Occupational Licensing, Labor Mobility, and the Unfairness of Entry Standards*

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Abstract

The combination of 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 leads to extreme heterogeneity across markets in admission outcomes (up to 50 percent differences in licensing exam pass rates), unfair (discriminatory) admission procedures (up to 49 percent unfair exam results), and inefficient mobility of workers. These findings, together with the estimated impact of the reform on exam outcomes and grading standards, provide the first evidence of regulatory competition based on strategic interaction among licensing boards.

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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, 2016). Entry into licensed professions is typically conditional on educational qualifications and passing 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).

A long and distinguished literature studies the effects of occupational licensing (see Kleiner, 2000, for a review) on prices, mobility (Federman et al., 2006, Holen, 1965), and the quality of the goods and services provided in licensed markets (Angrist and Guryan, 2004, Kleiner and Kudrle, 2000, Maurizi, 1974). A more recent literature has started to investigate 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 determined (Kleiner et al., 2016, Pagliero, 2011, 2013).

The combination of occupational regulation at the local market level and labor mobility across markets is common. In the EU, hundreds of professions are licensed in accordance with country-specific local laws. At the same time, mobility of workers is one of the cornerstones of the EU treaty. To the extent that local licensing regulations impose different standards for entry into a profession, labor mobility may be severely limited. In fact, harmonization of requirements and mutual recognition of professional licensing qualifications is high on the policy agenda in the EU.[1] Also in the US there is a tension between state licensing regulations for many professions and the general principle of labor mobility across states. State-based licensing requirements in the US also make it difficult for workers to practice across state lines. This too creates the need for mutual licensing-recognition agreements, so that workers can relocate

[1] At the state level, occupational licensing is also subject to a significant debate, which made headlines across the continent. For example, the entry of Uber into European markets sparked outcry from professional taxi drivers, who were in some cases successful in limiting or impeding entry.

without having to requalify.[2] Finally, occupational licensing regulations are not exempt from antitrust scrutiny. In the US, the Federal Trade Commission has been particularly active in applying antitrust legislation to occupational licensing boards.[3]

This paper shows that the combination of occupational regulation at the local market level and labor mobility may have serious consequences. As workers try to arbitrage differences in work amenities across markets, local regulators 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 regulators to interact with one another in setting entry requirements. Competition among regulators may have the unintended consequence of generating extreme heterogeneity across markets in admission outcomes, unfair (discriminatory) admission procedures, and inefficient mobility of workers. This generates a new form of regulatory competition, which has not yet been explored.

While anecdotal evidence of the importance of the combination of local occupational regulation and labor mobility is abundant, there is a lack of studies (theoretical or empirical) on its effects. One possible reason is that heterogeneity of labor market regulation across countries makes it difficult to compare specific labor markets. Moreover, cross-country comparisons are generally difficult, because of different institutions, languages, and cultures. In this paper, we focus on one specific labor market in one specific country: the Italian market for lawyers. This market features a combination of strict local entry regulation and complete labor mobility across local markets. Moreover, each local market follows the same rules and procedures for admission, making comparison of entry standards particularly easy. Finally, the Italian market for lawyers is homogeneous across local markets in terms of their legal framework, labor market regulations, and language. This combination of specific characteristics makes the Italian market for lawyers exceptionally well suited for the study of occupational licensing.

[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 U.S. 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).

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

In the early 2000s, the enormous differences in pass rates across districts in the Italian market for lawyers raised concerns about the fairness of the bar exam. In 2003, the rules for grading the exam changed. Starting with the 2004 examination, the written exams were no longer graded locally, but sent to a different district, randomly assigned each year after administration of the exam. The aim was to reduce the enormous differences in pass rates across districts. This is not only an interesting and unusual policy experiment, but the randomization of the grading district also provides a 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 on the Italian bar exam between 1998 and 2012, we document the existence of extreme heterogeneity across markets in exam pass rates, which vary between 16 and 96 percent. In particular, wealthier districts systematically have lower pass rates. We show that these differences are mainly caused by large and unfair (discriminatory) differences in grading standards, with identical exam candidates treated differently from district to district. We estimate that up to 49 percent of candidates experienced an unfair exam outcome, 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. These differences in grading standards lead to inefficient mobility of workers from poorer to richer districts. A 10 percent increase in the pass rate (due to a decrease in grading standards) leads to a 39 percent increase in net out-migration (number of successful candidates in the local bar exam - number of newly registered

lawyers in the district). The new rules introduced by the 2004 reform significantly affected exam outcomes, reducing differences in pass rates across districts and decreasing the overall pass rate at the national level. Nevertheless, differences across districts in grading standards persist.

We show that these results are consistent with the incentives provided by regulation and that strategic interaction between local professional associations can explain the observed heterogeneity across districts. This can also rationalize the implementation of the 2004 reform, which reduced the differences between rich and poor districts, yet increased the average difficulty of the exam. Moreover, competition among licensing boards leads to more entry into the profession relative to the case of a single licensing board. This helps accounting for the large number of lawyers in Italy, despite the large entry barriers faced by some candidates.

Our results point to an unexplored type of trade off between fairness and efficiency in regulated markets. Eliminating worker mobility might increase fairness, as different standards would apply to different independent local markets, but at the cost of eliminating the efficiency gains derived from a common labor market. Exam fairness could also be increased by creating a common admission exam implemented by a national licensing board. However, this would come at the cost of eliminating competition among licensing associations, which leads to more competition and entry into the regulated profession.

The paper is organized as follows. Section 2 describes the Italian market for lawyers, presents the data, and provides some preliminary evidence on exam outcomes. Section 3 exploits the randomization introduced by the 2003 reform to show that grading standards differ across districts. Section 4 builds on this feature of the 2003 reform and introduces an empirical model that allows to separately identify differences in grading standards and candidates' quality across districts. The consequences of different grading standards on exam outcomes and fairness are described in Section 5. Section 6 investigates the mechanism that generates the observed differences in grading standards. A model of strategic interaction rationalizes the observed heterogeneity in grading standards and provides additional empirical predictions, which are then tested in the data. Finally, Section 7 discusses the broader policy issues related to the combination of local licensing regulations and labor mobility.

2 Occupational licensing in the Italian market for lawyers

Italian lawyers are licensed professionals. Lawyers must be registered in the official register that is held and maintained by a local bar association, to which the national law gives extensive legal prerogatives.The bar associations, which are formed by all the lawyers listed in the official register, elect a council and a chairman. The latter are legally responsible for the official register and, more generally, for the professional conduct of their associates. They also settle disputes among lawyers, or between lawyers and their clients, and hold some disciplinary authority, such as suspending or expelling lawyers from the official register.

The national law also regulates the criteria for entry into the profession. Aspiring lawyers must complete a university degree in law (5 years) followed by a two-year apprenticeship 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 in which they are registered and do their apprenticeship.[4] 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.[5] The written exam takes place simultaneously in each district and the same exam questions are used 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.[6] Each year, districts are partitioned by the Ministry of Justice into groups of 3 to 8 districts. Groups vary every year in size and composition, but they tend to

[4]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.

[5]There is generally one destrict appeal court for each Italian region, although Lombardy has two (Brescia and Milano), Campania two (Napoli and Salerno), Calabria two (Catanzaro and Reggio Calabria), Puglia two (Bari and Lecce), and Sicily four (Caltanissetta, Catania, Messina and Palermo)

[6]The so called Castelli reform, Law 180/2003, `http://www.camera.it/parlam/leggi/03180l.htm`

include districts with similar number of applicants.[7] The grading committee in each district is then assigned to grade the essays coming from another district, randomly drawn from the same group. The reform only affected the procedure for grading of the written exam. Candidates still take the oral exam in the district where the written exam was taken.

After passing the oral exam, licensed lawyers are free to register and practice in the local bar association of their choice. Even after registering, mobility is not restricted. Therefore, although local licensing exams play a key role in admission procedures, the labor market for lawyers is a national one. This is the result of the evolution of the legal profession after Italy was unified in the 19th century. While a common labor market was created, the pre-existing heterogeneity in institutions and legal traditions persisted in the form of local bar examinations.[8]

The 2004 reform was motivated by the perceived unfairness of the existing procedures, which allegedly resulted in systematic differences in pass rates across districts. In fact, in the 6 years prior to the reform, pass rates ranged between 16 and 96 percent, supporting the view that the exam was easier in some districts. Newspapers reported stories of candidates moving across the country just to exploit some perceived differences in grading standards across districts.[9] In some cases, abuses were also reported, which led to public outcry and court cases. Following an intense debate, the grading procedures were eventually changed.

2.1 The data and preliminary evidence

We collected data on the number of participants and successful candidates in the written and oral exams for each district from 1998 to 2012.[10] 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

[7]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.

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

[9]A typical example is the former Minister of Education in Berlusconi's government Maria Stella Gelmini, who was reported to have moved far away from her home town and the university where she graduated (Brescia) to Reggio Calabria, in order to pass the bar exam more easily. `http://www.corriere.it/english/08_settembre_/gelmini_ca002410-7aa2-11dd-a3dd-00144f02aabc.shtml`; `http://www.nature.com/nature/journal/v471/n7337/full/471135b.html`

[10]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

of candidates who pass both stages). We complement this with data on the number of lawyers in each district and year from administrative records.[11] 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. 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, while those for the oral exam between 35 and 100 percent. Approximately 33,000 candidates take the bar exam each year. 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.

The number of successful candidates ranges between 3 and 136 percent of the stock of lawyers in each district. This partly reflects the enormous differences in the number of candidates taking the exam in each district, which ranges between 11 and 169 percent of the stock of lawyers. The average exam has about 1,200 candidates, the smallest 100, and the largest over 6,000. In our sample period, over 500,000 candidates took the bar exam.[12]

Table 2 provides statistics from each district during the periods before and after the reform. Average pass rates vary greatly across districts. Before the reform, they range between 24 and 74 percent, and after the reform, between 27 and 50 percent. This decrease in the range of pass rates occurred together with a drop in the average pass rate of about 12 percentage points, from 46 to 34 percent.

Figure 1 shows the correlation between pass rate and GDP per capita. Richer districts have lower pass rates both before and after the reform.[13] However, pass rates decrease much more after the reform in poorer districts than in richer ones. The largest changes occur in 8 of the poorest districts, which had the highest pass rates before the reform. Figure 2 reports

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

[12] The total number of candidates includes repeaters. We do not have specific information on candidates taking the exam more than once.

[13] Differences in GDP per capita across regions are large and very persistent. The values used in the figure refer to 2009 and are measured in 2000 euros. GDP per capita decreases moving from north to south and is highly correlated with other variables such as unemployment and wealth.

the negative correlation between the number of candidates (divided by the number of lawyers in the district) and GDP per capita. Surprisingly, in some districts, the average number of bar exam candidates was about equal to the stock of lawyers in the pre-reform period.

Figure 3 shows the correlation between number of passers per lawyer and GDP per capita. Consistently with Figures 1 and 2, the number of passers is much higher in poorer districts, and it decreases after the reform, with poorer districts experiencing the largest drops. While the reform reduced the most extreme differences across districts, the correlations between pass rates, number of passers, number of takers, and GDP per capita remain negative and statistically significant even after the reform.

The large number of passers in poorer districts described in Figure 3 is not consistent with the observed changes in the stock of lawyers. For instance, in Catanzaro (in the south) the number of passers in each year was close to 2,000, about 60 percent of the stock. However, the change in the number of lawyers in the regional register was less than 10 percent of the stock. To explore this issue more systematically, we compute the ratio of the average number of candidates passing the exam and the average change in the number of lawyers registered in each district, reported in Figure 4. This ratio is above 10 in some of the poorest districts before the reform, and between 1 and 2 in the richest districts. These differences suggest a systematic flow of successful candidates from districts in the south to districts in the north.

The 2018 register of Italian lawyers provides information on the district in which each lawyer is working, together with the date of first registration, and the date of registration in the current district. Using this data set, we can compute, for each district, the number of lawyers who registered in each year and then remained in the same district. This provides a year and district-specific measure of the inflow of professionals, to be compared with the number of successful candidates in the bar exam.[14]

Figure 5a shows the average net out-migration in each district (number of successful candidates in the bar exam - number of newly registered lawyers) before the reform.[15] In the

[14]This measure does not account for the mobility across districts after the first registration. While imperfect, this measure of the inflow of new lawyers is highly correlated with the actual number of new registrations.

[15]Net out-migration 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-

south, the number of successful candidates exceeds by far the number of new lawyers, while the opposite is true in the north. There is a negative correlation between GDP per capita and net out-migration (the correlation coefficient is -0.57, statistically significant at the 1 percent confidence level). Figure 5b shows the average net out-migration after the reform. The variability in net out-migration is lower. The correlation between the two variables decreases, but remains negative and statistically significant (-0.51, statistically significant at the 1 percent confidence level).[16] These results are consistent with a large number of candidates passing the exam in the south and then registering in the northern districts.

3 The impact of grading districts on exam outcomes

The cross sectional evidence in Figure 1 is consistent with richer districts applying higher grading standards. Still, one cannot rule out that the quality of candidates was somewhat higher in poorer districts, partly (or even completely) offsetting the potential impact of differences in standards. More in general, the data on pass rates does not allow us to disentangle the potential role of heterogeneity in grading standards and candidates' ability.

Still, there is a simple way to test the hypothesis that districts apply the same grading standards (across geographical areas and over time). Consider the period after the reform. Written exams were randomly allocated to a different grading district. If all districts applied the same standards in grading the written and oral exams, we would expect pass rates in the written exam not to be correlated with the identity of the grading district. We would also expect the overall pass rates to be uncorrelated with it, since the grading district cannot directly affect the outcome of the oral exam.

Figure 6 shows that overall pass rates are negatively correlated with the GDP per capita of the grading district. The pass rates of the written exam follow the same pattern. Richer grading

November 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. Very few register in December because of the seasonal break in the activities of the licensing boards. In computing net migration, we consider the average of the number of successful candidates in $t-1$ and $t-2$.

[16] Similar results hold if we compute the relative net out-migration (net out-migration / number of newly registered lawyers).

districts are associated with lower pass rates after the reform, even though the grading district is randomly assigned. This is true in aggregate (Figure 6) and also when holding constant the district of origin of the essays. For example, Figure 7 reports pass rates in Catanzaro and the GDP per capita of the grading districts.

Regressing pass rates on the GDP per capita of the grading district confirms the intuition conveyed by Figure 6 and Figure 7. Table 3, column 1 reports the regression coefficient capturing the correlation between the overall pass rate and GDP per capita of the grading district (the data is limited to the post reform period, as in Figure 6). Columns 2-9 report 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,

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

In columns 2-3, 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 X_{it} (GDP per capita, unemployment rate, population density) does not affect the magnitude of the coefficient. (This is expected, as grading districts are randomly assigned.) Pass rates in the written exams are lower when they are graded by a relatively rich district. This effect carries through to the results of the overall exam, as described in columns 4-6.[17] 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. In fact, columns 7-9 show that the pass rates in the oral exams are slightly higher when the grading district in the written exam is richer.[18]

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

[18]To further exploit the quasi-experimental nature of the data, one can estimate the impact of characteristics X_j on exam outcomes for each group g. Estimating

$$Exam\ Outcome_{kit} = \alpha_g + \beta_g X_j + \epsilon_{it}, \tag{2}$$

where the exam outcome is the pass rate in the written exam, provides a distribution of 34 coefficients β_g, which is described in Table A1 in the Appendix. The median is very similar to the estimate of β_1 obtained before. All the deciles of the distribution are negative.

Richer districts are also those with lower pass rates in the pre-reform period (Figure 1). Table 4 reports the estimated coefficients when the variable X_j is the average pass rate of the grading district in the pre-reform period. Districts with lower pass rates before the reform tend to generate lower pass rates when grading exams from other districts. Interestingly, these districts lead to higher pass rates in the oral exams, which are not directly affected by the identity of the grading district.[19]

We now consider a saturated model in which the matrix X_j includes a full set of fixed effects, one for each grading district. Figure 8 describes the correlation between grading-district fixed effects obtained when the dependent variable is the pass rate in the written exam and the overall pass rate.[20] Districts that cause higher pass rates in the written exam also cause higher overall pass rates.[21] The range of these fixed effects is 50 percent for the written exam (horizontal axis in Figure 8) and 35 percent for the overall exam (vertical axis). While a strong correlation is not entirely surprising, since passing the bar exam is a necessary condition for taking the oral one, it is interesting to note that the slope of the regression line is less than one. The impact of the grading district on the overall pass rate is smaller than on the pass rate of the written exam. Figure 9 shows the correlation between estimated fixed effects for the written and the oral exam. The negative correlation explains the effect observed in Figure 8. Districts that induce lower pass rates in the written exam tend to lead to higher pass rates in the oral exam, which partly compensates the first effect and leads to a lower correlation with the overall pass rate.[22]

[19] Note that the objective of this section is to test whether different districts apply different grading standards. We are not interested in estimating the causal effect of any specific variable X_j on exam outcomes. The results in Table 4 do not change including year fixed effects. The coefficients of the control variables (GDP per capita, unemployment rate, population density) are not statistically significant.

[20] Coefficients are reported in the Appendix.

[21] The omitted indicator variable is for Ancona (first city in alphabetical order), which then corresponds to the origin of the axes in Figure 8.

[22] We can also include in the empirical regression model the interaction between the average GDP per capita of grading district j and the average GDP per capita of district of origin i.

$$Exam\ Outcome_{kit} = \alpha_i + \beta_0 X_{it} + \beta_1 X_j + \beta_2 X_j \times X_i + \epsilon_{it}. \quad (3)$$

Coefficient β_2 captures the potential heterogeneous effect of the identity of the grading district depending on the GDP per capita of the exam's district of origin. The results in Table A3 confirm that wealthy grading districts cause significantly lower pass rates, but this effect is slightly smaller when wealthy districts grade exams coming from other wealthy districts. Still, this interaction effect is relatively small, and is statistically significant only for the overall pass rate. In general, we find a large impact of the identity of the grading district on exam outcomes,

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. Table A2 reports the results of placebo regressions. 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 fairly precisely estimated. We obtain similar results when we regress the number of takers on the pass rate of the grading district before the reform.[23]

Taken together, these results provide 3 main insights.

1. Not all districts apply the same grading standards, in the sense that some are systematically associated with lower pass rates when randomly matched with other districts. From a descriptive point of view, richer districts, which are also those with lower pass rates before the reform, tend to cause lower pass rates.

2. The estimated impact of the grading district is extremely heterogeneous. Different districts can lead to differences in pass rates as large as 50 percent in the written exam (35 percent overall).

3. The impact of the grading district is not limited to the results of the written exam. Pass rates in the oral exam are also affected, although in the opposite direction. This may be because a more selective written exam leads to a better pool of candidates at the oral exam, which may then lead to higher pass rates. Such a selection mechanism requires correlation of candidates' ability in the written and oral exams. It is also possible that licensing boards react to higher grading standards in the written exam by decreasing grading standards in the oral. To further explore these hypotheses, we need to define more precisely how candidates' ability and grading standards interact to determine pass rates. This will be the topic of Section 4.

but no evidence for systematic discrimination in grading written exams.

[23] When we include indicator variables for the grading city, no coefficient is statistically significant at the 5 percent confidence level.

4 Identification of grading standards

In this section, we introduce a simple 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 and candidate quality.

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

$$\begin{pmatrix} q_w \\ q_r \end{pmatrix} = m_i + \begin{pmatrix} e_w \\ e_r \end{pmatrix}; where \begin{pmatrix} e_w \\ e_r \end{pmatrix} \sim N \left(\begin{bmatrix} 0 \\ 0 \end{bmatrix}, \begin{bmatrix} 1 & \rho \\ \rho & 1 \end{bmatrix} \right) \tag{4}$$

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 $q_r > r_i$. Figure 1 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.

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 exam thresholds after the reform. If it is not possible to partition districts into subsets that grade exams independently, then the parameters m_i, w_i, r_i, and ρ are identified (after normalizing the mean quality of candidates in one district, $m_1 = 0$).[24]

The parameters are identified jointly by the pass rates, the randomization of the grading district, and the functional form of the performance distribution. The intuition is that, given

[24]The proof is reported in Appendix A.

the normalization $m_1 = 0$, pass rate data identify the exam thresholds in district 1. Then, the repeated randomization of the grading district sequentially identifies the thresholds and the mean quality in the other districts. The remaining parameter ρ is identified by the functional form assumption. 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.

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 environment in which licensing boards operate.[25] Still, the model places some restrictions on their behavior. In particular, the parameters w_i and w_i' (r_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.[26]

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 difficulties 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

[25]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.

[26]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.

in which the quality of candidates is a linear function of exam difficulty,

$$m_i = \mu_i + \varphi_1 r_i + \varphi_2 w_i, \tag{5}$$

before the reform, and

$$m'_i = \mu_i + \varphi_1 r'_i + \varphi_2 E(w'_{-i}), \tag{6}$$

after the reform, where $E(w'_{-i})$ denotes the expected threshold in the written exam for candidates taking the exam in district i.[27] 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. (Appendix A provides details on identification.)

4.1 Estimation

We estimate the parameters of the model by maximum likelihood. The contribution to the likelihood of one observation in our data set (one examination in one specific district) is

$$L_1 = \prod Pr(q_w < w, m_i)^{n_1} Pr(q_w > w, q_r < r, m_i)^{n_2} Pr(q_w > w, q_r > r, m_i)^{n_3} \tag{7}$$

where m_i is either a constant or $m_i = f_i(r, w)$, 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. We estimate the results for two empirical specifications. 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 (5) and (6) respectively, with the normalization $\mu_1 = 0$. Since the results do not vary depending on the specification used, we will report the results of the second, more general, specification.[28]

[27] 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.

[28] 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.

5 Empirical results on admission standards and exam fairness

5.1 The heterogeneity of admission standards

Table 5 reports the estimation results. Panel 1 shows that the correlation in candidate ability in 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 and not significantly different from zero. Panel 2, columns 9 and 10 report the estimated means of candidate ability in each district, m_i' and m_i. The mean quality of the first district in alphabetical order (Ancona) is normalized to 0. The mean quality of candidates in the other districts varies between -0.30 and 0.16 standard deviations before the reform, and slightly less after the reform. Columns 1-8 report the estimated grading standards w ad r for the period before and after the reform. Before the reform, w varies between -1.19 and 0.58 standard deviations, with a range of 1.77 standard deviations. The grading standard for the oral exam varies between -2.09 and -0.20, with a range of 1.89 standard deviations.

Figure 11 reports the estimated threshold w before and after the reform for each district, ordered by their GDP per capita. Before the reform, the threshold w is significantly higher in richer districts than in poorer districts. After the reform, this correlation is much smaller, as poorer districts adopt higher standards, while richer districts do not substantially change their thresholds. Figure 12 shows the change in grading standards in written exams and GDP per capita.[29] These correlations imply that the reform harmonized the expected grading standard of the written exam.

Figure 13 reports the r thresholds and Figure 14 changes in r thresholds between the two periods. To ease comparability, they are reported on the same scale as in Figure 11. On average, r tends to be lower than w, which implies that the oral exam tends to be easier than the written exam.[30] The threshold r is much higher in richer districts than in poorer districts.

[29]Since w measures the severity of grading standards of the district effectively grading the written exams, after the reform these thresholds 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.

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

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

Figure 15 reports the estimated mean ability in each district, again using the same scale. This provides an intuitive way to appreciate 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. 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 Figures 1 and 5.[31]

Four main conclusions can be drawn from the empirical results described in this section,

1. 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).

2. Grading standards differ between rich and poor districts. On average, richer districts have higher grading standards.

3. Grading standards change dramatically after the reform.

4. Changes in grading standards differ between rich and poor districts. On average, after the reform, poorer districts increased their standards for the written exam and decreased their standards for the oral exam. Richer districts kept their standards unchanged for the written exam but increased those for the oral exam.

These results are in line with the reduced form results reported in Section 3, showing that richer grading districts lead to lower pass rates. Grading standards are indeed higher in the north. Moreover, the results imply that both selection and strategic behavior play a role in determining the impact on pass rates. In fact, richer grading districts tend to exclude the

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

worse candidates from the oral exam (selection), since candidate quality at the written and oral exam are highly correlated. Moreover, poorer districts lower their standards on the oral exam following the reform (strategic behavior), as they start to be matched with districts with higher grading standards on the written exam.

5.2 The unfairness of admission standards

Since w and r jointly determine the pass rates, it is difficult to compare the magnitude of changes in thresholds. To illustrate the impact of the policy, we consider a hypothetical district with a bi-normal distribution of ability with mean quality equal to the average estimated ability (weighted by number of takers) and correlation ρ.

We then measure the overall pass rate implied by the estimated standards in each district. Table 6 ranks districts by grading severity and shows that passing the exam becomes substantially more difficult after the reform, with the pass rate falling from 46 to 35 percent.[32] Moreover, the largest drops in pass rates occur in districts that were enjoying the highest pass rates before the reform. The increase in grading standards in those districts implied drops in pass rates up to 25 percent. The ranking of districts by overall exam selectivity remains fairly stable after the reform (correlation 0.9). The most difficult exam is Trieste's, with a pass rate of about 21 percent, the easiest is Bari's (and Catanzaro's) before the reform (pass rate of 70 percent), and Palermo's after the reform (pass rate of 46 percent).[33]

A second way to appreciate the magnitude of the differences in standards across districts is to measure the pass rates that would occur if the standards of a given district were used in every district. Considering the two districts with the easiest and the most difficult exams before the reform (Bari and Trieste), we find that, on average, 24 percent more candidates (about 7,100 per year) would pass if the standards from Bari before the reform were used nationally. This implies that 45 percent of the individuals who actually failed the exam would have passed.

[32]For the period after the reform, Table 6 reports the pass rates implied by the estimated difficulty $E(w)$ and r, using as reference a distribution of ability with mean equal to the average estimated ability after the reform, which is not significantly different from that before the reform.

[33]Since variability in candidates quality is small, the counterfactual pass rates are very close to the observed pass rates (correlation 0.95) and the ranking based on observed pass rates is similar to the ranking based on the counterfactual ranking (correlation 0.93).

Instead, about 25 percent more candidates (7,400) would fail if all districts used the standards from Trieste. This implies that 54 percent of individuals who actually passed the exam would have failed.

Since all local exams give access to the same labor market, differences in exam difficulty lead to questions about the fairness of the exam. Applying a strict definition of fairness, 24 percent of all candidates have experienced an unfair failure, having performed better than some candidates admitted in the district with the lowest standards. Likewise, 25 percent of all candidates have experienced an unfair admission, having performed worse than some of the candidates who failed in the district with the highest standards. Hence, 49 percent of candidates obtained an unfair exam outcome in one sense or the other. This notion of fairness captures the idea that candidates may think they have unfairly failed if candidates of the same ability are systematically passed in a different district. Since the bar exam provides access to the same labor market, this definition seems realistic and reflects the negative opinions expressed by bar exam candidates about the fairness of the exam.

Overall, the exam has become less unfair after the reform. If the standards from Palermo were used throughout the country, pass rates would be significantly higher, and 12 percent more candidates would pass each year (about 4,200 per year). If all districts adopted the standards from Trieste, pass rates would be significantly lower, and 14 percent more candidates would fail each year (about 4,900). This implies that 26 percent of candidates experienced an unfair exam after the reform, about half of those who experienced an unfair result before the reform.[34] Overall, the reform seems to have decreased significantly the unfairness of the grading procedures.

5.3 Bar exam difficulty and the mobility of new lawyers.

Figure 3 shows that the number of passers per licensed lawyer is highly correlated with GDP per capita. Moreover, the number of passers per active lawyers is as high as 0.70 before the reform, or 0.20 after, which suggests that the number of passers in some districts exceeds by far the

[34]This slightly underestimates the unfairness after the reform, as it ignores the year-to-year variability in the difficulty of the written exam caused by the randomization of the grading district.

number of lawyers necessary to compensate for natural decline in the lawyer population. Even if we acknowledge that the growth rate of the legal profession is different across districts, Figure 4 shows that the average ratio between the number of passers and the change in the number of lawyers is extremely heterogeneous across districts. In the south, it is not uncommon to observe 3 or 4 passers for a one unit increase in the size of legal profession. Before the reform, this figure is as high as 10 or 11 in some districts. Figure 5a shows that the net out-migration of new lawyers is highly correlated with GDP per capita, suggesting a possible systematic flow of new lawyers from south to north.

The reform impacted the exam grading standards throughout the country as described in Table 6, which reports the pass rates implied by the estimated grading standards in each district for a given reference distribution (the implied pass rates). The variability in grading standards described in Table 6 (across and within districts) can be used to study the impact of grading standards on net out-migration.

Table 7 shows that net out-migration is positively correlated with implied pass rates. A 10 percent increase in the implied pass rate leads to a 39 percent increase in net out-migration.[35] This result is robust to the inclusion of district and year fixed effects and other control variables. We also estimate the impact of the difference between implied pass rates and their mean. This is because incentives to migrate may be linked to the differences in grading standards across districts, rather than to their absolute values.

Table 8 reports the estimated coefficients of the model

$$Net\ outmigration_{it} = \alpha_i + \beta X_{it} + \gamma_1 IPR_{it} + \gamma_2 Avg\ IPR_t + \epsilon_{it} \tag{8}$$

where IPR is the implied pass rate and Avg IPR the average implied pass rate, which is common across districts but varies over time taking two different values before and after the reform. We find that γ_1 is positive and that γ_2 has the opposite sign, but it is very similar in absolute value.[36] This suggests that net out-migration is driven by differences between implied

[35]The mean net out-migration is 180, with a standard deviation of 277. The mean implied pass rate is 37 percent, with a standard deviation of 12.

[36]Differences in absolute values are not statistically significant at conventional levels in all three specifications.

pass rates and average pass rates. The magnitude of the coefficients is similar to those in Table 7. Overall, the results in Tables 7 and 8 are consistent with the idea that there is a systematic flow of new lawyers from districts with lower standards to districts with higher standards.

6 Why do grading standards differ?

6.1 Occupational licensing and strategic interaction

In this section, we explain our empirical results by analyzing the incentives of licensing boards. More specifically, we study the empirical implications of the possibility that labor market mobility may lead licensing boards to strategically choose entry standards. We propose a model that captures the key features of this market (described in Section 2):

1. Local exams: Licensing boards choose the severity of grading standards.
2. Labor mobility: After admission, lawyers can freely move across districts.
3. Limited mobility of candidates: Exam candidates cannot easily move across districts.
4. Self-regulating profession: Licensing boards represent the interests of the professionals operating in each district.

Consider two districts denoted by $i = 1, 2$. There is a unit mass of potential entrants in each market who need to take an entry examination. Potential entrants are heterogeneous in their exam performance, with a distribution of types F_i.[37] In each market, a licensing board regulates entry by 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.[38]

[37] For simplicity, we assume that F_i is exogenous (candidates cannot choose the district in which they want to take the exam). One interpretation is that candidates in each district have the same ability m_i but their exam performance is equal to $m_i + \epsilon_i$, thus generating a distribution of types. They 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).

[38] 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).

Each licensed worker provides one unit of a professional service. In each market, there are heterogeneous consumers with a unit demand. 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.[39] If there is no mobility, the mass of workers in each market is equal to the pass rate, $\tilde{n}_i = n_i$.

Licensing boards choose n_i to maximize $\Pi(\tilde{n}_i)$, a continuous and globally concave function with maximum in $\tilde{n}_i^*$. Let's denote by $i = 1$ the board with the lower preferred salary, $w_1(\tilde{n}_1^*) < w_2(\tilde{n}_2^*)$.[40] The model simply requires that the two boards have two different preferred salaries. However, making some additional assumptions on the objective function of licensing boards, it is possible to make predictions about the characteristics of district 1 and 2, which can then be taken to the data. Licensing boards are (to some extent) captured by the profession, hence they exploit their market power to increase the salaries of licensed workers above their competitive level (the outside option salary, or the salary of the unregulated labor market for workers with similar skills, assumed to be the same for all types). 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.

Consider the case in which the objective function is producers' surplus, or, more realistically, a weighted sum of producers' surplus and total welfare.[41] Independently of the weight of producers' surplus in the objective of licensing boards, $w_i(\tilde{n}_i^*)$ 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.[42] For convenience, we will then refer to district 1 as the 'poor' market

[39] 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.

[40] 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.

[41] In this model, occupational licensing cannot affect consumers' willingness to pay, hence it cannot lead to efficiency gains. See Pagliero (2011) for a detailed discussion of this point and an empirical analysis of the objective function of licensing boards.

[42] 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.

and district 2 as the 'rich' market.

If there is no mobility of workers across markets, each board will set the entry threshold such that $n_i = \tilde{n}_i^*$. However, mobility of workers implies that there is a unique equilibrium wage $w_1(\tilde{n}_1) = w_2(\tilde{n}_2)$, where $n_1 + n_2 = \tilde{n}_1 + \tilde{n}_2$. In this case, the total number of admitted workers and the aggregate demand function determine the number of workers in each market, which is $\tilde{n}_i = f_i(n_i + n_j)$, where $f_i' > 0$.[43] This generates strategic interaction between licensing boards. In fact, the optimal pass rate of district i is

$$n_i^* = f^{-1}(\tilde{n}_i^*) - n_j, \tag{9}$$

unless it is constrained by the minimum or maximum possible pass rate.[44] Figure 16 describes the best reply functions. The licensing board in the poorer market 1, with lower desired wage w_1^*, will have a higher best reply.[45]

In the unique 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.[46] In equilibrium, some professionals admitted in the poor market move to the rich market. The board in district 1 effectively controls the market salary, by admitting more workers than would be necessary to achieve the preferred wage without labor mobility.[47] 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 A1). In equilibrium, entry exams may produce unfair outcomes, as they may treat differently *identical* individuals wishing to enter the *same* market. For example, if the two F distributions are identical, then some potential entrants who fail in the rich district would pass the exam in the poor district.

Consider now a policy that reduces the maximum pass rate, which is binding only in the

[43] For example, if $w_i = a_i - b_i\tilde{n}_i$, then $\tilde{n}_i = \frac{a_i - a_j}{b_i + b_j} + b_j \frac{n_i + n_j}{b_i + b_j}$.

[44] $n_i^* = min_i$ if $f^{-1}(\tilde{n}_i^*) - n_j < min_i$, and $n_i^* = max_i$ if $max_i < f^{-1}(\tilde{n}_i^*) - n_j$.

[45] The inequality $w_1(\tilde{n}_1^*) < w_2(\tilde{n}_2^*)$ implies that $f_1^{-1}(\tilde{n}_1^*) > f_2^{-1}(\tilde{n}_2^*)$. If demand functions are linear, $n_i^* = \frac{\tilde{n}_i^*(b_i + b_j)}{b_j} - \frac{a_i - a_j}{b_j} - n_j$.

[46] In equilibrium, $n_1 = \tilde{n}_1^* + \tilde{n}_2(w_1^*)$, where $\tilde{n}_2(w_1^*) > \tilde{n}_2^*$.

[47] Note that the same equilibrium arises in a more complex model in which only a given proportion of workers admitted in one market are willing to consider moving into a different market.

poor district. This is an interesting thought experiment, since the observed reform had exactly this effect. As discussed in Section 5, 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. However, districts in the north were not affected as they could increase the difficulty of the oral exam to compensate for the more generous grading of the written exam. In our model, this policy implies lower pass rates in the poor district, and no effect on pass rates in the other. Moreover, a reduced variability in pass rates implies less unfair outcomes (if quality distributions are sufficiently similar). Finally, the licensing board in the rich district benefits from a reduction in the maximum pass rate, which is binding only in the poor district, limits entry into the profession, and increases equilibrium wages.[48] The opposite is true for the poor district.[49]

6.2 Equilibrium with N districts

The model extends to a market with N districts. Assume that districts can be ranked by $w_1(\tilde{n}_1^*) \leq w_2(\tilde{n}_2^*)... \leq w_N(\tilde{n}_N^*)$.[50] 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 $n_i = max_i$.[51]

Consider now a policy that introduces a national 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 $Min[n_i^*, max_i]$. Figure 17 describes the changes

[48] Note that any maximum pass rate below $f^{-1}(\tilde{n}_2)$ generates in equilibrium the optimal outcome for the rich district.

[49] These observations extend to a model with N districts discussed in the next section.

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

[51] This is also the unique equilibrium outcome.

in equilibrium pass rates after the reform. 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 marginal district are constrained at the lower between max_i and max. Among these districts, some will certainly decrease their pass rate, since the reform introduces a new binding constraint for some districts. However, it is possible that some other districts, those with lower max_i and thus lower pass rates before the reform, are not affected. Districts in between the old and the new marginal (if there are any at all) will behave similarly to the new marginal, increasing their pass rate 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 entry thresholds, the exam is expected to become less unfair. 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.

6.3 Empirical implications and further evidence

Studying the strategic interaction among licensing boards provides a coherent explanation for the results in Sections 3 and 4, and the estimates of the grading standards in Section 6. In this section, we review this evidence and test additional implications.

1. ***Heterogeneity in admission outcomes.*** Strategic interaction explains the observed extreme differences in pass rates and entry thresholds across districts, and their correlation with GDP per capita.[52]

2. ***Unfairness of admission standards.*** Strategic interaction explains the unfairness

[52]The ranking of districts by admission thresholds is robust using different measures of income and wealth.

of entry standards documented in Section 5.2. Strategic interaction implies that, if the distribution of potential entrants is not too different across markets (empirically differences in quality are small, see Section 6), the admission outcomes will necessarily be unfair, as differences in candidate quality cannot undo the differences in equilibrium pass rates.

3. ***Consequences of the reform.*** Strategic interaction between districts implies a positive correlation between changes in pass rates and income per capita across districts. Indeed, Figure 18 shows that this correlation is positive and statistically significant (the correlation coefficient is 0.53, p-value 0.005). This evidence is based on a specific implication of strategic interaction. Given the small differences in the quality of candidates across districts, strategic interaction also explains the fact that the exam becomes less unfair after the reform (Section 5.2).

4. ***Identification of the marginal district.*** Figure 17 shows the impact of the reform on the equilibrium pass rates as a function of the preferred salary $w_i(\tilde{n}_i^*)$. The data on exam outcomes partially identify the ranking of districts by preferred salary.[53] In particular, the model implies that there is at least one district with $\Delta n_i > 0$ and, if only one district has $\Delta n_i > 0$, then this is the marginal district after the reform.[54]

   Figure 18 reports changes in pass rates and GDP per capita in each district (together with the 10-percent confidence intervals). There is only one district with a sizable increase in pass rate (Cagliari, with an approximately 10 percent increase in pass rate, statistically significant at the 10 percent confidence level), which the model identifies as the marginal district. While we acknowledge that the model is very stylized, it is interesting to note that districts with significant drops in pass rates are all poorer than the marginal (and are those with the highest pass rates before the reform). On average, districts poorer than the marginal decrease their pass rate by 15 percent (statistically significant at conventional levels), while richer districts do not display any significant change in pass rate (-1.6 percent

[53] However, the preferred salaries $w_i(\tilde{n}_i^*)$ are not identified.

[54] If more than one do, then the marginal district after the reform is the one with the highest preferred salary. In this case, the marginal district can only be identified if we assume that the unobserved ordering by preferred salary is the same as the ordering by observed income per capita.

on average, not statistically significant).[55]

5. ***Which districts benefit from the reform?*** Strategic interaction implies that the reform is supported by districts richer than the marginal, since districts richer than the marginal benefit from a decrease in average pass rate. In practice, all districts richer than Cagliari are located to the north of Rome. These districts account for 64 percent of Italian lawyers. 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.[56]

6. ***Grading standards before and after the reform.*** In discussing the implications of strategic interaction in Section 6, 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. However, districts can achieve any given pass rate by choosing different combinations of grading standards for the two components of the exam. This generates additional testable predictions.

   In equilibrium, all infra-marginal districts choose grading standards to achieve their maximum or minimum feasible pass rates. After the reform, poorer districts experience lower pass rates for the written exam, as a result of being matched with districts with higher standards, but they still benefit from increasing their pass rate as much as possible. Hence, they will relax their 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 14.

   Similarly, after the reform, richer districts experience higher pass rates for the written exam, as a result of being matched with districts with lower standards, but their incentives are not affected. Hence, they will increase their grading standard for the oral exam. In fact, Figure 14 shows that rich districts significantly increased the threshold for the oral

[55]Still, two districts in Figure 18 experience a statistically significant drop in pass rates. This is not in line with the model, which predicts no change in pass rates for these districts.

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

exam.[57]

7. ***The inefficient migration of exam candidates and licensed lawyers.*** Even if mobility of potential entrants is difficult and costly, there are gains from trying to arbitrage differences in the severity of grading standards. The 2003 reform decreased the differences in grading standards. As a consequence, the number of bar exam candidates decreased in poorer cities (Figure 2). Strategic interaction also implies a systematic flow of licensed lawyers from poor to rich districts. This flow is expected to be larger before the reform, when differences in standards are higher, and decrease afterwords. This is in line with the evidence in Figures 4 and 5 and Tables 7 and 8.

6.4 Alternative interpretations

Newspapers and media repeatedly suggested that differences in pass rates across districts were unfair to aspiring lawyers. While there was no solid evidence of heterogeneity in grading standards, differences in pass rates were interpreted as the result of differences in behavior of the grading committees. Two main explanations were proposed.

Based on anecdotal evidence (and perhaps some prejudice) that corruption was worse in the south, some suggested that this was the reason for the higher pass rates. However, while some cases of corruption were reported, this cannot explain why richer districts in the north increased their grading standards for the oral exam after the reform. Presumably unaffected by corruption, districts in the north should have kept their standards unchanged.[58]

The second explanation was related to the potential profitability of administering exams to a large number of candidates. This view was mainly based on the observation that easier exams attracted a larger number of candidates, and increased the demand for hotels, restaurants, and

[57] Note that in equilibrium, 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 thresholds for the oral exam. Hence, poor districts have no benefit applying low grading standards in the written exam after the reform. In fact, after the reform, all districts use very similar grading standards in the written exam (Figure 11).

[58] Alternatively, lower social capital can be used to explain lower grading standards in southern regions. The idea is that grading committees are not fully internalizing the potential negative effects to society of implementing lax grading standards. Still, even in this case, it is difficult to explain why districts in the north increased grading standards in the oral exam after the reform.

transportation services during the examination. It is possible that local bar associations may indirectly benefit from a large number of bar exam candidates, although one should acknowledge that the costs of organizing the exam also increase with the number of candidates.[59] Still, districts in the north could have benefited from a larger number of potential candidates as well. Moreover, as in the previous case, it is difficult to explain why they increased the grading standards for the oral exam after the reform, making their exam less appealing to potential bar exam candidates.

In summary, although these explanations have some intuitive appeal, they do not seem to square with some key empirical evidence. It is possible that they contribute towards explaining some of the differences in the level of pass rates across districts, but they do not undermine the evidence in favor of a strategic interaction among licensing boards.[60]

7 Local exam, mobility, and a policy dilemma

In this section, we discuss the advantages and disadvantages of alternative policies in light of our empirical results and the incentives generated by strategic interaction. We take as a benchmark exam regulations prior to the reform, which featured local licensing exams, mobility of professionals, and restrictions on the mobility of candidates. The objective is to draw more general conclusions that might shed light on the current licensing policy debate in the EU and the US.

1. ***Local exams with randomization (or a maximum pass rate)***. Our data provides direct evidence from the introduction of this type of regulation. The introduction of the randomization process reduced the overall pass rate. Strategic interaction implies that, as a group, professionals in rich districts benefited from the reform, while those in poor districts were damaged by it.[61] Still, the randomization did have some positive effects. It

[59] Exam fees are paid to the central government and do not vary across districts.

[60] The theoretical framework in Section 6.1 does not exclude that the potential profits from organizing a large bar exam may enter the objective function of licensing boards. If poorer districts benefit more from a large number of candidates, incentives to decrease grading standards will be even higher, and the same equilibrium outcomes will result.

[61] Since entry into the profession fell, consumers' and social welfare presumably decreased. This conclusion

decreased heterogeneity in exam thresholds and the unfairness of the exam.

2. ***Local exams without mobility of workers***. Labor mobility generates competition among licensing boards. Hence, licensing boards would generally prefer to limit labor mobility, as competition places a constraint on the outcomes they can achieve. Although licensing boards benefit from eliminating mobility of workers, the overall welfare effect is theoretically ambiguous, as restricting mobility increases salaries in some districts but may decrease them in others.[62]

3. ***A national licensing exam***. A national exam guarantees fairness. However, there is an inherent risk in concentrating the authority to regulate entry into a single institution by setting a national grading standard. The outcomes of setting up a national exam depend on the decision process that determines the national grading standards.

   In the Italian market for lawyers, we find that the majority of districts, representing about 64 percent of professionals (see Section 6.3), would realistically be in favor of a lower pass rate and a higher equilibrium salary at the national level.[63] Hence, our results suggest that, if grading standards were determined by some sort of majority rule, a national exam would probably imply lower entry and a redistribution of rents towards richer districts.

4. ***Local exams with mobility of candidates***. In our model, rich districts have an incentive to make the mobility of candidates costly, for example by requiring a minimum number of years of training in the district and setting stringent rules about the number of trainees per professional. In fact, the mobility of candidates in the Italian case is difficult.

   In our model, if we allow for perfect mobility of candidates, then all candidates will take the exam in the poorest district (or districts), where grading standards are lowest. This will necessarily increase entry and lower salaries. Moreover, in principle, no candidate experiences an unfair exam in equilibrium.

requires that there is no significant impact of exam thresholds on consumers' demand, or external effects. See Pagliero (2011) for a discussion of this point.

[62] This result is reminiscent of the welfare effects of third degree price discrimination.

[63] This assumes that the ranking by GDP per capita corresponds to the ranking by preferred salary.

Mobility of candidates and professionals seems to generate the largest entry into the profession, lowest prices for consumers, and fair exams. Still, in practice, an equilibrium in which all (or most) candidates strategically move across districts to exploit differences in grading standards is unlikely to be politically stable. Moreover, since in practice mobility is unlikely to be perfect, some candidates will indeed experience differences in grading standards.

Overall, competition among local licensing boards counterbalances their tendency to restrict entry into the profession. Still, competition comes at the cost of generating unfair exams. While some exam arrangements may be preferable in specific circumstances, there seems to be no general solution to this policy dilemma. The origin of this dilemma lies in the dual role of licensing boards, which not only represent the interest of professionals (as they are elected by the professionals) but they also provide access to specific labor markets. Ideally, one possible solution to the dilemma would be to separate these two roles. This could be achieved by setting up grading committees that are independent from the interests of the regulated profession.

8 Conclusions

This paper shows that the combination of local licensing regulations and labor mobility across local markets may lead to extreme heterogeneity in admission outcomes across markets, unfair (discriminatory) admission procedures, and inefficient mobility of workers. We provide specific evidence that strategic interaction among licensing boards may help explain why these two features of regulated markets can lead to such outcomes. This sheds 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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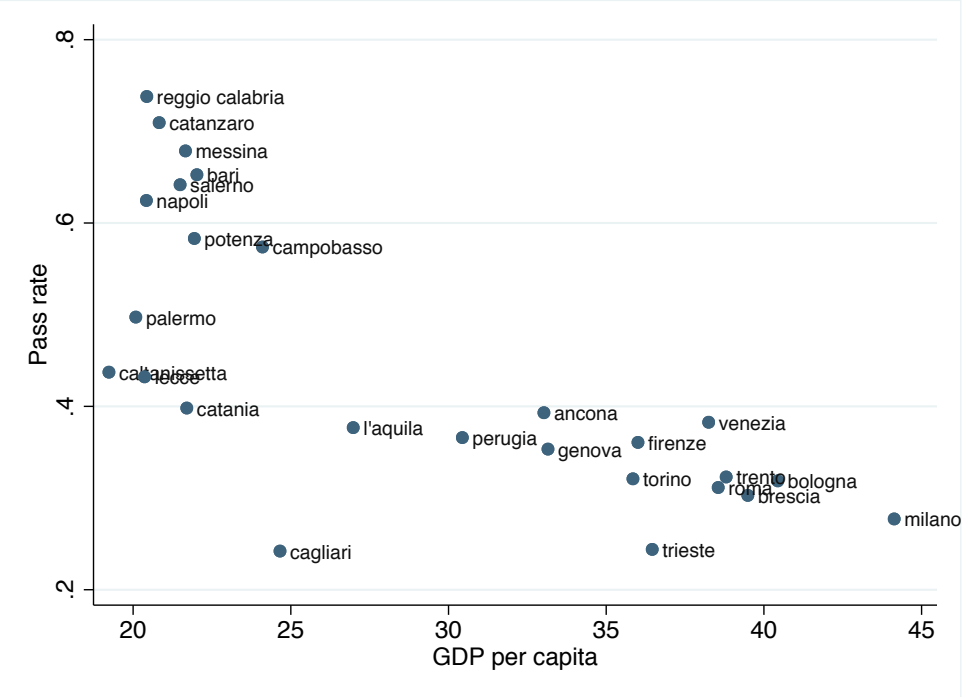
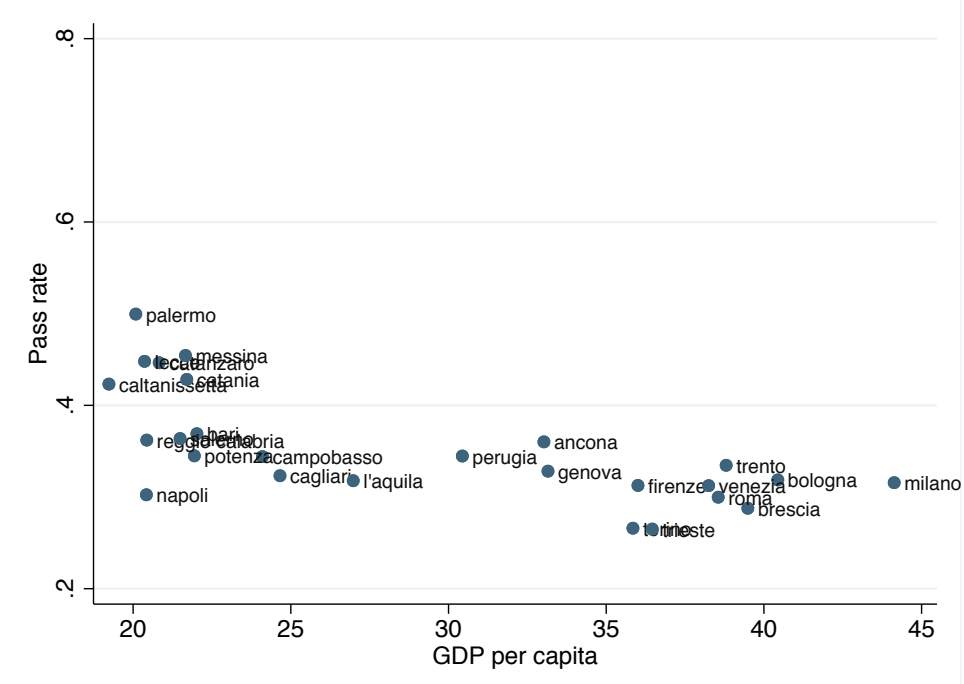
9 Figures

Figure 1: Mean pass rate by district.

(a) Before the reform.



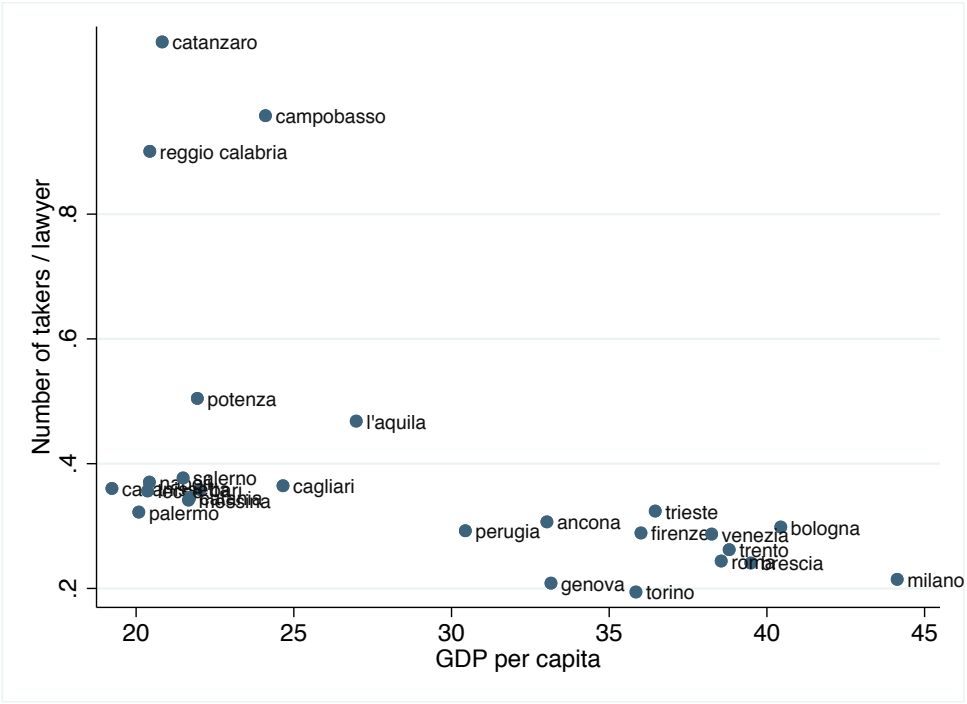
(b) After the reform.



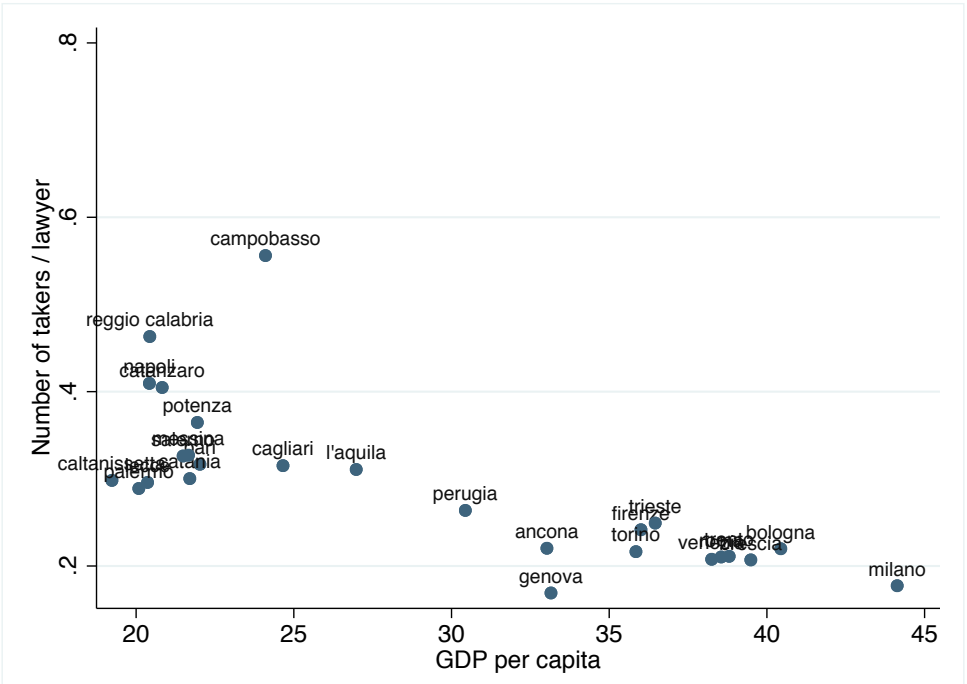
Notes: Figure displays the average pass rate for each district in the period before and after the 2004 reform. GDP per capita is the average real GDP per capita in each district in the sample period (2009 euros).

Figure 2: Mean number of takers per licensed lawyer by district.

(a) Before the reform.



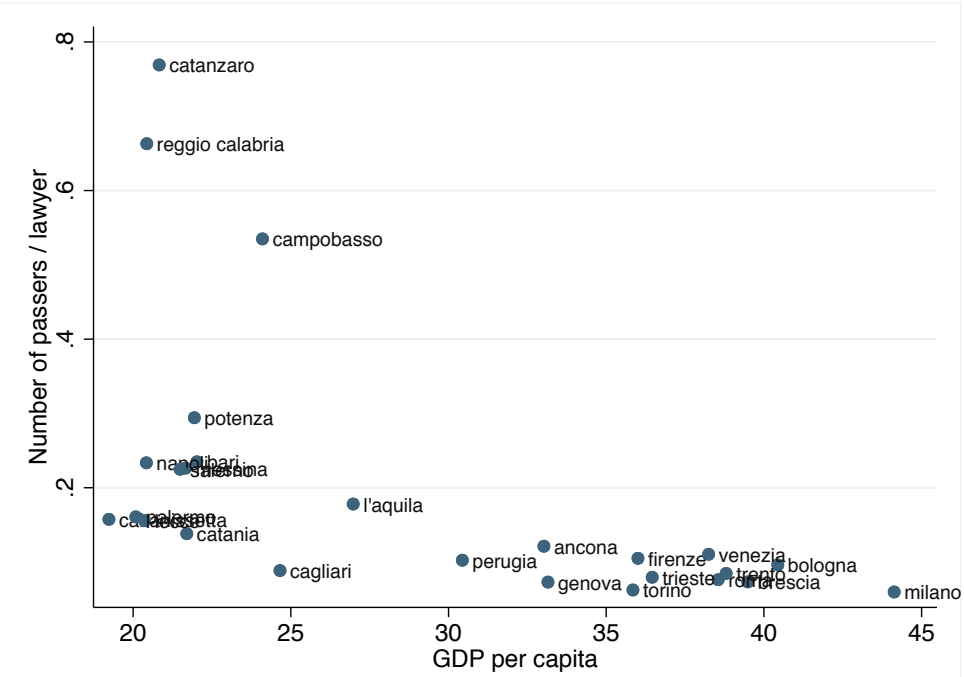
(b) After the reform.



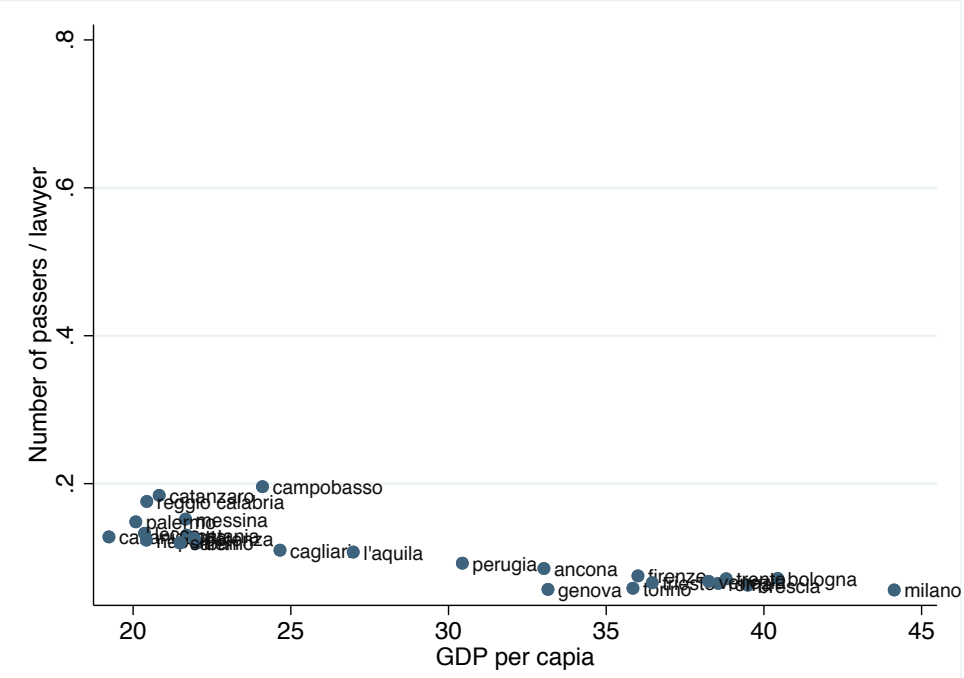
Notes: Figure shows the average number of exam candidates for each district in the period before and after the 2004 reform. GDP per capita is the average real GDP per capita in each district in the sample period (2009 euros).

Figure 3: Mean number of passers per licensed lawyer by district.

(a) Before the reform.

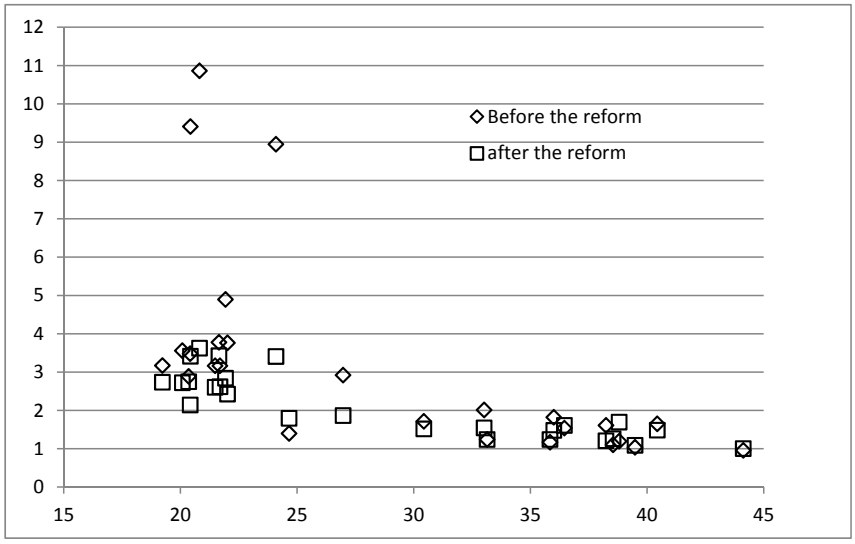


(b) After the reform.



Notes: Figure shows the average number of successful bar exam candidates for each district in the period before and after the 2004 reform (divided by the number of lawyers in each district). GDP per capita is the average real GDP per capita in each district in the sample period (2009 euros).

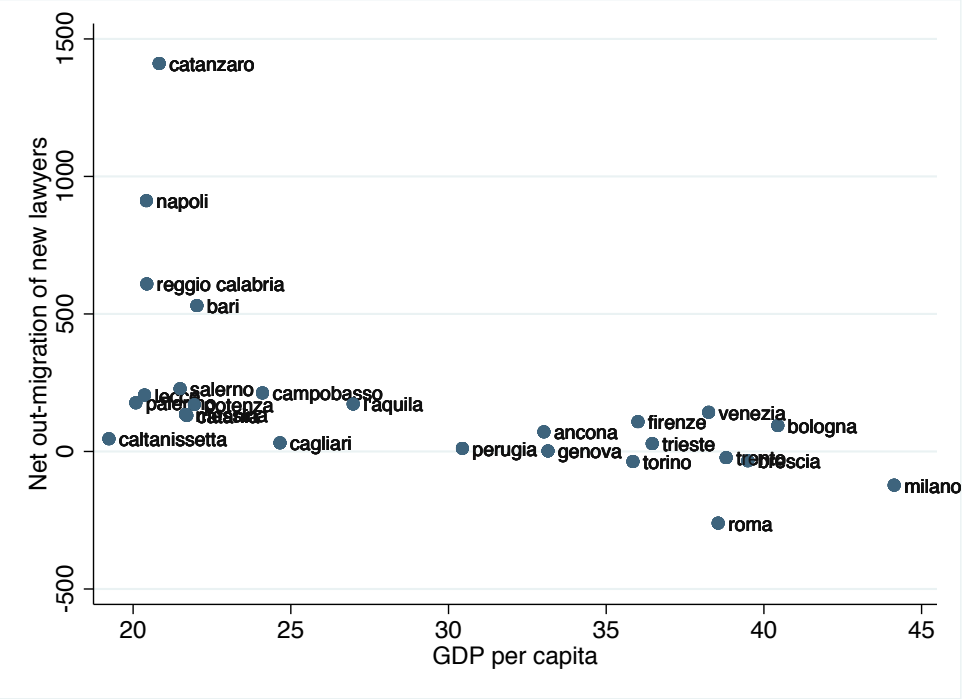
Figure 4: Ratio of passers over new lawyers and GDP per capita.



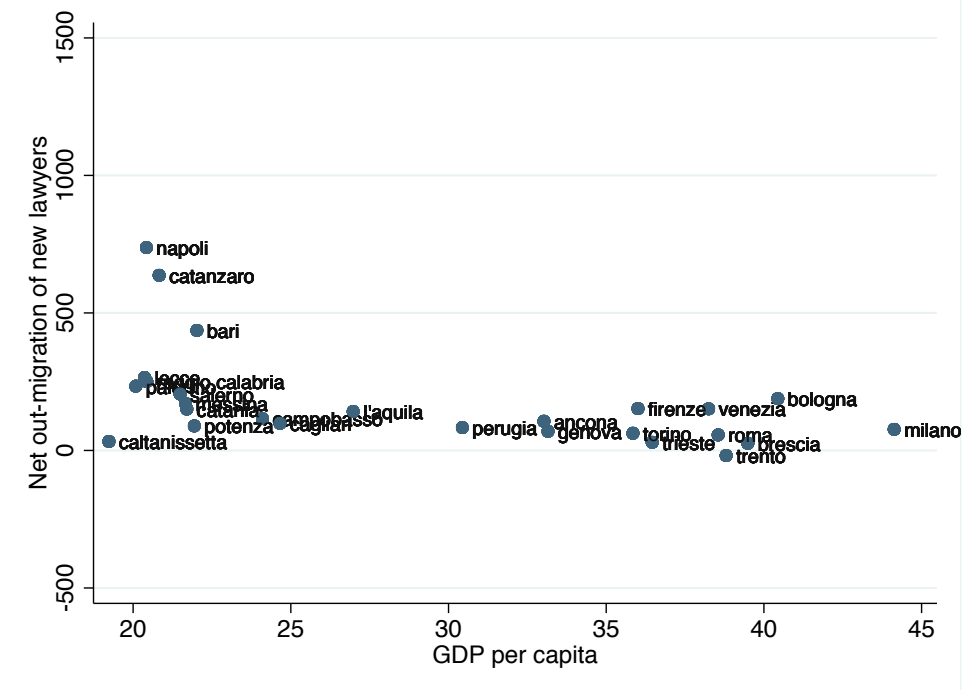
Notes: Figure shows the ratio of the average number of successful bar exam candidates and the average change (always positive) in the number of lawyers in each district (from administrative data on registered lawyers). GDP per capita is the average real GDP per capita in each district in the sample period (2009 euros).

Figure 5: Net out-migration of new lawyers.

(a) Before the reform.



(b) After the reform.



Notes: Figure shows the yearly average net out-migration in each district (Number of successful candidates in the bar exam - Number of newly registered lawyers). GDP per capita is the average real GDP per capita in each district in the sample period (2009 euros).

Figure 6: Pass rates and GDP per capita of the grading district.

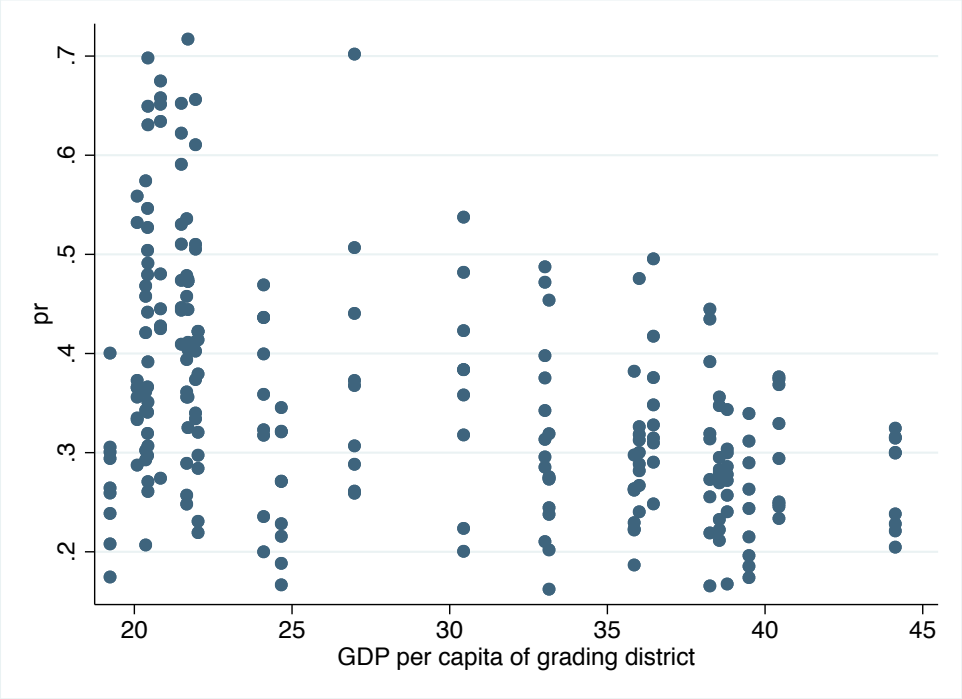


Figure 7: Pass rates in Catanzaro and GDP per capita of the grading district.

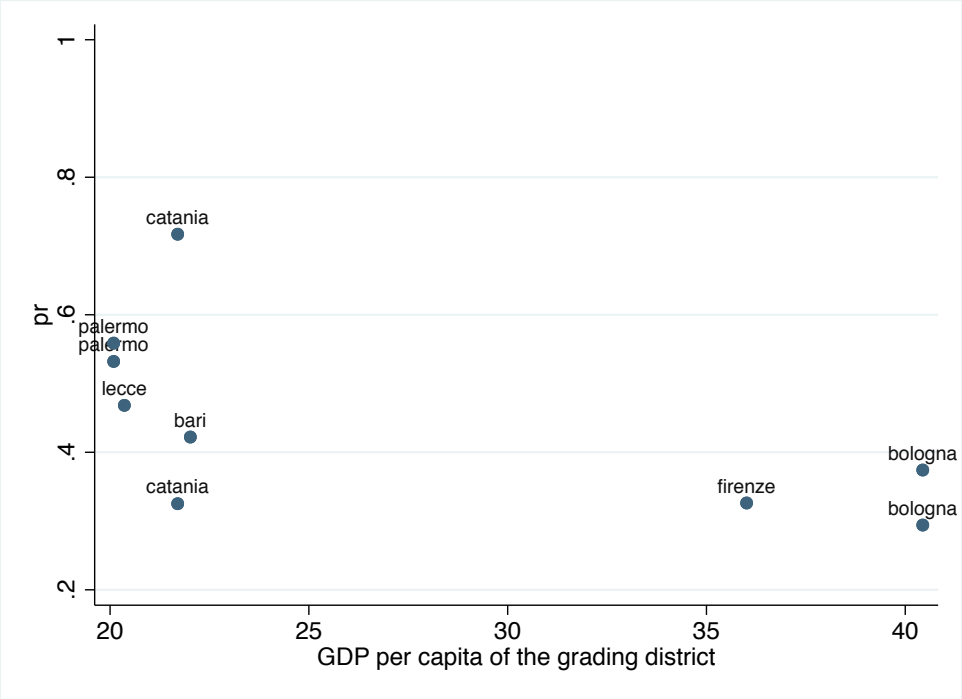
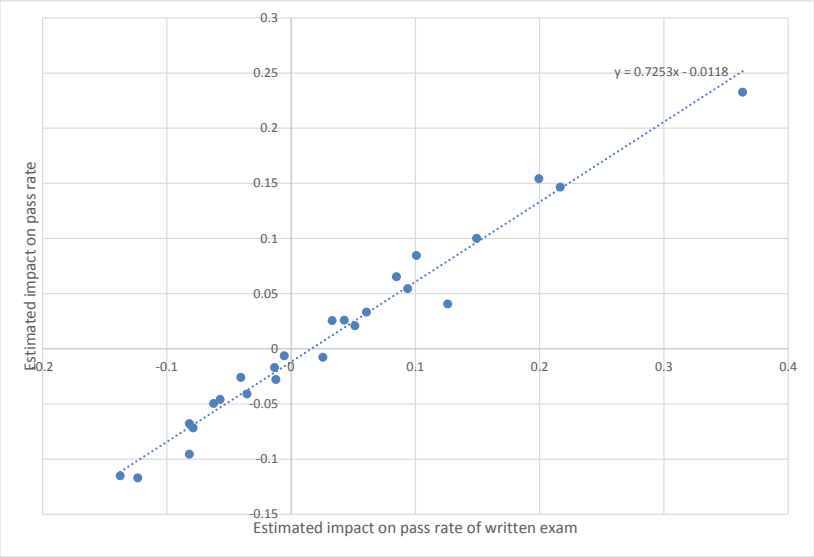
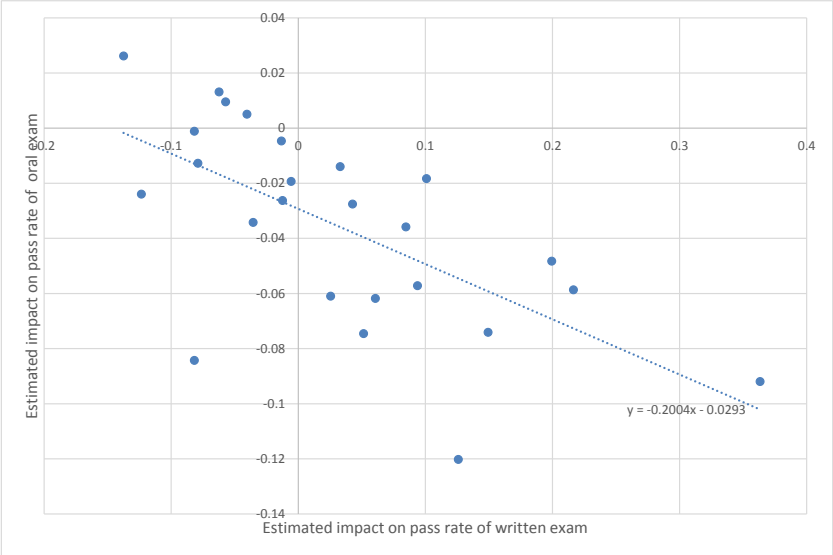


Figure 8: Estimated impact of each grading district on overall pass rates and pass rates for the written exams.



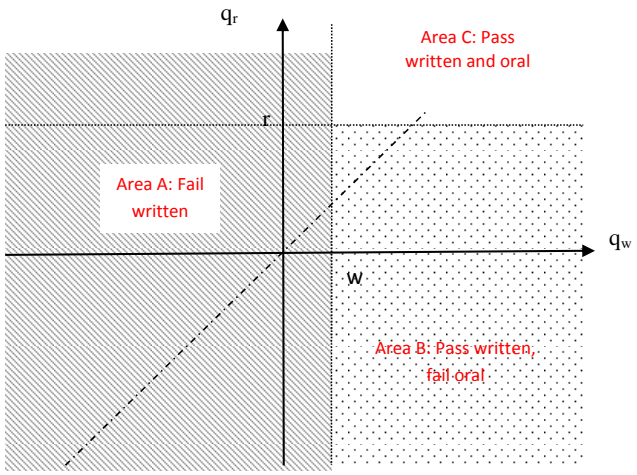
Notes: Figure shows the OLS estimated fixed effects α_j in the regression model $Exam\ Outcome_{it} = \alpha_i + \alpha_j + \epsilon_{it}$, where the dependent variable is the pass rate for the written exam (horizontal axis) and the overall pass rate (vertical axis). Values for Ancona (the omitted district)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

Figure 9: Estimated impact of each grading district on pass rates for the oral and written exams.



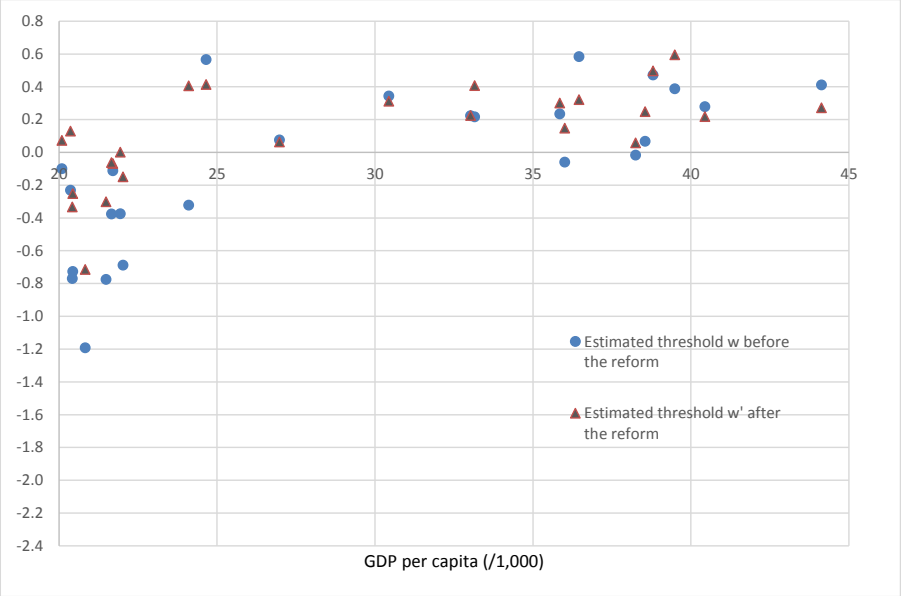
Notes: Figure shows the OLS estimated fixed effects α_j in the regression model $Exam\ Outcome_{it} = \alpha_i + \alpha_j + \epsilon_{it}$, where the dependent variable is the pass rate for the written exam (horizontal axis) and the pass rate for the oral exam (vertical axis). Values for Ancona (the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

Figure 10: Empirical model of the admission process.



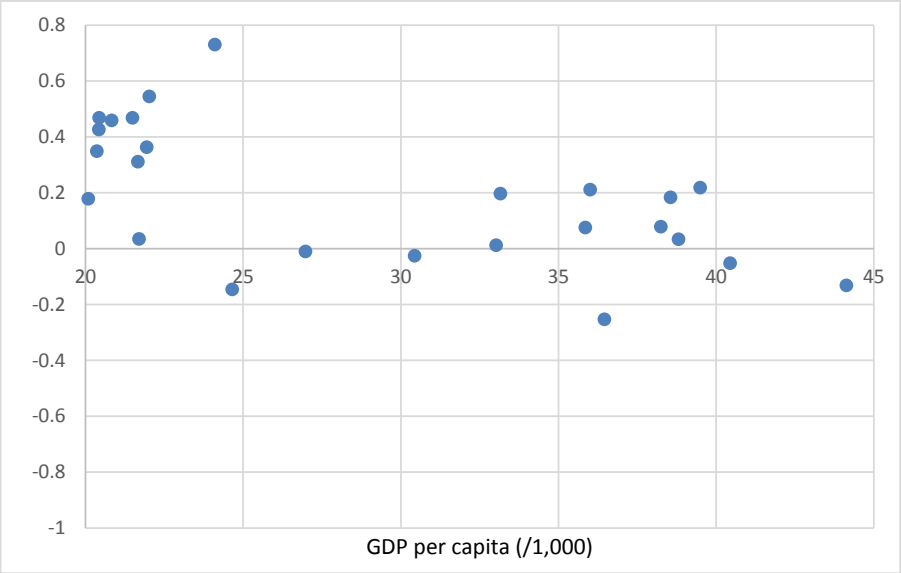
Notes: Figure shows exam outcomes as a function of grading thresholds for a population of exam candidates with a performance distribution described by (4).

Figure 11: Grading standards in written exam and GDP per capita.



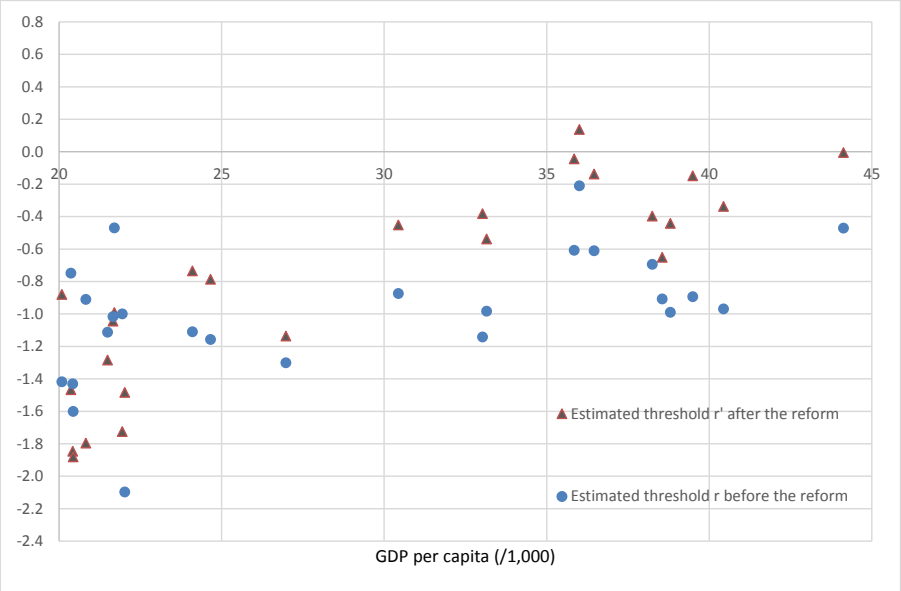
Notes: Figure shows estimated grading thresholds in the written exam for each district. GDP per capita is the average real GDP per capita in each district in the sample period (2009 euros).

Figure 12: Change in grading standards for written exams and GDP per capita.



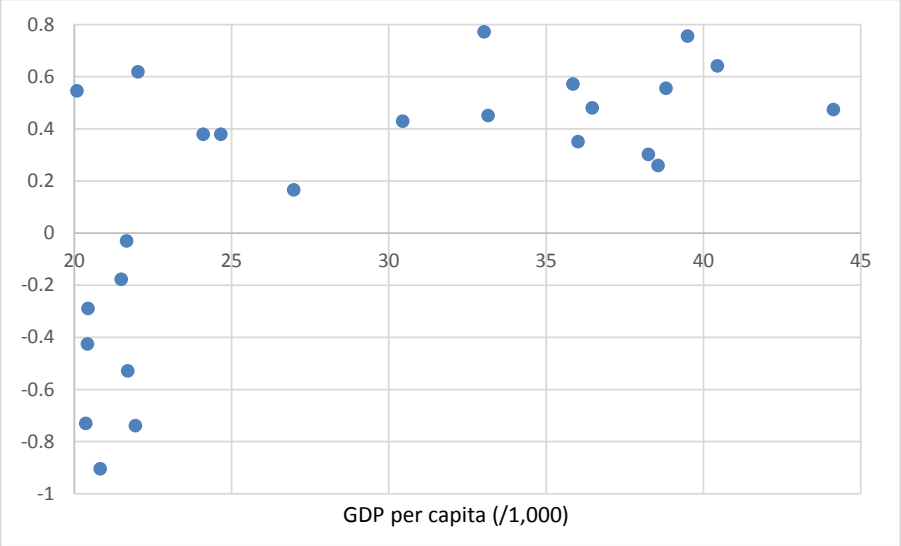
Notes: Figure shows estimated changes in grading thresholds for the written exam between the period before and after the reform. GDP per capita is the average real GDP per capita in each district in the sample period (2009 euros).

Figure 13: Grading standards for oral exam and GDP per capita.



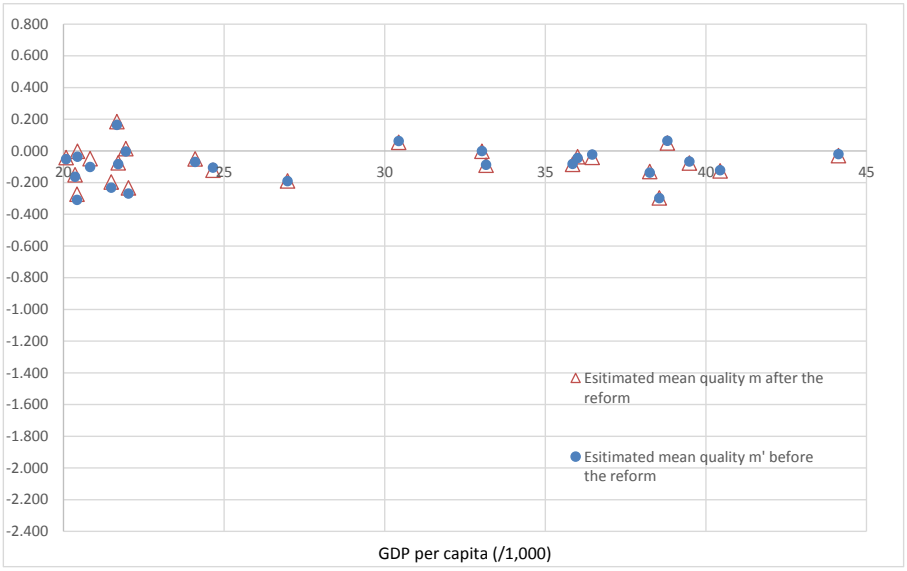
Notes: Figure shows estimated grading thresholds for the oral exam for each district. GDP per capita is the average real GDP per capita in each district in the sample period (2009 euros).

Figure 14: Change in grading standards for oral exams and GDP per capita.



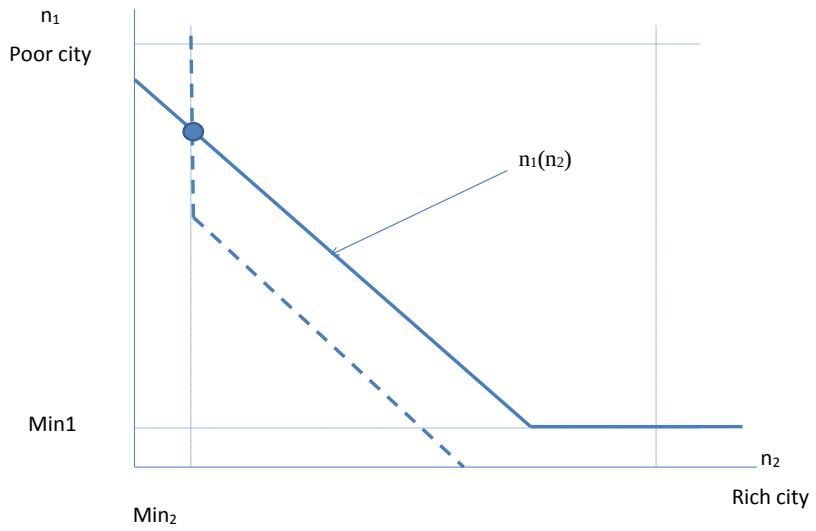
Notes: Figure shows estimated changes in grading thresholds for the oral exam between the period before and after the reform. GDP per capita is the average real GDP per capita in each district in the sample period (2009 euros).

Figure 15: Estimated mean quality of candidates and GDP per capita.



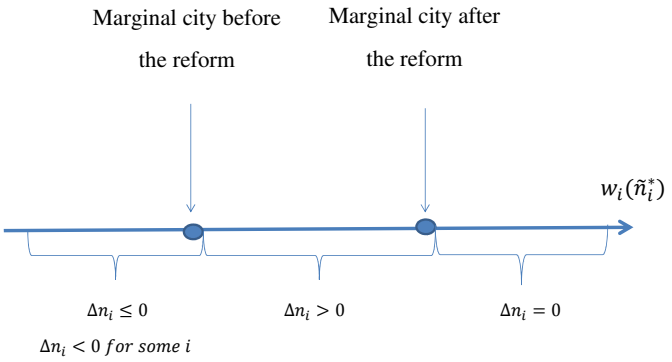
Notes: Figure shows estimated mean quality of candidates in each district. GDP per capita is the average real GDP per capita in each district in the sample period (2009 euros).

Figure 16: Equilibrium admissions.



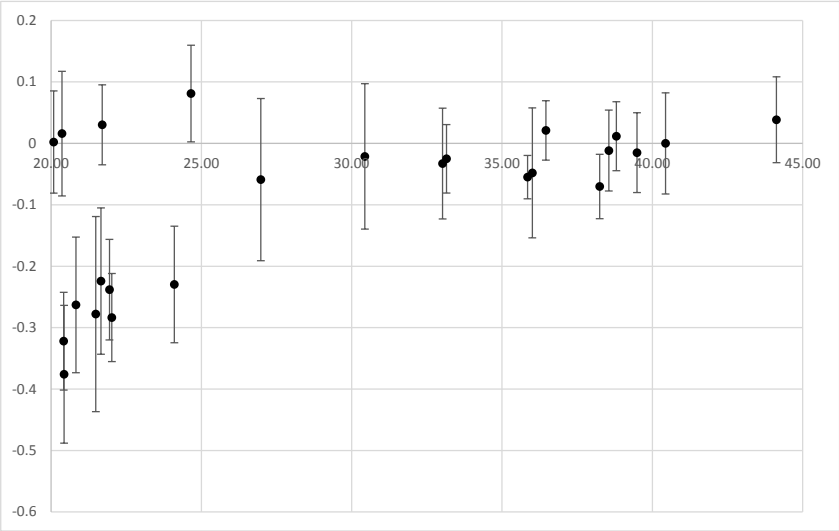
Notes: Figure shows an equilibrium in which the rich district is constrained by its minimum possible pass rate.

Figure 17: The impact of the reform on equilibrium pass rates.



Notes: Figure shows the impact of the reform (in the model with N districts) on the equilibrium pass rate in each district as a function of the desired pass rate.

Figure 18: 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).

10 Tables

Table 1: Summary statistics (1998-2012)

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.

Table 2: Mean pass rates and number of exam candidates by district.

	Pass rate	Pass rate	Passers	Passers	Takers written exam	Takers written exam	Change in pass rate
	(1998 - 2003)	(2004 - 2012)	(1998 - 2003)	(2004 - 2012)	(1998 - 2003)	(2004 - 2012)	
Ancona	0.39	0.36	261	271	666	724	-0.03
Bari	0.65	0.37	1024	776	1,567	2,067	-0.28
Bologna	0.32	0.32	583	644	1,837	2,002	0.00
Brescia	0.30	0.29	177	241	591	818	-0.02
Cagliari	0.24	0.32	170	316	706	925	0.08
Caltanissetta	0.44	0.42	86	95	194	225	-0.01
Campobasso	0.57	0.34	272	145	493	417	-0.23
Catania	0.40	0.43	369	485	922	1,118	0.03
Catanzaro	0.71	0.45	1957	727	2,734	1,614	-0.26
Firenze	0.36	0.31	542	584	1,518	1,895	-0.05
Genova	0.35	0.33	238	273	675	821	-0.03
L'aquila	0.38	0.32	377	334	1,003	991	-0.06
Lecce	0.43	0.45	516	631	1,172	1,397	0.02
Messina	0.68	0.45	298	283	454	614	-0.22
Milano	0.28	0.32	686	1012	2,446	3,225	0.04
Napoli	0.62	0.30	1949	1640	3,113	5,498	-0.32
Palermo	0.50	0.50	454	596	907	1,168	0.00
Perugia	0.37	0.34	122	173	336	492	-0.02
Potenza	0.58	0.34	267	167	457	485	-0.24
Reggio Calabria	0.74	0.36	785	316	1,075	847	-0.38
Roma	0.31	0.30	928	1237	2,969	4,031	-0.01
Salerno	0.64	0.36	493	404	796	1,102	-0.28
Torino	0.32	0.27	294	403	917	1,505	-0.05
Trento	0.32	0.33	38	47	118	141	0.01
Trieste	0.24	0.27	99	116	410	439	0.02
Venezia	0.38	0.31	568	546	1,489	1,710	-0.07
Total	0.46	0.34	13,549	12,464	29,560	36,272	-0.11

Notes: Table reports the average pass rates and the number of exam takers for the Italian bar exam in each district before and after the 2004 reform. The data includes observations for 26 districts from 1998 to 2012.

Table 3: The heterogeneous impact of grading district on pass rates (differences in GDP per capita).

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
VARIABLES	Pass rate written exam	Pass rate written exam	Pass rate written exam	Pass rate	Pass rate	Pass rate	Pass rate oral exam	Pass rate oral exam	Pass rate oral exam
GDP per capita 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)	0.00235 (0.00145)	0.00232** (0.000835)	0.00228*** (0.000805)
District FE		Yes	Yes		Yes	Yes		Yes	Yes
Controls			Yes			Yes			Yes
Obs.	234	234	234	234	234	234	234	234	234
R^2	0.262	0.403	0.463	0.197	0.401	0.460	0.020	0.816	0.821

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.

Table 4: The heterogeneous impact of grading districts on pass rates (differences in selectivity before the reform).

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
VARIABLES	Pass rate written exam	Pass rate written exam	Pass rate written exam	Pass rate	Pass rate	Pass rate	Pass rate oral exam	Pass rate oral exam	Pass rate oral exam
Average pass rate of grading district before the reform	0.599***	0.556***	0.554***	0.385***	0.394***	0.392***	-0.248***	-0.137***	-0.136***
	(0.0566)	(0.0517)	(0.0535)	(0.0528)	(0.0426)	(0.0440)	(0.0719)	(0.0303)	(0.0298)
District FE		Yes	Yes		Yes	Yes		Yes	Yes
Controls			Yes			Yes			Yes
Obs.	234	234	234	234	234	234	234	234	234
R^2	0.424	0.509	0.568	0.238	0.467	0.525	0.076	0.821	0.826

Notes: Table reports results from OLS regressions of pass rates on the average pass rates of the grading district in the period before the reform. 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 5: 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 (4), where the mean quality of candidates in each district is given by (5) and (6) in the period before and after the reform respectively. The table also reports the estimated grading thresholds 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.

Table 6: Ranking of districts by severity of grading standards.

Rank	District (before the reform)	Pass rate (before the reform)	District (after the reform)	Pass rate (after the reform)
1	Trieste	0.21	Trieste	0.22
2	Cagliari	0.23	Torino	0.24
3	Milano	0.24	Brescia	0.26
4	Trento	0.25	Trento	0.26
5	Brescia	0.27	Milano	0.27
6	Perugia	0.29	Firenze	0.27
7	Torino	0.30	Perugia	0.28
8	Bologna	0.31	Campobasso	0.30
9	Firenze	0.32	Potenza	0.31
10	Genova	0.33	Genova	0.31
11	Ancona	0.34	Venezia	0.32
12	Caltanissetta	0.35	Cagliari	0.32
13	Roma	0.38	Bologna	0.32
14	Catania	0.38	Ancona	0.33
15	Venezia	0.38	L'aquila	0.34
16	L'aquila	0.40	Caltanissetta	0.34
17	Lecce	0.45	Reggio Calabria	0.34
18	Palermo	0.47	Messina	0.34
19	Campobasso	0.52	Roma	0.37
20	Potenza	0.53	Napoli	0.37
21	Messina	0.53	Salerno	0.41
22	Salerno	0.66	Catania	0.41
23	Napoli	0.69	Bari	0.43
24	Reggio Calabria	0.69	Catanzaro	0.44
25	Bari	0.70	Lecce	0.45
26	Catanzaro	0.70	Palermo	0.46
Average		**0.46**		**0.35**

Notes: Table reports the estimated ranking of districts according to the pass rate implied by the estimated grading thresholds in each district (Table 5) and a bivariate normal distribution of candidates' performance, described in equation (4), where the mean quality of candidates is equal to the mean of the estimated m_i and $\rho = 0.438$.

Table 7: The impact of grading standards on net out-migration.

	(1)	(2)	(3)	(4)
VARIABLES	Net out-migration	Net out-migration	Net out-migration	Net out-migration
Implied pass rate	14.69***	7.621**	8.347***	7.148***
	(3.607)	(3.065)	(2.604)	(2.455)
District FE		Yes	Yes	Yes
Controls			Yes	Yes
Year FE				Yes
Obs.	338	338	338	338
R^2	0.341	0.665	0.684	0.730

Notes: Table reports results from OLS regressions of net out-migration (Number of successful candidates in the bar exam - Number of newly registered lawyers in each district and year) on implied pass rates (in percentage). Implied pass rates, described in Table 6, are a measure of estimated grading standards. 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 2000-2012 period. Standard errors clustered by district are reported in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 8: The impact of grading standards on net out-migration.

	(1)	(2)	(3)
VARIABLES	Net out-migration	Net out-migration	Net out-migration
Implied pass rate	16.57***	10.36***	9.666***
	(3.826)	(3.118)	(2.869)
Avg implied pass rate	-14.74***	-8.518***	-8.842
	(4.023)	(2.532)	(5.524)
District FE		Yes	Yes
Controls			Yes
Obs.	338	338	338
R^2	0.379	0.675	0.688

Notes: Table reports results from OLS regressions of net out-migration (Number of successful candidates in the bar exam - Number of newly registered lawyers in each district and year) on implied pass rates (in percentage) and average implied pass rate for the period before and after the reform. Implied pass rates, described in Table 6, are a measure of estimated grading standards. 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 2000-2012 period. Standard errors clustered by district are reported in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

A Additional tables and figures

Table A1: 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 A2: 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

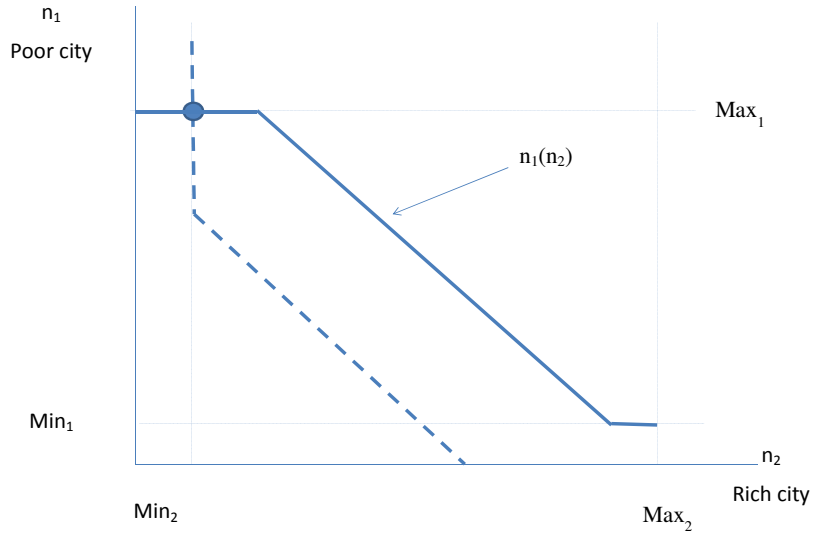
Notes: Table reports results from OLS regressions of the number of bar exam candidates in each district (divided by the number of lawyers in each district) on GDP per capita (average for the 1998-2012 period, measured in 2009 euros) of the district grading the written component of the exam. Control variables 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 A3: The heterogeneous impact of grading districts on pass rates (interaction effects)

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	Pass rate written exam	Pass rate written exam	Pass rate	Pass rate	Pass rate oral exam	Pass rate oral exam
X_j	-0.0132***	-0.0121***	-0.0155***	-0.0147***	-0.00159	-0.00174
	(0.00375)	(0.00352)	(0.00318)	(0.00304)	(0.00218)	(0.00204)
$X_j \times X_i$	0.000136	0.000103	0.000294***	0.000269**	0.000128	0.000131
	(0.000130)	(0.000129)	(0.000104)	(0.000102)	(8.58e-05)	(8.14e-05)
District FE	Yes	Yes	Yes	Yes	Yes	Yes
Controls		Yes		Yes		Yes
Obs.	234	234	234	234	234	234
R^2	0.406	0.465	0.421	0.476	0.819	0.824

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 (X_j) and the interaction of X_j with the GDP per capita (average for the 1998-2012 period, measured in 2009 euros) of the district in which the exam takes place (X_i). Control variables include real GDP per capita (2009 euros, time varying), unemployment rate, and population density of the district in which the exam is taken. All these controls vary across district and year. The data include observations for 26 districts in the 2004-2012 period. Standard errors clustered by district.

Figure A1: Equilibrium admissions.



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.

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, r_i, and ρ of the model in Section 6.1 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 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 (5) and (6) 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 $M = m_i w_i + m_j w_j$, where w_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, $M = \sum_{i=1}^{n} w_i m_i$, but also the constraint on the variance of the quality distribution, $V = \sum_{i=1}^{n} w_i \left[(m_i - M)^2 + 1 \right]$. 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.