)
district f.e.		yes	yes		yes	yes		yes	yes
controls			yes			yes			yes
Obs.	338	338	338	364	364	364	364	364	364
R-squared	0.298	0.714	0.745	0.100	0.428	0.537	0.018	0.231	0.327

Notes: Table reports results from OLS regressions of excess supply (eq. 10), migration ratio (eq.11), and return migration (eq. 12) on exam difficulty (Table 3). 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.

Table 6, column 4-6 reports a positive impact of exam difficulty on the migration ratio. The coefficient in column 6 implies that a 10 percentage point increase in difficulty leads to a 7 percent increase in the migration ratio.[35] These new results confirm that differences in exam difficulty generate migration across districts.

Still, differences in exam difficulty should lead to a specific pattern of migration, first towards districts with easier exams, and then back to districts with more difficult exams. Having individual level data on place of birth, we compute the proportion of newly registered lawyers who are migrant (according to the above definition) *and* born in the same district:

$$Return\ migration_{it} = Immigrant\ lawyers\ born\ locally_{it}/New\ registered\ lawyers_{it}. \quad (12)$$

This ratio is a proxy for return migration. Regression results in Table 6, columns 6-9 show a positive impact of exam difficulty on return migration. The coefficient in column 9 implies that a 10 percentage point increase in difficulty leads to a 4 percent increase in return migration.[36] Taken together, results on the impact of exam difficulty on the number of passers, takers, excess supply, migration, and return migration show that exam difficulty affects the mobility of exam candidates and licensed lawyers. Since mobility is costly, differences in exam difficulty may give rise to significant inefficiency.[37]

A counterfactual experiment illustrates this point. Consider the ranking of districts by

[35] Measured at the average (0.045).

[36] Measured at the average return migration ratio (0.027).

[37] For example, there are costs related to searching for a suitable mentor and then a new law firm after passing the exam. Moreover, moving across districts after the exam implies losing the benefits of the network created during the training period.

exam difficulty in Table 3, column 1. The results in Table 4, column 3 imply that if we increased difficulty by 10 percentage points in the 14 districts with easier exams (less than 0.65), and decreased it by 12 percentage points in the others, the total number of passers would be roughly unchanged. However, Table 4, column 6, implies that the number of takers would drop by about 2,300 candidates per year in the first group, and increase by about the same amount in the second. Moreover, Table 6, column 3 implies that differences in excess supply between the two groups would decrease significantly. In the first group, excess supply would drop by 8 percentage points (starting from a level of 0.47), and in the second it would increase by 10 percentage points (starting from 0.0026). The difference between the number of passers and registered lawyers would drop by about 900 individuals per year in the first group, and increase by about 350 in the other. Hence, a symmetric change in difficulty could conceivably affect the career of thousands of individuals. Given that there are no systematic differences in the quality of candidates of the two groups, this policy would increase the quality of the marginal candidate passing the exam, leading to a higher average quality of passers, and a less discriminatory exam.

5 Why do grading standards differ?

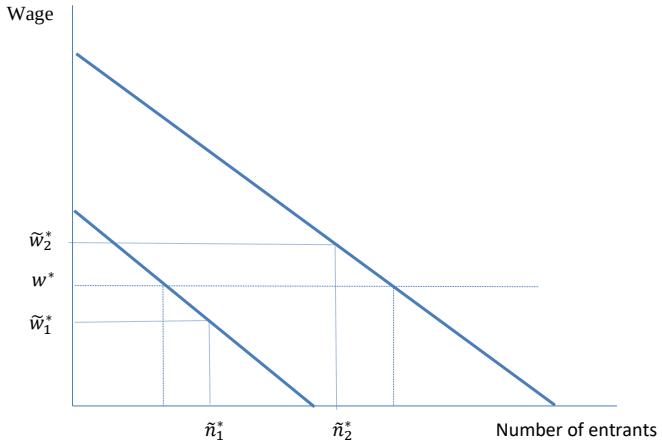
In this section, we investigate the mechanism behind our results. We study a model that captures the key features of this market: (i) Local exams. Licensing boards choose the severity of grading standards; and (ii) Labor mobility. After admission, lawyers can freely move across districts. The model shows that differences in grading standards, inefficient mobility, and discrimination naturally emerge in equilibrium as a result of the interaction of licensing boards. We discuss the intuition of the model with a graphical example, while the details and the general results are presented in Appendix C.

Consider two districts denoted by $i = 1, 2$.[38] Each market is characterized by a demand for licensed workers. District 1 is the 'poor' market (lower demand) and district 2 is the 'rich' market (higher demand). See Figure 9 in the appendix. 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 (for simplicity, assume it is the same in the two markets). Licensing

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

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.[39].

Figure 9: Labor demands, desired wage, and entry without mobility.



Notes: Figure shows the labor demands, the desired wage $\tilde{w}_i^*$, and entry $\tilde{n}_i^*$ without mobility. If there is mobility wages are equalized at w^*. Hence, there is too little entry from the point of view of the poor district (with lower demand), which will have an incentive to increase the pass rate. The opposite is true for the rich district.

If there is no mobility, the mass of workers in each market $\tilde{n}_i$ is equal to the pass rate. Hence, the licensing boards can directly choose the number of entrants $\tilde{n}_i^*$ to obtain their preferred combination of salary and entry. Figure 9 shows the labor demands, the desired wage $\tilde{w}_i^*$, and entry $\tilde{n}_i^*$.

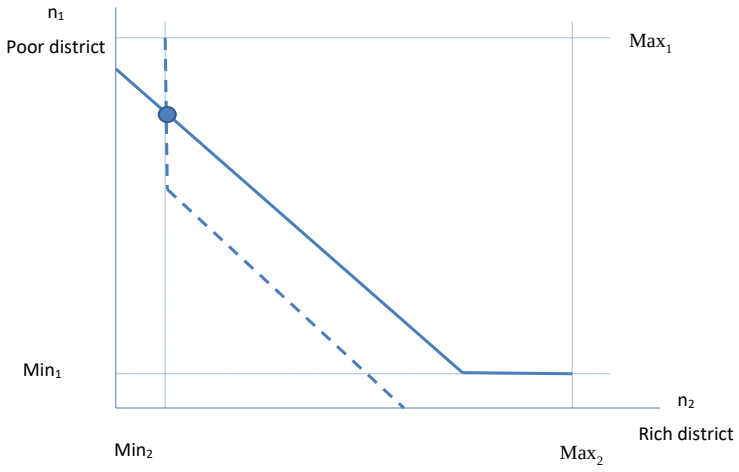
If there is mobility, the admitted workers will move towards the district with higher wage until wages are equalized (w^* in Figure 9). This wage is too high from the point of view of the poor district, and too low from the point of view of the rich district. Hence, the poor district has an incentive to increase entry and the rich to decrease it. These incentives can be represented by the best reply functions in Figure 10.[40] In the unique Nash equilibrium, the pass rate in

[39]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

[40]The licensing board in the poorer market 1, with lower desired wage $w_1(\tilde{n}_1^*)$, has a higher best reply.

the rich market is equal to min_2 (a corner solution). The pass rate in the poor market is such that the preferred wage is reached. Hence, strategic interaction generates extreme differences in pass rates across districts, which are negatively correlated with demand.[41]

Figure 10: Equilibrium admissions.



Notes: Figure shows an equilibrium in which the rich district is constrained by its minimum possible pass rate.

In equilibrium, extreme differences in pass rates imply that the exam is discriminatory, and treats identical individuals differently. Hence, strategic interaction can explain the persistent heterogeneity and discriminatory nature of entry standards documented in Section 3.4. Finally, in equilibrium, some professionals admitted in the poor market move to the rich market. Hence, the model generates an excess supply of lawyers in the poor district and mobility across districts (as documented in Section 4).

Efficiency. In our model, entry restrictions are inefficient. The first best would be to abolish the licensing exams.[42] Mobility of workers (and hence competition among licensing boards) partially solves this problem and improves efficiency relative to a situation in which mobility

[41] The board in district 1 effectively controls the market salary, by admitting more workers than would be necessary to achieve the preferred wage. Depending on the level of max_i, it is possible to have an equilibrium in which the poor district is constrained by max_1 and the rich district by min_2 (Figure 11).

[42] 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.

is not allowed, since it increases entry at the aggregate level. However, the model shows that competition comes at the cost of a very discriminatory exam. Moreover, the welfare gains from more entry should be weighed against the costs of the additional mobility generated by competition, which can be substantial (see Section 4).[43]

5.1 A policy reform and additional implications

Consider now a policy that reduces the maximum pass rate, which is binding only on the poor district (Figure 11). This is an interesting thought experiment, since the 2003 reform had exactly this effect in the Italian market for lawyers. As discussed in Section 3, the randomization of the grading district made the written exam substantially more difficult in the south, as districts in the south started 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 put a ceiling on the overall pass rate in southern districts.

In our model, this policy implies (i) a lower pass rate in the poor district, and no effect on the pass rate in the rich district. Strategic interaction between districts implies a positive correlation between changes in pass rates and income per capita across districts. Indeed, Figure 12 shows that this correlation is positive and statistically significant.[44] A second implication of the policy is (ii) a reduced variability in pass rates and less discriminatory exams. Hence, the model explains the observed reduction in discrimination documented in Section 3.4. Finally, (iii) the rich district benefits from the lower pass rate in the poor district, since it limits entry into the profession, and increases equilibrium wages. The opposite is true for the poor district. Hence, strategic interaction implies that the reform is supported by richer districts. This is in line with the fact that the reform was proposed and supported by the Northern League, a party openly representing the interests of the north.[45]

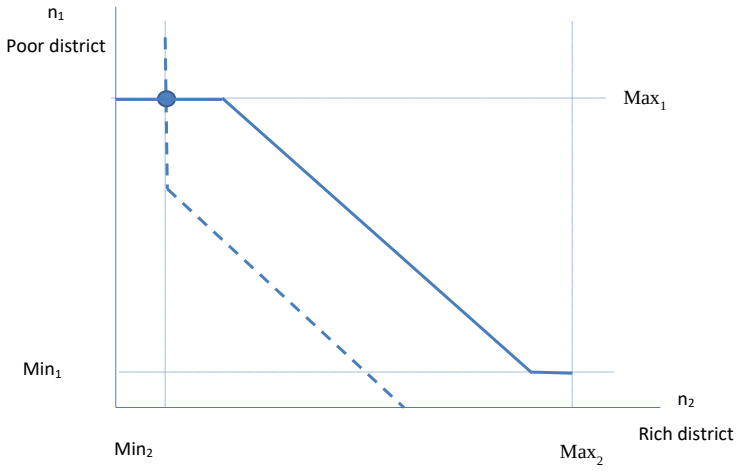
In discussing the implications of strategic interaction, we made no distinction between choosing grading standards for the written and oral exam, as the incentives of licensing boards are described in terms of optimal pass rates for the overall examination. However, districts can

[43]Hence, the case for abolishing the entry exam remains, even with mobility and competition. Minimum quality standards in the profession could be achieved in other ways, for example by setting minimum quality standards for law schools, thus limiting incentives to restrict entry.

[44]The correlation coefficient is 0.53 (p-value 0.005).

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

Figure 11: Equilibrium admissions with two binding constraints.



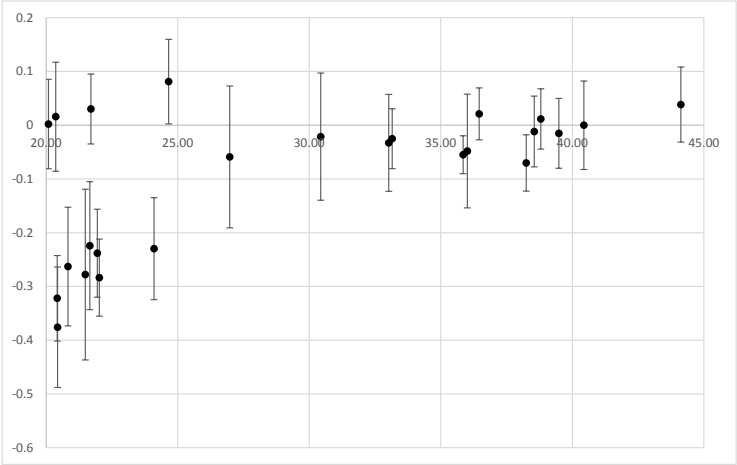
Notes: Figure displays an equilibrium in which the rich district is constrained by its minimum possible pass rate and the poor district by its maximum pass rate.

achieve any given pass rate by choosing different combinations of grading standards for the two components of the exam. Consider now a bar exam with these two components and a reform that lowers the pass rate for the written exam in the poor district (capturing the effect of the 2003 reform). Since this district still benefits from increasing its overall pass rate on the examination, it will relax grading standards for the oral exam, in an attempt to undo as much as possible the effect of the lower pass rate for the written exam. This is clearly in line with Figure 7, which shows a drop in grading standards for the oral exam in poorer districts.

A reform that increases the pass rate in the written exam for the rich district (2003 reform) has the opposite effect. The rich district still wants to decrease the overall pass rate and will increase the grading standard on the oral exam. In fact, Figure 7 shows that rich districts significantly increased the grading standard on the oral exam.[46] Hence, our stylized model also explains the observed changes in grading standards after the 2003 reform.

[46]Note that in the equilibrium with n districts, poor districts would like to increase the pass rate in rich districts, but they cannot benefit from setting very low grading standards in the written exam, as this can be undone by rich districts who can (and do) set higher grading standards for the oral exam. Hence, poor districts have no benefit from applying low grading standards on the written exam after the reform. In fact, after the reform, all districts use very similar grading standards on the written exam (Figure 6).

Figure 12: Changes in pass rates after the reform.



Notes: Figure shows changes in mean pass rates between the period before and after the reform and 10 percent confidence intervals. GDP per capita is the average real GDP per capita in each district in the sample period (2009 euros).

5.2 Complementary reasons for heterogeneous standards

The media and the press repeatedly suggested that the bar exam was unfair to aspiring lawyers. Two main explanations were advanced. First, based on anecdotal evidence (and perhaps some prejudice) about corruption in the south, some suggested that this was the reason for the lower standards in the south. Second, some suggested that bar associations in the south indirectly benefited from lower standards, as they attracted a large number of exam candidates and increased the demand for hotels, restaurants, and transportation services during the examination.[47]

These factors may play a role, but are ad hoc in nature, assuming, rather than explaining, a preference for lower standards in the south. Still, 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.

[47]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 paid as a function of the number of exams graded.

5.3 External validity and evidence from the US market for lawyers

The incentives described in our model apply to markets in which exams are local and mobility is possible. The Italian case offers a particularly clean setting, but our results should hold more generally.

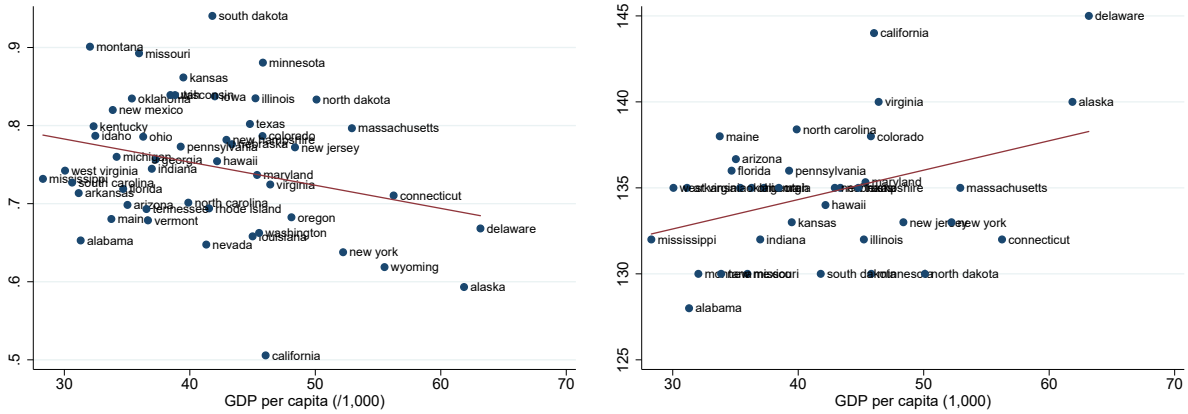
In the US market for lawyers, bar exams are organized at the state level and mobility of lawyers across states is possible on the basis of bilateral agreements among states. Hence, exams are local and there is mobility of workers (although not perfect). Surprisingly, in this market data is available not only for pass rates, but also for grading standards. Since bar exam scores are standardized using the same procedures across states, the thresholds used for determining the pass rates can be compared across states and provide a cardinal measure of grading standards.[48]

Figure 13a shows that pass rates are negatively correlated with GDP per capita.[49] This is consistent with the model and our findings in the Italian market for lawyers (Figure 1). Figure 13b shows that grading standards are higher in richer states, which is in line with our findings in Figure 6 and 7 and the interpretation provided by the model.[50] Although specific data on bilateral agreements is needed to make firmer claims in this case, these preliminary results suggest that our analysis may be relevant to other markets.

Figure 13: US bar exam.

(a) Pass rates.

(b) Grading standards.



Notes: Figure shows bar exam pass rates, grading standards (MBE scale), and GDP per capita in US states in 2011. Data from Pagliero (2013).

[48] Pagliero (2011, 2013) provides a detailed description of these data.
[49] The correlation coefficient is -0.28 (p-value 0.05).
[50] The correlation coefficient is 0.38 (p-value 0.02).

6 Conclusions

This paper shows that the combination of local licensing regulations and labor mobility across local markets leads to extreme heterogeneity in admission outcomes across markets, discriminatory admission procedures, and inefficient mobility of workers. We provide specific evidence that strategic interaction among licensing boards may explain why these two features of regulated markets can lead to such outcomes. From a policy perspective, this implies that harmonization of requirements and mutual recognition of professional licensing qualifications may be difficult to achieve, given the incentives of local professional associations to set very different entry standards. Our results shed light on an understudied type of regulatory competition. Given the relevance of labor mobility across countries, and the large proportion of licensed workers in modern economies, an understanding of the impact of this type of regulatory competition seems important.

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A Additional tables and figures

Table A1: Preliminary evidence.

VARIABLES	(1) Pass rate	(2) Pass rate	(3) Candidates / lawyer	(4) Candidates / lawyer	(5) Passers / lawyer	(6) Passers / lawyer
Real GDP per capita	-0.00898	-0.0140	-0.0114	-0.0147	-0.00813	-0.0128
	(0.00119)	(0.00230)	(0.00248)	(0.00455)	(0.00187)	(0.00372)
After reform		-0.299		-0.227		-0.286
		(0.0904)		(0.121)		(0.112)
Real GDP per capita		0.00904		0.00642		0.00847
x After reform		(0.00259)		(0.00376)		(0.00339)
Constant	0.648	0.806	0.660	0.774	0.377	0.526
	(0.0397)	(0.0763)	(0.0913)	(0.153)	(0.0667)	(0.124)
Observations	390	390	390	390	390	390
R-squared	0.257	0.334	0.286	0.322	0.252	0.340

Notes: Table reports results from OLS regressions of pass rates, number of bar exam candidates per lawyer, and number of bar exam passers per licensed lawyer on real GDP per capita in the district, an indicator variable for the period after the reform (2004-2012), and the interaction. Data and fitted values are reported in Figures 1, 2, and 3. Standard errors clustered by district.

Table A2: The heterogeneous impact of grading districts on pass rates (group-specific results)

variable	N	mean	sd	p10	p25	p50	p75	p90
β_g	34	-0.00105	0.044991	-0.02055	-0.01385	-0.00826	-0.0035	-0.00038

Notes: Table reports summary statistics of the distribution of the OLS estimated coefficients β_g of regression model $Pass\ rate_{it} = \alpha_g + \beta_g X_j + \epsilon_{it}$, where g defines the randomization group and X_j the GDP per capita (average for the 1998-2012 period, measured in 2009 euros) of the district grading the written component of the exam. The data include observations for 26 districts in the 2004-2012 period.

Table A3: Placebo regressions.

VARIABLES	(1) Exam candidates	(2) Exam candidates	(3) Exam candidates
GDP per capita of grading district	0.00141 (0.00128)	-0.000140 (0.000764)	-4.82e-05 (0.000574)
District Fe		Yes	Yes
Controls			Yes
Obs.	234	234	234
R^2	0.010	0.599	0.775

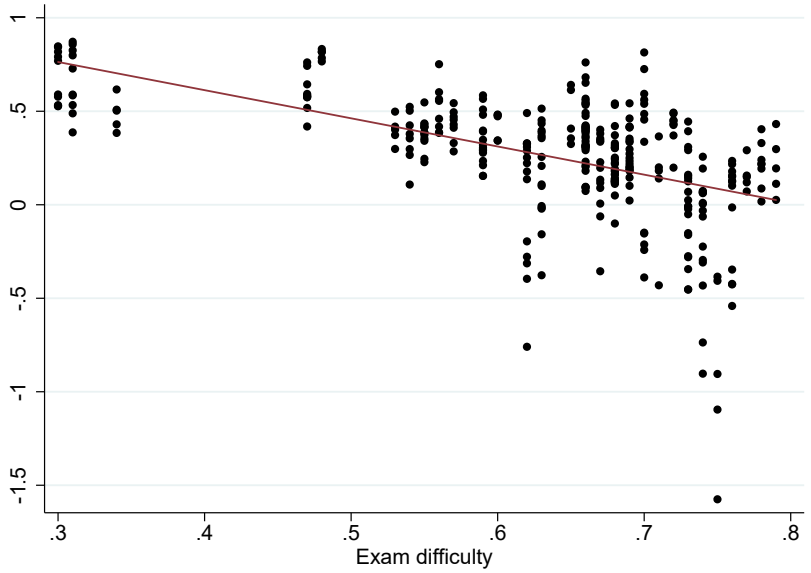
Notes: Table reports results from OLS regressions of the number of bar exam candidates in each district (divided by the number of lawyers in each district) on GDP per capita (average for the 1998-2012 period, measured in 2009 euros) of the district grading the written component of the exam. Control variables include real GDP per capita (2009 euros), unemployment rate, and population density of the district in which the exam is taken. The data include observations for 26 districts in the 2004-2012 period. Standard errors clustered by district.

Table A4: 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 (2), where the mean quality of candidates in each district is given by (3) and (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.

Figure A1: Excess supply and exam difficulty.



Notes: Figure shows the correlation between excess supply (see eq.(10)) and exam difficulty (see Table 3).

B Identification

B.1 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 3.2 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 Figure 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.

B.2 Identification with endogenous quality

Consider now the case in which the mean quality of candidates before and after the reform is given by (3) and (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, ρ, 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 $M = m_i\pi_i + m_j\pi_j$, 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, $V = \sum_{i=1}^{n} \pi_i \left[(m_i - M)^2 + 1 \right]$. 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.

C The model

Consider two districts denoted by $i = 1, 2$. There is a large number of potential entrants in each market who need to take an entry examination. Potential entrants are heterogeneous in

their exam performance, with a continuous distribution of types F_i.[51] Licensing boards regulate entry by simultaneously choosing a threshold t_i and granting a license to candidates with types larger than t_i, which is equivalent to choosing 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.[52]

Each licensed worker provides one unit of a professional service. In each market, there are heterogeneous consumers and each market is characterized by a monotone inverse demand for licensed workers $w_i = g_i(\tilde{n}_i)$, $g_i' < 0$, $g_i'' \leq 0$, where $\tilde{n}_i$ is the number of licensed workers working in district i.[53] If there is no mobility, the mass of workers in each market is equal to the pass rate, $\tilde{n}_i = n_i$. If there is mobility, workers move so that there is a unique equilibrium wage $w_1(\tilde{n}_1) = w_2(\tilde{n}_2)$, where $n_1 + n_2 = \tilde{n}_1 + \tilde{n}_2$.

Licensing boards choose n_i to maximize $\Pi_i(\tilde{n}_i)$, a continuous and globally concave function with maximum in $\tilde{n}_i^*$. 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 $\tilde{n}_i$ 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.

Let's denote by $i = 1$ the board with the lower preferred salary, $w_1(\tilde{n}_1^*) < w_2(\tilde{n}_2^*)$.[54] The model simply requires that the two boards have two different preferred salaries. For convenience, we will refer to district 1 as the 'poor' market and district 2 as the 'rich' market. This interpretation is intuitive for realistic objective functions. 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.[55] Independently of the weight of producers' surplus, $w_i(\tilde{n}_i^*)$ will be higher in the market with more rigid demand, which is realistically the one with richer

[51] 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).

[52] For simplicity, we assume that the distribution of types is univariate, but a more realistic bivariate distribution can be used. In this case, the licensing boards determine the pass rate by choosing the two thresholds (w_i, r_i) as described in Section 3.2.

[53] w_i does not depend on the type of licensed workers. Exam performance is not correlated with labor market outcomes. This assumption can be relaxed without affecting our main results.

[54] There is no specific reason for why $w_1(\tilde{n}_1^*)$ should be equal to $w_2(\tilde{n}_2^*)$. Local licensing boards are elected by the local members of the profession and are composed of local professionals. Moreover, local markets generally differ in their demand for professional services.

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

consumers, or a higher prevalence of business customers.[56]

If there is no mobility of workers across markets, each board will set the grading standard such that $n_i = \tilde{n}_i^*$. However, mobility of workers implies that there is a unique equilibrium wage $w_1(\tilde{n}_1) = w_2(\tilde{n}_2)$. Hence, the number of workers in each market is an increasing function of the total number of admitted workers, $\tilde{n}_i = f_i(n_i + n_j)$. (We provide an example of the function f below.) This generates strategic interaction between licensing boards (pass rates are strategic substitutes). The optimal pass rate of district i is a linear function of n_j,

$$n_i = f_i^{-1}(\tilde{n}_i^*) - n_j, \tag{13}$$

unless it is constrained by the minimum or maximum possible pass rate. (The best reply is linear even if the demand functions are not linear.) Figure 10 describes the best reply functions. The licensing board in the poorer market 1, with lower desired wage $w_1(\tilde{n}_1^*)$, will have a higher best reply.[57] In the unique Nash equilibrium, the pass rate in the rich market is equal to min_2. The pass rate in the poor market is such that the preferred wage is reached. Hence, strategic interaction generates extreme differences in pass rates across districts, which are negatively correlated with demand.

C.1 Equilibrium with linear demand

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

$$a_1 - b_1\tilde{n}_1 = a_2 - b_2\tilde{n}_2. \tag{14}$$

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

$$\tilde{n}_1 = \frac{a_1 - a_2}{b_1 + b_2} + \frac{b_2(n_1 + n_2)}{b_1 + b_2}, \tag{15}$$

[56] If the demand function is linear ($w = a - bn$) and k denotes the weight of producers' surplus, then $\Pi(n_i) = k\left[(a - bn - w_0)n\right] + (1-k)\left[(2a - 2w_0 - bn)n/2\right]$, with $0 \leq k \leq 1$. 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, $\Pi(n_i) = k\left[w(n) - w_0)n\right] + (1-k)\left[\int_0^n w(x) - w_0\, dx\right]$, 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.

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

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

$$n_1 = \tilde{n}_1^* \frac{b_1 + b_2}{b_2} - \frac{a_1 - a_2}{b_2} - n_2 \tag{16}$$

candidates. This is a special case of the best reply (13). The best reply of district 1 is higher than that of district 2 if and only if the intercept is larger,

$$\tilde{n}_1^* \frac{b_1 + b_2}{b_2} - \frac{a_1 - a_2}{b_2} > \tilde{n}_2^* \frac{b_1 + b_2}{b_1} - \frac{a_2 - a_1}{b_1}, \tag{17}$$

then,

$$a_1 - b_1 \tilde{n}_1^* < a_2 - b_2 \tilde{n}_2^*, \tag{18}$$

and

$$w_1(\tilde{n}_1^*) < w_1(\tilde{n}_2^*). \tag{19}$$

Hence, the best reply of district 1 is higher if and only if the desired salary is lower. District 1 is the 'poor' district. The equilibrium is described in Figure 10.

C.2 Equilibrium with N districts

The model extends to a market with N districts. Assume that districts can be ranked by $w_1(\tilde{n}_1^*) \leq w_2(\tilde{n}_2^*) ... \leq w_N(\tilde{n}_N^*)$.[58] 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 $n_i = max_i$.[59]

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 richer 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 are richer than this new marginal district remain constrained at min_i, with no change in pass rate. Districts that are poorer than the old

[58] For simplicity, further assume that the max_i and the min_i for each district are ordered such that $Min[max_i] > Max[min_i]$.

[59] This is also the unique equilibrium outcome.

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.[60] 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 GDP per capita at the district level. This generalizes the results of the two player game, in which the rich district benefited from the reform. Second, the average change in pass rate is expected to be negative for districts poorer than the marginal and not significantly different from zero for districts richer than the marginal. Third, since the constraint max limits the variability in grading standards, the exam is expected to become less discriminatory. Finally, the increase in wages implies that licensing boards in rich districts obtain a salary that is closer to their preferred salaries, while those in poorer 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 richer districts, and opposed by the poorer.

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