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Estimating the returns to Occupational Licensing: Evidence from Regression Discontinuities at the Bar Exam

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Maurizio Franzini

Estimating the returns to Occupational Licensing: Evidence from Regression Discontinuities at the Bar Exam

(Stima dei rendimenti delle licenze occupazionali: evidenze da un disegno a regressione discontinua sull'esame di avvocato)

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Estimating the returns to Occupational Licensing: Evidence from Regression Discontinuities at the Bar Exam
(Stima dei rendimenti delle licenze occupazionali: evidenze da un disegno a regressione discontinua sull'esame di avvocato) *

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Abstract

We estimate the monetary returns from professional licensing of Italian lawyers. To enter the profession lawyers must pass a written and a oral exam featuring sharp discontinuities in the passing grade. Focusing on a subgroup of Italian law graduates taking the bar exam in Turin (a city in northwest Italy), we exploit the sharp discontinuity generated by the bar exam to compare individuals who marginally pass and fail the bar exam and compare their earnings up to 19 years since their first attempt at the bar exam. We find that individuals with a license to practice law earn, on average, 21,000 euros gross more per year than individuals without a license. These returns are positive in each year of the analysis, increase up to the tenth year and then decrease.

Abstract

Il lavoro stima i ritorni monetari derivanti dalla concessione di licenze professionali agli avvocati italiani. Per accedere alla professione gli avvocati devono superare una prova scritta ed una orale. Concentrandoci su un sottogruppo di laureati italiani in giurisprudenza che sostengono l'esame di abilitazione a Torino, sfruttiamo la discontinuita' generata dal voto ottenuto per confrontare individui che superano e falliscono marginalmente l'esame di abilitazione e confrontiamo i loro guadagni fino a 19 anni dal loro primo tentativo di esame di avvocato. I risultati mostrano che gli individui con l'abilitazione guadagnano in media 21.000 euro lordi in piu' all'anno rispetto agli individui senza abilitazione. Tali rendimenti sono positivi in ogni anno dell'analisi, aumentano fino al decimo anno per poi diminuire.

1 Introduction

Occupational licensing regulations require workers to obtain a special permit (a license) to work; a license is typically obtained after passing an exam and meeting educational and experience requirements. Licensing is a widespread and growing phenomenon both in the US and Europe. Kleiner and Krueger (2013) estimated that while during the early 1950s less than 5% of the US workforce was in occupations covered by licensing laws, this share had risen to 29% by 2008. Koumenta and Pagliero (2019) find that licensing affects about 22% of workers in the EU.[1]

This pervasiveness of licensing in the economy has made quantifying its effects on earnings a classic topic in the professional licensing literature, dating back to Adam Smith (Smith, 1776)[2]. While several studies have since then attempted to estimate the effects of licensing on earnings[3], they have faced the challenge of potential endogeneity of licensing status. To address this, researchers have typically relied on controlling for workers' characteristics to make licensed and non-licensed workers comparable. However, finding a credible instrument for professional licensing has remained an open question since Friedman and Kuznets (1945). To fill this gap in the literature, we propose a novel approach based on a regression discontinuity design, which makes workers identical in all aspects except their licensing status.

The Italian bar exam offers an ideal setting to estimate the returns from professional licensing for lawyers. To enter the profession, law graduates must pass a written and oral exam featuring sharp discontinuities in grades. Focusing on a subgroup of Italian law graduates taking the bar exam in Turin (the fourth largest city in Italy), we exploit the sharp discontinuity generated by the bar exam to compare individuals who marginally pass and fail the bar exam and compare their earnings up to 19 years since their first

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[1]Mocetti et al. (2021) shows that in Italy, the empirical ground of this paper, licensing affects about 24% of workers and 53% of college graduates.

[2]Adam Smith argued that long apprenticeships "prevent this reduction of price, and consequently of wages and profit, by restraining that free competition which would most certainly occasion it." Adam Smith (1776 [1937]) in the *Wealth of Nations* (Book I, Ch. 10, Part II).

[3]Gittleman et al. (2018), Gittleman and Kleiner (2016), Ingram (2019), Kleiner and Krueger (2010, 2013), Kleiner and Park (2010), Kleiner and Vorotnikov (2017), Koumenta and Pagliero (2019), Timmons and Thornton (2019), Zhang (2019)

attempt at the bar exam.

Despite no limit on the number of times one can take the bar exam, individuals failing the bar exam on their first attempt are 30 percentage points less likely ever to obtain the license to practice law. We find that individuals with a license to practice law earn 21,000 euros more annually than individuals without a license, approximately 13,000 euros net.[4] These returns grow in the periods immediately following the exam and start to decrease ten years later. Because licensed and unlicensed candidates are equally likely to work, these effects come from higher earnings in the legal profession than alternative occupations for law graduates.

Our results show that people earn an extra 21,000 euros gross per year if they obtain the license, but care should be taken in the interpretation. Indeed, the wage premium for individuals entering the profession could originate from a number of concurrent factors. On the one hand it is possible that the qualification and exam requirements — that guarantee quality standards — lower competition and generate rents for successful candidates; but on the other hand other factors could justify the wage premium. Candidates who enter the profession become self-employed professionals, a riskier activity than that of candidates who do not enter and who typically undertake careers as employees: part of the salary premium can be remuneration for the higher risk of those who become lawyers. Further, because candidates who do not become lawyers choose other occupations where their human capital might be less productive, the skills mismatch is a possible additional factor underlying the wage premium. Finally, the license can also have an *indirect effect* as an additional signal of quality on top of all other educational credentials regardless of whether the profession is actually practiced.

We recognize that licensing may affect workers differently depending on the stage of their career, and our research examines how licensing impacts workers throughout their careers. While the initial effect of licensing may be modest, our study explores the potential for significant long-term effects. Our data is rich enough to allow us to investigate this dynamic. Our study also contributes to the ongoing debate surrounding

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[4]To obtain the net amount we apply the current tax rate.

the need for licensing and its consequences.

Our study relates to the extensive literature on professional licensing and its effect on various outcomes. Previous studies looked at the effect of licensing on prices (Kleiner and Kudrle, 2000, Kleiner et al., 2016), mobility (Cassidy and Dacass, 2021, Johnson and Kleiner, 2020), and the quality of the services offered by licensed professionals (Anderson et al., 2020, Bhai and Mitchell, 2022, Bowblis and Smith, 2021). Closer to our work, many studies report a wage premium associated with professional licensing, even after accounting for worker characteristics such as education, age, work experience, occupation, and industry.[5] In the US, Kleiner and Krueger (2013) find that licensing is associated with 18% higher wages. In contrast, Koumenta and Pagliero (2019) find only 4% higher wages for European licensed workers. Yet, with a few exceptions (Kawaguchi et al., 2014, Kleiner et al., 2016, Thornton and Timmons, 2013), there is little quasi-experimental evidence on the effects of licensing on wages.

Our study also relates to the literature on the return to different fields of education. Exploiting lottery-determined admission to medical (Ketel et al., 2016) and dental school (Ketel et al., 2019) estimates the returns from studying medicine and dentistry in the Netherlands. Dahl et al. (2020), Daly et al. (2022), Kirkeboen et al. (2016) exploit the discontinuities created by the centralized admission process at secondary school and university in Denmark, Sweden, and Norway, to study the returns to different fields of study. Although similar in terms of empirical strategies, this literature estimates the economic returns deriving from the possibility of accessing some faculties. Instead, we estimate the return from effective access to the profession and not to the preparatory faculty.

The remainder of the paper is organized as follows. Sections 2, 3 and 4 describe the institutional background, the data and the empirical design, respectively. Then, section 5 provides evidence on the validity of the identification strategy and section and 6 reports the results. Finally, section 7 draws the conclusions.

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[5]Gittleman et al. (2018), Gittleman and Kleiner (2016), Ingram (2019), Kleiner and Krueger (2010, 2013), Kleiner and Park (2010), Kleiner and Vorotnikov (2017), Koumenta and Pagliero (2019), Timmons and Thornton (2019), Zhang (2019).

2 Institutional background

According to the EU Survey of Regulated Occupations, as of 2015, 19 percent of Italian workers belonged to a licensed profession, precisely at the median in the distribution of licensed workers in the EU—with the highest and lowest shares in Germany, 33 percent, and Denmark, 14 percent—making Italy an ideal setting to study the returns to professional licensing (Koumenta and Pagliero (2019)). More recently, Mocetti et al. (2021) used the Labor Force Survey and estimated that in 2018 licensing affected about 24% of Italian workers and 53% of Italian college graduates.

There are precise legal requirements to become a lawyer in Italy. The first is a five-year law degree.[6] Second, after graduating, law graduates must complete a two-year apprenticeship;[7] and only after that they are eligible to take the bar exam. The bar exam has two stages: first, a written part, and then, for those passing it, an oral part; to pass each stage, there are minimum grade thresholds. Candidates obtain the license allowing them to practice law only after passing both parts of the bar exam.

The bar exam is conducted simultaneously across the 26 Italian courts of appeal. It is divided into two parts: an anonymous written exam and a subsequent oral exam. Candidates are required to take the exam at the court where they completed their apprenticeship. The written exam consists of three tests, each administered on a separate day over a period of three days. The questions for all jurisdictions are prepared in advance by the Ministry of Justice and are identical. Candidates are asked to write two legal briefs on civil law (contracts and torts) and criminal law, as well as a third court brief on a subject of their choice from civil, criminal, or administrative law. Candidates who pass the written tests (with an average pass rate of 45% in our sample) can proceed to the oral exam, which is conducted before a panel of five examiners. The panel consists of one judge, three lawyers, and one law professor, each asking one question on five fields

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[6]Law schools also offer shorter three-year programs, but graduating from a five-year program is a prerequisite to becoming a lawyer.

[7]Sometimes the terms *internship* and *trainee-ship* are used to refer to *apprenticeship*. We follow the European Commission, and the European Center for the Development of Vocational Training (CEDE-FOP), and use the term *apprenticeship*.

of law. Unlike the written part, the oral exam is considered a formality and has a high pass rate (87%).[8]

In the written exam, each brief is graded on a scale of up to 50 points. Candidates must score at least 90 points to proceed to the oral exam. Candidates who score less than 90 points must either wait until the following year to retake the exam or pursue a different profession. On the other hand, candidates who score over 90 points in the written exam have a high chance of becoming lawyers, as the oral exam has a high pass rate. To obtain a license to practice law, candidates must score at least 180 points in the oral exam. Because there is a gap of almost a year between the written and oral parts of the exam, the entire process takes over a year to complete. For instance, the cohort of candidates who passed the written exam in 1999 was only admitted as licensed lawyers to the Italian Bar Association at the end of 2000.

Candidates who fail the bar exam on their first attempt may choose to retake it the following years with no limits in the number of attempts. Considering the years of our empirical analysis (1997-2000), about 70 percent of those who fail their first attempt at the written exam try again at least once. There may be at least two reasons for which candidates may decide to not retake the exam. Firstly, in Italy, having a law degree is required for other professions so unsuccessful candidates may pursue other open competitions that allow them to enter a different profession. Alternative job positions for law graduates are judges, notary, teacher, labor consultant, building administrator, legal officer in a company, relationship expert trade union or some positions of the diplomatic career. Second, while waiting for the exam, candidates continue their apprenticeships, which are frequently paid far below competitive wages because they are viewed as an investment in human capital.

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[8]For descriptive statistics on pass rates in the late 1990s and early 2000s see Table 2 in Buonanno and Pagliero (2018)

3 Data

We use newly collected data from the National Archives of the city of Turin, Italy.[9] This archive keeps all the documents related to the bar exams that took place in Turin before 2001. For each exam session, the archives contain the social security number of the person taking the exam, its grade at the written exam, and, conditioning on passing the written exam, the grade at the oral exam. Our resources allowed us to digitize four exam sessions: 1997-2000. We also partly digitized the exam sessions in 1995 and 1996, but, for these two years, we only collected the information allowing us to identify the first bar exam ever taken by candidates in the exam sessions 1997-2000.[10] In our sample, 87 percent of individuals passing the written part of the bar exam also pass the oral exam, while the pass rate for the written exam is only 46 percent. Therefore, we focus only on the written part of the exam in this project because it is the one that acts as a barrier to obtaining the license and, being the first, offer a larger sample size. Further, we keep only the first attempt at the bar exam (as in Ketel et al. (2016)) to preserve the validity of our regression discontinuity design,[11] therefore our final sample consists of all law school graduates who took, for the first time, the written exam between 1997 and 2000.

The bar exam data was linked by the Italian Social Security Agency (INPS) to its archives. INPS data contains the social security contributions of all Italian private and

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[9]All the documents used to construct the data used in this study can be requested at the National Archives of the city of Turin (Archivio di Stato di Torino), `https://archiviodistatotorino.beniculturali.it/`.

[10]The main burden of digitizing our data is the social security number of exam takers. For the 1995 and 1996 exam sessions, we only digitized the names of the exam takers and their grades, while for the 1997-2000 sessions, we also digitized their social security numbers; we, therefore, identity exam retakers in 1997-2000 based on their names and the data in 1995 and 1996. Besides mistakes coming from namesakes individuals, we may fail to identify the first attempt at the bar exam for individuals who skip sessions. For example, if someone tried the exam for the first time in 1994 and then waited until 1997 to try it again, we would wrongly classify this individual as a first-timer. However, our data shows that failing the first attempt and skipping one or more years to retake the exam is extremely rare, less than 1 percent of exam takers between 1995 and 2000.

[11]The first attempt results in a cut of the candidates based on the vote distribution. In addition to those who pass the exam and never try again, those who fail with particularly low grades may become discouraged and never try again. The narrower distribution of those who try again, when combined with those who try for the first time the following year, may cause discontinuity in the predetermined characteristics along the distribution of candidates, invalidating the assumption of potential outcome continuity.

public sector workers, and of licensed workers, including lawyers.[12] Importantly, INPS data only cover public sector worker earnings since 2014. This raises concerns regarding the reliability of our framework: indeed, candidates who do not obtain the license may work in the public sector much more than those who do, who almost all have high revenues from the profession of lawyers. Furthermore, in order to merge exam data with their archives, INPS required that the exam grade be rounded so that there are at least ten candidates with the same grade and year; in this way the candidates' original identity is impossible to retrieve. Combining exam data with the INPS archives, we observe the earnings of all law school graduates up to 19 years since their first attempt at the bar exam.

We separately link our candidates taking the bar exam in 1997-2000 to the archives of the law school of the university of Turin. Approximately 67 percent of bar exam takers in 1997-2000 also graduated from this institution. Although not essential for our analysis, this data allows us to validate our identification strategy by showing that pre-determined variables, such as graduation grade and age at graduation, are balanced at the regression discontinuity cutoff. For the full sample of bar exam takers, including those who did not graduate from the University of Turin, we can still provide a balancing test, but only on their gender, place of birth, and age at the first bar exam.[13]

Finally, we use two methods to classify if an individual has a license to practice law. First, we observe whoever passed both written and oral parts of the bar exam sessions of 1997-2000. Second, we search for the remaining individuals in the archives of the Italian Bar Association, Consiglio Nazionale Forense (CNF), because after passing the bar exam, all lawyers must register at the CNF to practice law. Therefore, if an individual is registered at the CNF he or she must have, at some point, passed the bar exam.[14]

Table A.1 in the Appendix summarizes all the steps taken in the sample construction,

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[12]This data can be accessed by applying to the Visitinps Scholars Progam, `https://www.inps.it/dati-ricerche-e-bilanci/attivita-di-ricerca/programma-visitinps-scholars`.

[13]Other information could not be merges with the INPS archives to preserve anonymity of the income data.

[14]Information—including their social security number—on lawyers is available on the website of the CNF, `https://www.consiglionazionaleforense.it/`

from the baseline sample of bar exam takers to the final estimation sample.

4 Empirical design

We want to measure the effect of a professional license on income over the entire career of a worker. A longstanding problem in the literature on occupational licensing is that the comparison between the income of licensed and non-licensed workers is confounded by unobserved variables like ability, preferences, opportunities, and backgrounds. To address this problem, we use a fuzzy regression discontinuity design arising from the minimum grade to pass the bar exam: candidates scoring less than 90 points are not admitted to second and last phase of the exam, the oral exam, and can only attempt the exam again one year later.

We are interested in the returns from the legal profession for individual throughout the lifetime of our law graduates. This can be captured by the regression model

$$Y_{it} = \beta_t L_i + X_i' \theta_t + \varepsilon_{it}, \tag{1}$$

where Y_{it} is the labor market outcome of interest, for example earnings, measured t years after the year in which the individual took the bar exam for the first time ($t = 1$ means 2001 for individuals who took the bar exam in 2000 and 1999 for those who took it in 2000); L_i is an indicator taking value 1 if the individual obtains the license to practice law in his or her life; the vector X_i includes calendar year fixed-effects, gender and the year of birth of the individual; ε_{it} is the error term. The parameters of interest are β_t, which identify the returns from the legal profession t years after the first attempt at the bar exam. Equation (1) is estimated separately for each year since the first bar exam t. We also estimate equation (1) using average annual earning, Y_i, over all 19 years after the first exam.

If high-ability individuals are more likely to pass the bar exam, the OLS estimator of β_t from equation (1) will be biased. We solve this endogeneity problem exploiting the sharp discontinuity in the Italian bar exam: individuals scoring less than 90 points at

the written exam are not admitted to the second, and last, phase of the bar exam which consists of an oral examination. Indeed, individuals need to also pass the oral exam to obtain the license to practice law, however, in our sample, 87 percent of individuals passing the written part of the bar exam also pass the oral exam, while the pass rate for the written exam is only 46 percent. We instrument L_i in equation (1) with the result of the first bar exam. More precisely, following Imbens and Lemieux (2008), Lee and Lemieux (2010), we estimate a first-stage equation of the form,

$$L_i = \gamma P_i + X_i'\delta + f(g_i) + \nu_i \qquad (2)$$

where P_i is a dummy variable taking value 1 if the individual scores 90 or more at the his or her first attempt at the bar exam, $f(g_i)$ is a polynomial in the grades at the first bar exam, and ν_i is the error term.

The parameter γ captures compliance, the difference in the probability of obtaining the license to practice law between passers and failers at the first attempt at the bar exam.[15] Compliance is not perfect because failers can keep repeating the bar exam, which takes place once a year and because of the small share of candidates failing the oral exam (13 percent). This raises a fuzzy regression discontinuity design that we use to estimate equation (1) separately for each year following the first bar exam. With this causal setting we learn how the earnings differential develops during the first 19 years after the first bar exam.

5   Testing the validity of the RD design

Table 1 compares the pre-treatment characteristics of law graduates with and without the license to practice law. Law graduates who eventually pass the bar exam have higher graduation grades and graduate sooner than law graduates who never passed the bar exam. Also, women are less likely than men to obtain the license, although this difference

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[15]Indeed, following the LATE interpretation of instrumental variables, γ measures the share of compilers.

is not statistically different from 0. Then, a simple mean comparison would be biased because the samples of licensed and unlicensed candidates differ; however, under mild assumptions, our fuzzy regression discontinuity design provides unbiesed estimates. In this section we run a battery of standard checks pertaining to the regression discontinuity design to validate our framework.

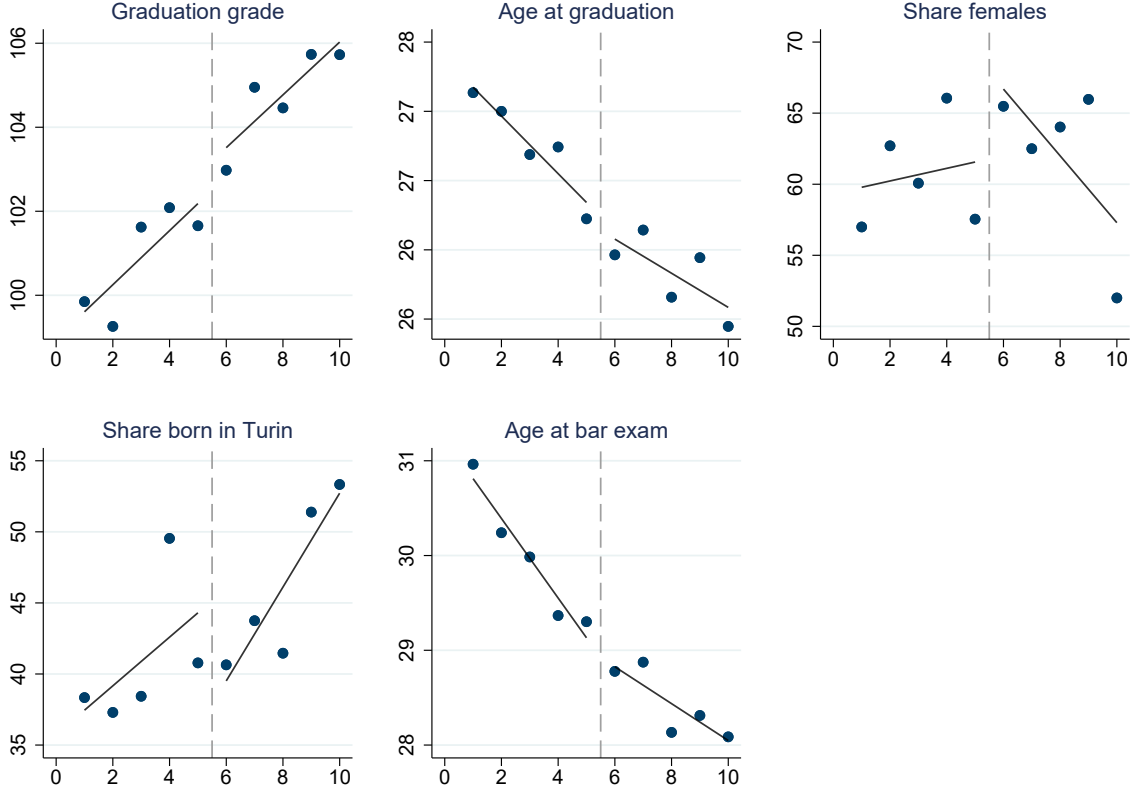Table 1: licensed and non-licensed law graduates before the bar exam

	License	No license	Difference
Graduation grade	103.3	100.5	-2.79***
	(6.470)	(6.668)	(.45)
Age at graduation	26.05	27.00	.952***
	(2.220)	(2.741)	(.16)
Observations	891	279	
Age at first bar exam	28.69	30.82	2.13***
	(2.873)	(5.133)	(.195)
Share of females	60.74	62.73	.0199
	(48.85)	(48.40)	(.026)
Observations	1244	493	

Note: the table compares the pre-treatment (before the first bar exam) characteristics of law graduates who eventually obtain the license and those who do not.

The regression discontinuity design requires potential outcomes to be continuous around the threshold. We validate this assumption with two common exercises. First, we check whether predetermined characteristics of individuals around the threshold are similar, the balancing test. Second, we inspect whether individuals sort around the threshold, the absence of bunching.

To test for balancing, Figure 1 shows that predetermined characteristics such as graduation grade, age at graduation, age at the bar exam, gender, and place of birth are balanced around the passing threshold. Table A.3 reports the corresponding regression results. Interestingly, Figure 1 shows a clear positive correlation between the graduation grade from law school and the grade at the bar exam—confirming that the bar exam screens out bad candidates.

11

Figure 1: individual characteristics are balanced around the cutoff grade

To test for the absence of bunching, Figure 2 reports the grades distribution at the first bar exam. There is a clear spike at the minimum passing grade (90). However, given the results of the balancing test, the spike at the minimum passing grade is likely the result of *rounding* by examiners—examiners rounding up all the grades falling a few points short of 90—rather than *sorting* by the candidates—candidates cheating at the exam to score exactly at the threshold. Also, note that rounding appears at all passing grades that are multiples of 5, further supporting the claim that the spike at the minimum passing grade is the result of rounding by the examiners rather than sorting by the candidates. Still, we check the robustness of our main results following a donut approach and drop all individuals scoring exactly 90 points from our estimation sample (e.g. Canaan and Mouganie (2018), Dahl et al. (2014), Zinovyeva and Tverdostup (2021)).

Figure 2: Grades distribution at the bar exam
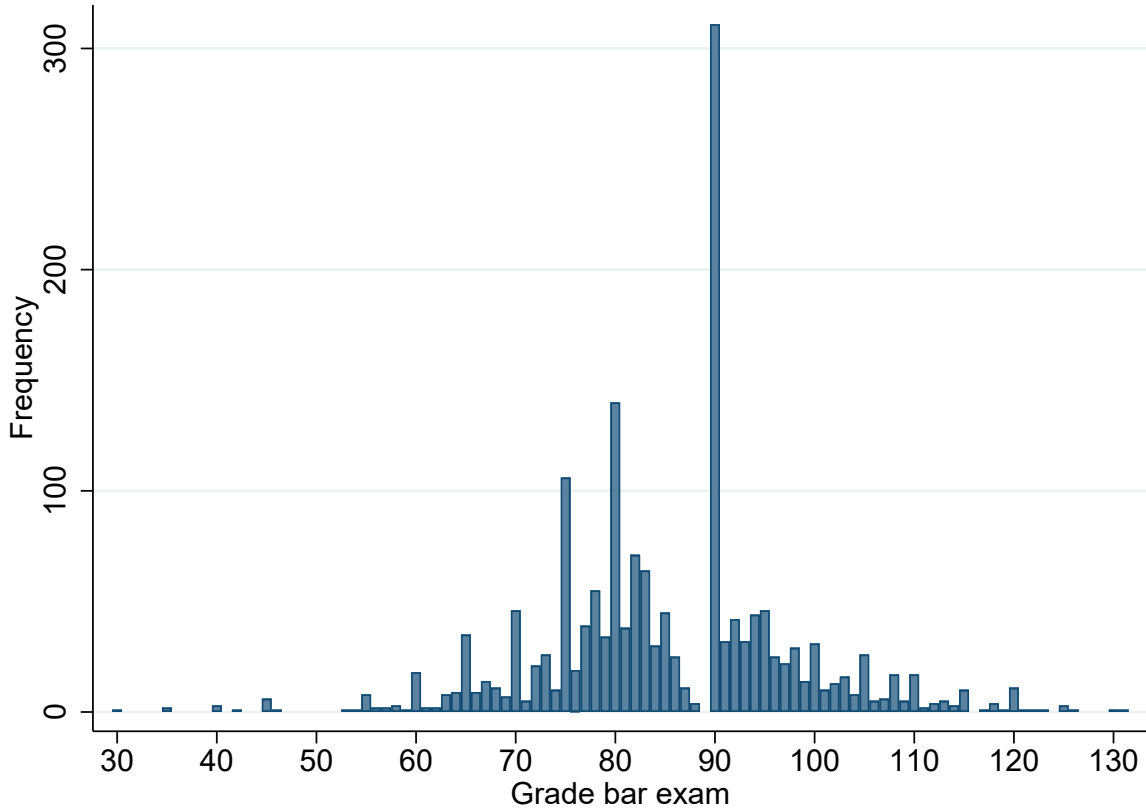
6 Returns from the legal profession

Among candidates taking the exam for the first time, 98 percent of those passing the written part obtain the license, instead only 62 percent of those failing the exam do.[16] Figure 3 graphically confirms this and also shows a marked discontinuity in the probability of having the license at the passing threshold. Almost all candidates to the right of the threshold, compared to approximately 60 percent for those right to the left, hold a license to practice law: this confirm a sharp discontinuity in the probability of holding the license at the passing threshold (Angrist and Lavy, 1999). The first row of Table 2 reports the

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[16]As explained in section 2, candidates who fail the bar exam on their first attempt may retake and pass the exam in the following years.

empirical estimates of the first stage. Candidates who pass the written exam at their first attempt are 30 percent more likely to obtain the license. The estimate is consistent if we restrict it around the threshold or if we use a quadratic polynomial on the whole sample.

Figure 3: failing the first bar exam makes it less likely to become a lawyer
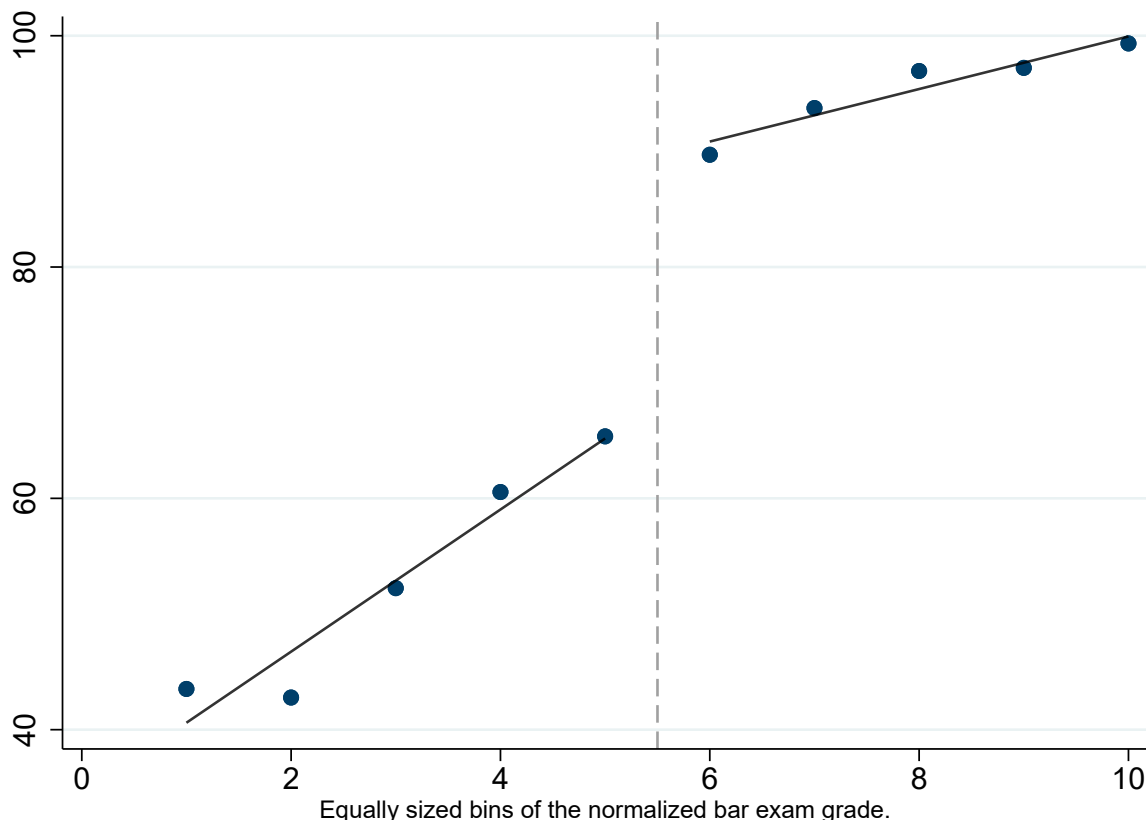
Notes: the figure shows that failing to pass the bar exam on the first attempt decreases the probability of holding a license at any point in time. Each dot refers to the share of individuals holding the license to practice law in an interval of the grade at the first bar exam. These intervals contain roughly the same number of observations.

Then, we exploit the sharp variation in the probability of holding a license around the passing threshold to estimate the effect of the license on earnings. The IV estimates obtained with equation (2) (first-stage) to instrument L_i in equation (1) (second-stage) isolate the effect of the license and are reported in the second row of Table 2. When we consider incomes from private sector only, annual earnings are at least 33,000 euros gross higher for candidates holding the license. Columns 3 to 6 show the results divided into groups of five years. Returns from entering the profession grow in the first ten years, and

then gradually decrease until they halve at the end of our study period. These results are robust to different bandwidth choices and polynomials in the running variable and to the exclusion of candidates scoring 90 points (Table A.5).

Table 2: Aggregated estimates

	(1) License (first stage)	(2)	(3)	(4)	(5)	(6)
		Earnings (IV)				
		Full sample	1st-5th years	6th-10th years	11th-15th years	15th-19th years
	0.28	33,142	30,503	48,833	36,092	26,266
	(0.029)	(14,287)	(5,532)	(12,417)	(18,222)	(27,231)
Observations	1,539	1,539	1,538	1,536	1,532	1,530
Degree	1	1	1	1	1	1
Bandwidth	full	full	full	full	full	full

Note: the first column shows the estimate of the first stage. Columns 2 to 6 show the results of the same specifications for the IV model considering as outcome the average annual income of the 19 years following the first exam attempt (column 2) or the average annual income over subperiods of five years. We apply a linear model to the whole sample.

Figure 4 reports the same instrumental variable (IV) estimates for each year t before and after the year of the first bar exam. Confirming the validity of our RD design, there are no differences between licensed and non-licensed law graduates before the first exam in terms of earnings. Instead, we find large returns from the legal profession from the beginning of the career. These differences start after the first bar exam and persist over time. The sample size, 1,539 individuals, is almost unchanged in all years (there is negligible exogenous attrition of 11 individuals in 25 years). The larger standard errors in later years come from the standard deviation in earnings increasing over time, as reported in Figure A.1.

Figure 4: Returns from the license—IV estimates income
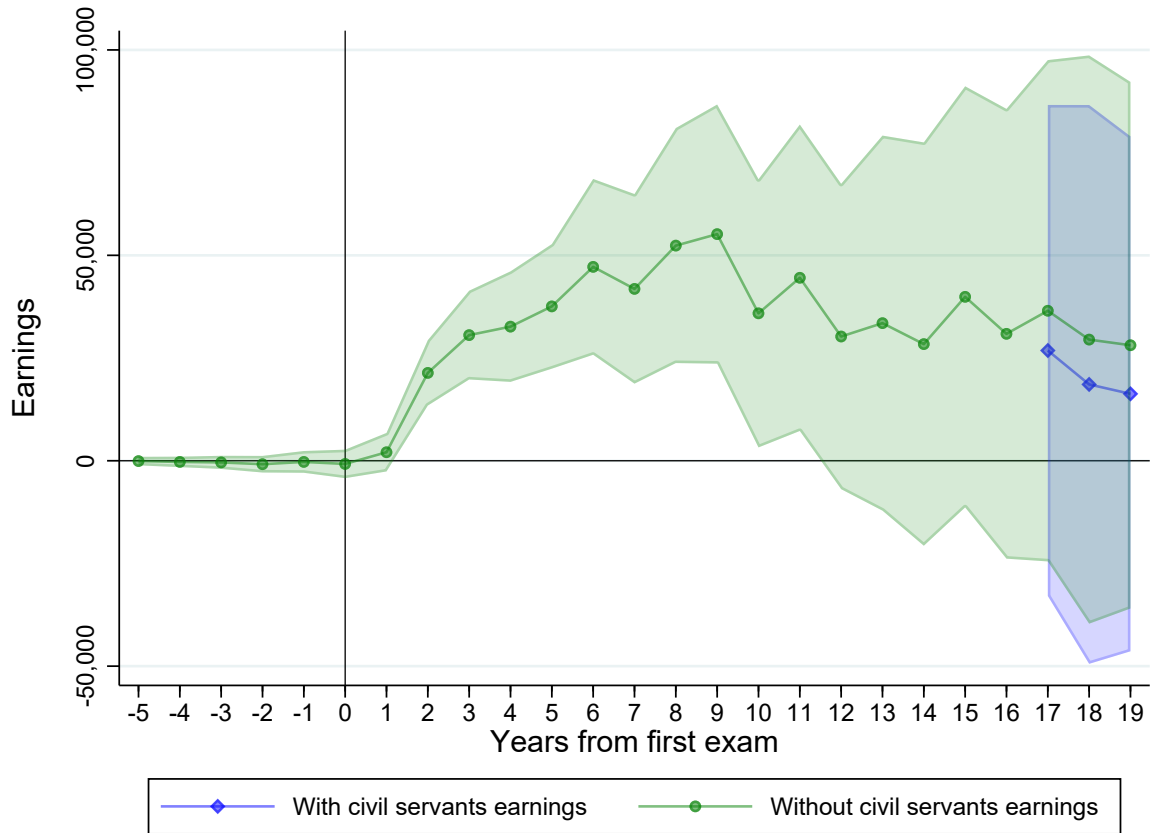
Notes: the figure reports the differences in earnings, obtained from the IV estimates based on equation (1), between individuals with and without the license to practice law. Omitting the income of civil servants produces only minor differences in the results. Because income for civil servants is observed only starting in 2014, and our earliest cohort takes the first exam in 1997, we have a complete measure of income only 17 years after the exam. However, comparing IV estimates with and without considering the income from the registry of civil servants biases our results by only 12,000 euros. The shaded areas denote 95% confidence intervals.

The social security data contains the income of public employee starting only in 2014. This could potentially create an upward bias in the estimates reported in Figure 4 because we would wrongly impute zero income, before 2014, for individuals marginally failing the bar exam who then become civil servants. Reassuringly this bias amounts to only 12,000 euros. Figure 4 compares the IV estimates—for the years in which the data is available—omitting and including income from civil servants; the difference between these two estimates is approximately 12,000 euros.[17]

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[17]Given that this data is available starting in 2014 and our first cohort takes the exam in 1997, 17 years later is the first year when we observe income from being a civil servant for all individuals.

There are two reasons to believe that this 12,000 euros bias, measured later in the career, is an upper bound for the bias which could be present earlier in the career. First, the earnings of civil servants increase mechanically over time. Second, public employment is likely an absorbing state, and it is unlikely that more individuals are working as civil servants in the earlier years compared to the later years. Extrapolating from this, we argue that if we could observe the income of civil servants before 2014, the IV estimates in Figure 4 would give a difference of 21,000 euros in yearly income (instead of 33,000) between treated and non-treated compliers—which is still a large return from being a lawyer.

The causal effect of having a license on income raises the question of how the license impacts income. The wage premium for those who pass the exam could be due to a variety of factors, including the level of competition, the riskiness of the job, or the use of one's human capital. Indeed, the wage premium may result from entry restrictions in a profession where competition is limited. However, it is also possible that the wage premium is due to other competing factors: for example, self-employment of a professional such as a lawyer is more risky than employment in the public or private sector; the salary premium could include compensation for the increased risk. Furthermore, law graduates who fail the exam risk wasting human capital that is likely to be less productive if they do not enter the profession. Finally, the license can, at least in principle, also have an *indirect effect* by creating advantages in other professions. For example, it may be valued by employers as an additional signal of quality on top of all other educational credentials, even though it is not a requirement for any activity outside the legal profession.

Besides earnings, we consider the probability of working (defined as earning any positive income) as outcome variable. Importantly, we classify being an apprentice as not working. Figure 5 reports the IV estimates using this outcome. In the first few years after the first bar exam, law graduates who got the license because they barely passed the exam are significantly more likely to work than those who barely failed. Marginal exam failers try the exam again the following year; meanwhile, they extend their apprenticeship by one year. Instead, in the later years, there is no difference in working between

17

licensed and non-licensed law graduates—suggesting that those not getting the license stop trying, eventually, and settle for different occupations.

Figure 5: IV estimates working
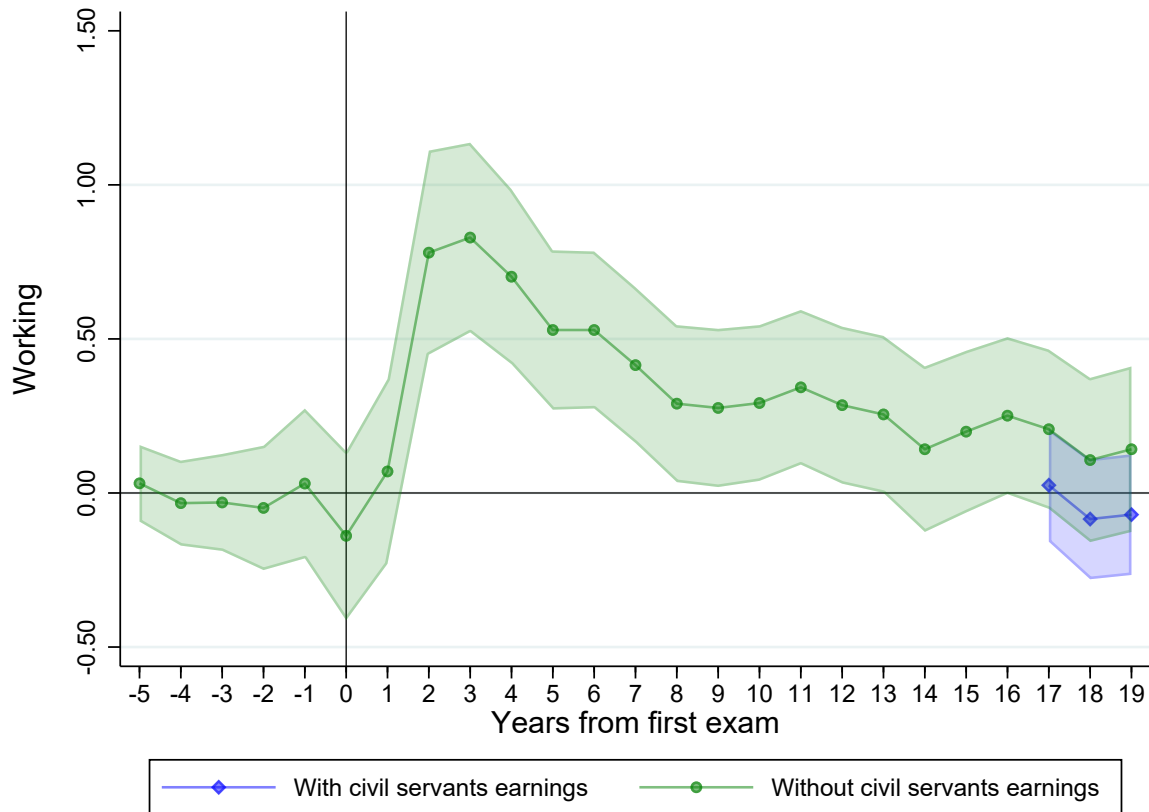
Notes: the figure reports the differences in working (defined as any income larger than 0 in the data), obtained from the IV estimates based on equation (1), between individuals with and without the license to practice law.

7 Conclusions

Quantifying the returns to professional licensing has long been important in labor and regulatory economics. Existing studies, which compared licensed to non-licensed workers and control for observable characteristics, can at most say that licensing is associated with higher wages, but they cannot conclude that these higher wages are *caused* caused by the actual possession of the licence. We fill this gap in the literature by providing quasi-experimental evidence based on the sharp discontinuities offered by the bar exam in Italy. Exam takers scoring less than the cutoff fail their licensing exam and must wait

until next year to attempt it again. Despite no limit on the number of times one can take the bar exam, individuals failing the bar exam at their first attempt are 30 percentage points less likely ever to obtain the license to practice law, suggesting that the costs of waiting one year to try the exam again are relevant and set exam failers on different career paths. Our results suggest that individuals obtaining the licensing because they marginally pass the bar exam on their first attempt earn at least 21,000 euros more than those failing. In relative terms, depending on the distance from the year of the exam, this earning difference can be as much as two times the earnings of non-licensed individuals.

References

Anderson, D. M., R. Brown, K. K. Charles, and D. I. Rees (2020). Occupational licensing and maternal health: Evidence from early midwifery laws. *Journal of Political Economy 128*(11), 4337–4383.

Angrist, J. D. and V. Lavy (1999). Using maimonides' rule to estimate the effect of class size on scholastic achievement. *The Quarterly journal of economics 114*(2), 533–575.

Bhai, M. and D. T. Mitchell (2022). The effects of occupational licensing reform for nurse practitioners on children's health. *Southern Economic Journal*.

Bowblis, J. R. and A. C. Smith (2021). Occupational licensing of social services and nursing home quality: A regression discontinuity approach. *ILR Review 74*(1), 199–223.

Buonanno, P. and M. Pagliero (2018). *Occupational Licensing, Labor Mobility, and the Unfairness of Entry Standards*. Centre for Economic Policy Research.

Canaan, S. and P. Mouganie (2018). Returns to education quality for low-skilled students: Evidence from a discontinuity. *Journal of Labor Economics 36*(2), 395–436.

Cassidy, H. and T. Dacass (2021). Occupational licensing and immigrants. *The Journal of Law and Economics 64*(1), 1–28.

Dahl, G., D.-O. Rooth, and A. Stenberg (2020). High school majors, comparative (dis) advantage, and future earnings. Technical report, National Bureau of Economic Research.

Dahl, G. B., K. V. Løken, and M. Mogstad (2014). Peer effects in program participation. *American Economic Review 104*(7), 2049–2074.

Daly, M., M. F. Jensen, and D. le Maire (2022). University admission and the similarity of fields of study: Effects on earnings and skill usage. *Labour Economics 75*, 102118.

Friedman, M. and S. Kuznets (1945). *Income from independent professional practice.* Number frie54-1. National Bureau of Economic Research.

Gittleman, M., M. A. Klee, and M. M. Kleiner (2018). Analyzing the labor market outcomes of occupational licensing. *Industrial Relations: A Journal of Economy and Society 57*(1), 57–100.

Gittleman, M. and M. M. Kleiner (2016). Wage effects of unionization and occupational licensing coverage in the united states. *ILR Review 69*(1), 142–172.

Imbens, G. W. and T. Lemieux (2008). Regression discontinuity designs: A guide to practice. *Journal of econometrics 142*(2), 615–635.

Ingram, S. J. (2019). Occupational licensing and the earnings premium in the united states: updated evidence from the current population survey. *British Journal of Industrial Relations 57*(4), 732–763.

Johnson, J. E. and M. M. Kleiner (2020). Is occupational licensing a barrier to interstate migration? *American Economic Journal: Economic Policy 12*(3), 347–73.

Kawaguchi, D., T. Murao, and R. Kambayashi (2014). Incidence of strict quality standards: Protection of consumers or windfall for professionals? *The Journal of Law and Economics 57*(1), 195–224.

Ketel, N., E. Leuven, H. Oosterbeek, and B. van der Klaauw (2016). The returns to medical school: Evidence from admission lotteries. *American Economic Journal: Applied Economics 8*(2), 225–254.

Ketel, N., E. Leuven, H. Oosterbeek, and B. Van Der Klaauw (2019). Do dutch dentists extract monopoly rents? *Journal of health economics 63*, 145–158.

Kirkeboen, L. J., E. Leuven, and M. Mogstad (2016). Field of study, earnings, and self-selection. *The Quarterly Journal of Economics 131*(3), 1057–1111.

Kleiner, M. M. and A. B. Krueger (2010). The prevalence and effects of occupational licensing. *British Journal of Industrial Relations 48*(4), 676–687.

Kleiner, M. M. and A. B. Krueger (2013). Analyzing the extent and influence of occupational licensing on the labor market. *Journal of Labor Economics 31*(2), S173–S202.

Kleiner, M. M. and R. T. Kudrle (2000). Does regulation affect economic outcomes? the case of dentistry. *The Journal of Law and Economics 43*(2), 547–582.

Kleiner, M. M., A. Marier, K. W. Park, and C. Wing (2016). Relaxing occupational licensing requirements: Analyzing wages and prices for a medical service. *The Journal of Law and Economics 59*(2), 261–291.

Kleiner, M. M. and K. W. Park (2010). Battles among licensed occupations: Analyzing government regulations on labor market outcomes for dentists and hygienists. Technical report, National Bureau of Economic Research.

Kleiner, M. M. and E. Vorotnikov (2017). Analyzing occupational licensing among the states. *Journal of Regulatory Economics 52*, 132–158.

Koumenta, M. and M. Pagliero (2019). Occupational regulation in the european union: coverage and wage effects. *British Journal of Industrial Relations 57*(4), 818–849.

Lee, D. S. and T. Lemieux (2010). Regression discontinuity designs in economics. *Journal of economic literature 48*(2), 281–355.

Mocetti, S., L. Rizzica, and G. Roma (2021). Regulated occupations in italy: Extent and labour market effects. *International Review of Law and Economics 66*, 105987.

Smith, A. (1776). *An Inquiry Into the Nature and Causes of the Wealth of Nations.* London: Methuen and Co., Ltd.

Thornton, R. J. and E. J. Timmons (2013). Licensing one of the worldâs oldest professions: Massage. *The Journal of Law and Economics 56*(2), 371–388.

Timmons, E. J. and R. J. Thornton (2019). There and back again: The de-licensing and re-licensing of barbers in alabama. *British Journal of Industrial Relations 57*(4), 764–790.

Zhang, T. (2019). Effects of occupational licensing and unions on labour market earnings in canada. *British Journal of Industrial Relations 57*(4), 791–817.

Zinovyeva, N. and M. Tverdostup (2021). Gender identity, coworking spouses, and relative income within households. *American Economic Journal: Applied Economics 13*(4), 258–84.

Appendix

Table A.1: Sample construction

Database	Individuals
Bar exam in 1997-2000	2,327
First time exam takers in 1997-2000 ("baseline sample")	1,741
Linked to INPS registry ("linked sample")	1,539
Drop all 90 grades ("estimation sample")	1,271

Note: the table summarises the databases at each step of the data linkage between the data from the bar exam and other databases. We also link our "baseline sample" to University of Turin, which leaves 1,170 individuals that we only use to check balancing between treated and non-treated individuals.

Table A.2: First-stage—pre-INPS baseline sample

	License			
	Baseline sample (1)	Donut (2)	Bandwidth 30 (3)	Bandwidth 15 (4)
Pass bar exam	0.259	0.299	0.240	0.100
	(0.033)	(0.034)	(0.039)	(0.060)
Mean outcome left cutoff	0.520	0.520	0.528	0.546
Observations	1,737	1,426	1,696	1,382

Note: the table reports the first-stage, the reduced-form, and the IV estimates in the first 19 years after the first bar exam.

Table A.3: Individual characteristics are balanced around the cutoff grade—pre-linkage to INPS sample

	(1) Graduation grade	(2) Age at graduation	(3) Male	(4) Born in Turin	(5) Age at bar exam
Baseline sample					
Pass bar exam	1.015	-0.212	-0.042	-0.015	-0.355
	(0.631)	(0.226)	(0.039)	(0.039)	(0.304)
Mean outcome left cutoff	101	27	.398	.399	30
Observations	1,170	1,170	1,734	1,734	1,737
Donut					
Pass bar exam	2.148	-0.337	-0.075	0.010	-0.662
	(0.744)	(0.267)	(0.048)	(0.049)	(0.336)
Mean outcome left cutoff	101	27	.398	.399	30
Observations	949	949	1,424	1,424	1,426
Bandwidth 30					
Pass bar exam	0.903	0.063	-0.061	-0.049	-0.093
	(0.720)	(0.296)	(0.044)	(0.044)	(0.372)
Mean outcome left cutoff	101	27	.394	.398	30
Observations	1,144	1,144	1,693	1,693	1,696
Bandwidth 15					
Pass bar exam	-0.034	0.038	-0.054	-0.076	-0.055
	(1.022)	(0.307)	(0.065)	(0.064)	(0.478)
Mean outcome left cutoff	101	27	.399	.407	30
Observations	935	935	1,380	1,380	1,382

Note: the table reports results from the following model:

$$Y_i = \gamma P_i + X_i'\delta + f(g_i) + \nu_i$$

where each column refer to a separate regression with different outcomes denoted by Y_i; P_i is a dummy variable taking value 1 if the individual scores 90 or more at the his or her first attempt at the bar exam; and $f(g_i)$ is a polynomial in the grades at the first bar exam; X_i is a vector of controls including year of the exam fixed-effects, gender and the year of birth of the individual; ν_i is the error term.

Table A.4: Individual characteristics are balanced around the cutoff grade—post-linkage to INPS sample

	(1) Male	(2) Age at bar exam
Linked sample (N=1,539)		
Pass bar exam	-0.0437	-0.655
	(0.0369)	(0.240)
Estimation sample (N=1,271)		
Pass bar exam	-0.0571	-0.964
	(0.0470)	(0.277)
Bandwidth 15 (N=1,166)		
Pass bar exam	-0.0482	-0.134
	(0.0652)	(0.404)

Note: the table reports results from the following model:

$$Y_i = \gamma P_i + X_i'\delta + f(g_i) + \nu_i$$

where each column refer to a separate regression with different outcomes denoted by Y_i; P_i is a dummy variable taking value 1 if the individual scores 90 or more at the his or her first attempt at the bar exam; and $f(g_i)$ is a polynomial in the grades at the first bar exam; $E_{i\tau}$ is the year of first bar exam; X_i is a vector of controls including year of the exam fixed-effects, gender and the year of birth of the individual; ν_i is the error term.

Table A.5: Aggregated estimates

	(1) Full sample	(2) Full sample	(3) Donut sample
License (first-stage)	0.28 (0.029)	0.29 (0.026)	0.31 (0.029)
Earnings (IV)	33,142 (14,287)	51,221 (23,872)	49,768 (21,085)
Observations	1,539	1,539	1,271
Degree	1	2	1
Bandwidth	full	full	full

Note: the first row shows the estimate of the first stage. In order, we apply a linear (column 1) and quadratic (column 2) model to the whole sample, and a linear model to the donut sample (column 3), i.e. excluding observations exactly on the threshold. The second row reports the results of the same specifications for the IV model considering as outcome the average annual income of the 19 years following the first exam attempt.

Figure A.1: Standard deviation of income
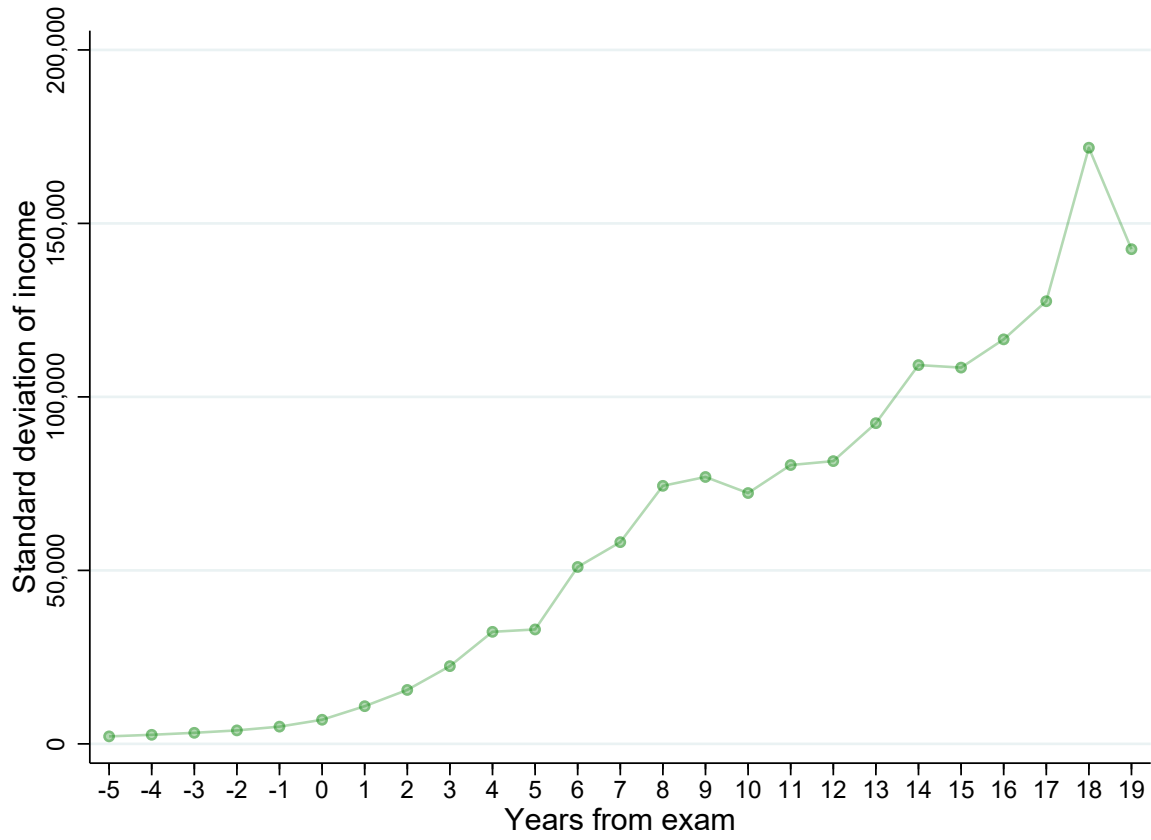
Notes: the figure reports the standard deviation of income in each earn relative to the year of the exam.