

Collegio Carlo Alberto

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Identification of a Static Model of Licensing and
Some Evidence from the US Market for Lawyers

Mario Pagliero

Working Paper No. 106

January 2009

www.carloalberto.org

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¹I would like to thank Pascal Courty, Ugo Colombino, Francesca Cornelli, Daniela Del Boca, Chris Flinn, Christos Genakos, David Genesove and seminar participants at the London Business School, Universitat Pompeu Fabra, European University Institute, and Collegio Carlo Alberto for helpful comments.

²University of Turin and Collegio Carlo Alberto

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Abstract

According to public interest theory, professional licensing solves the lemon problem generated by asymmetric information. In contrast, capture theory claims that licensing aims at increasing professional salaries by restricting supply. This paper shows that the two theories can be identified using data from one regulated profession and provides an empirical application to the US market for lawyers. The results imply that lawyers' salaries have a large weight relative to social welfare in the objective function of licensing boards.

JEL Classification: L4, L5, K2.

Keywords: professional licensing, legal market, bar exam.

1 Introduction

Entry into many professions is contingent upon approval by a state licensing board and demonstration of a certain level of competency. This paper focuses on licensing in the legal profession, but other examples of regulated professions include accounting, auditing, teaching, nursing, engineering, psychology and hairdressing. In fact, according to Kleiner (2000), more than 800 occupations are licensed in at least one US state. Occupational licensing is widespread, directly affecting 18 percent of US workers, even more than those affected by minimum wage or unionization. Professional regulation has been the subject of academic and political debate for decades. Evaluation of the impact of policy reform proposals relies on a clear understanding of the objectives pursued by licensing boards.

Although professional associations argue that the only goal of professional licensing is to protect the public, economists have long held two opposing views on the subject. The first falls into the category of public interest theory. Building on the work of Akerlof (1970), Leland (1979) showed that professional licensing may serve to remedy the market failure derived from asymmetric information. In markets where consumers cannot observe the quality of professionals, the imposition of a minimum quality standard by the social planner may lead to increased welfare (relative to the free entry equilibrium). Establishing the optimal minimum standard implies a trade-off between the quality-enhancing and the competition-reducing effects of licensing. This view is in line with the notion that licensing serves the public interest.

Capture theory, pioneered by Stigler (1971), argues instead that “regulation is acquired by the industry and is designed and operated primarily for its benefit”. This position can be traced back to Adam Smith (1776, I.x.c.5), who claimed that the objective of licensing requirements is to limit competition by reducing the number of practitioners willing to enter a trade. In this view, professional examinations serve to limit the number of professionals, increase prices, and weaken competition, thereby introducing the typical inefficiencies caused by market power.

Obviously, licensing boards do not necessarily operate in pursuit of a single goal. In

practice, they may set a different weight to the two objectives in response to the relative influence of different interest groups. Therefore, both theories may have some power in explaining how licensed professions are regulated.

In order to provide conclusive evidence for the underlying motivation for professional licensing, one would need to compare the actual, observed salaries w in a licensed profession with what salaries would be without licensing standards (w_0). The counterfactual earnings may be obtained in different ways. The simplest is to compare licensed professions with similar unlicensed professions (Kleiner 2000). Another (Shepard 1978, HaasWilson 1986, and Kleiner and Kudrle 2000) is to use variability across states in licensing regulation to measure the impact of licensing on the price of professional services, possibly controlling for the quality of the services being provided. A third approach, taken by Kugler and Sauer (2005), is to measure the effects of occupational licensing by exploiting some specific features of a regulated market, such as the assignment rule of immigrant physicians to different retraining programs.

One limit to the first approach is that making comparisons across industries is typically problematic. Only in very specific cases can the researcher directly compare two different professional markets. Even in fairly similar professions, unobserved heterogeneity in the type of service being compared and in the market structure may impede direct comparisons. The second approach reduces unobserved heterogeneity by focusing on the same profession in different states, but heterogeneity in market structure or demand characteristics across states may still be substantial. While the third approach is not subject to these problems, it is only feasible in very specific cases and it cannot be applied to a wide set of industries. It also requires detailed micro data, which are not always available.

This paper explores a different and complementary approach, starting from the basic assumption that w_0 is unobservable, and so is the difference $w - w_0$. I do not directly proxy w_0 with the observed salary in a different industry, or in a different state. In this paper, the counterfactual salary w_0 and the licensing board behavior are taken as parameters to be estimated. This paper shows that the two theories can be identified using aggregate data from a single regulated professional market.

To identify licensing board behavior, I focus on a static model of licensing and compare the first order condition of the social planner with that of the captured regulator. According to public interest theory, the social planner optimally trades off the welfare-increasing effects of admitting one additional candidate with the social cost of lowered standards. The social cost is due to the fact that the consumers' valuation decreases with the observed minimum standard. Under capture theory, instead, the regulator attempts to maximize salaries within the profession. In addition to the effect of minimum standards on consumers' valuation, such a regulator takes into account that admitting one additional candidate decreases wages for existing members of the profession.

Differences over time in the number of candidates, demand level and market size make it possible to identify the weight given by licensing boards to the two contrasting objectives described above. The empirical implementation uses data on the US market for entry level lawyers, which is regulated at the state level. The data is comprised of a panel of states for which information is available on bar exam outcomes, bar exam difficulty, entry level salaries and a number of control variables.

Estimates of the structural parameters imply that the weight given to maximization of the wage bill is 0.69, not significantly different from 1, as predicted by capture theory, but significantly different from 0, as predicted by public interest theory. These estimates can be used to compute the welfare impact of alternative behavioral hypotheses. In terms of efficiency, current regulation implies standards that are too stringent, resulting in too few lawyers with salaries that are too high. The efficient benchmark would imply a 22 percent increase in lawyers and a 46 percent decrease in salaries, leading ultimately to an increase in consumer welfare of \$800 million per year.

The problem of identifying the behavior of a licensing board is related to the classic problem of identifying market power with market level data (Bresnahan 1982 and 1987). In fact, under capture theory, the regulator limits the number of lawyers and generates the classic deadweight loss associated with market power. The licensing problem, however, is different from the identification of market power because it requires modeling the entry examination, and a feedback mechanism from exam difficulty to consumers' demand.

This paper is also different from Gagnepain and Ivaldi (2002), who estimate a model of regulation in a principal-agent setting. In the case of professional licensing, the regulator enjoys perfect information, which is not the case in a principal-agent relation. In my problem, there is no strategic interaction, since the licensing board interacts with a large number of exam candidates and consumers who take the choices of the regulator as given. This paper is also related to Schaumans and Verboven (2007), who investigate the impact of entry regulation in the market for pharmacies, following the approach of Bresnahan and Reiss (1991). This paper does not estimate an entry model, but rather directly models the behavior of a licensing board setting the difficulty of a licensing exam.

The structure of the paper is as follows: the theoretical framework is introduced in the first section and is followed by the section on empirical implementation, which describes the empirical specification and identification. The last two sections present the results and conclusions. An appendix provides a description of the data, the sources and the construction of the variables used in the empirical analysis.

2 A static model of professional licensing

Consumers

Consumers do not observe the quality of the professionals, but rely on publically-available information. Following Akerlof (1970) and Leland (1979), the demand for legal services is a function of a quality summary statistic. I assume that each lawyer supplies exactly one unit of legal services, and that the valuation of consumers depends on the minimum quality t allowed in the market. (One can relax this assumption with no significant change in what follows). Consumers can observe the minimum quality level (i.e. the exam difficulty) at no cost. (In the market for lawyers, for example, this information can be easily accessed).

The demand equation derives naturally from a standard model with heterogeneous consumers. There are Z consumers willing to pay $v(t, \varphi, Y, \epsilon)$. Their type φ is randomly drawn from the uniform distribution on $[0,1]$, Y is a vector of exogenous variables (ob-

served by the researcher) affecting consumers' willingness to pay. ϵ is the unobserved (to the researcher) heterogeneity in consumers' valuations.

Consumers buy one unit of legal services if $v(t, \varphi, Y, \epsilon) - w \geq 0$, zero units otherwise. Higher types have lower willingness to pay for the service, $\frac{dv}{d\varphi} < 0$. Given w , t , Y and ϵ , if L units of legal services are bought, the consumers buying the services are those with $\varphi \in [0, \frac{L}{Z}]$. The price of one unit of legal services must then be equal to the valuation of the marginal customer, $w = v(t, \frac{L}{Z}, Y, \epsilon)$.

I assume linearity and rewrite the aggregate inverse demand function as

$$w = \alpha_0 + \alpha_1 t - \alpha_2 \frac{L}{Z} + \alpha_3 Y + \epsilon \quad (1)$$

where w is the wage of a lawyer; L is the number of lawyers.

The admission process

There are N candidates taking a professional examination. Each candidate receives an exam score s , which is a random draw from the continuous distribution $F(s, m)$, with mean m and density $f(s, m)$. (Identification does not rest on any specific assumption on $F(s, m)$.) The difficulty of the exam is t , which is the minimum quality allowed in the market. All candidates who score s at or above the threshold pass the exam and enter the legal profession. Given the distribution of candidates $F(s, m)$, there is a direct relationship between the number of professionals admitted and the exam difficulty. The number of successful candidates is $L = [1 - F(t, m)]N$ and the exam difficulty can be written as

$$t = F^{-1}\left(1 - \frac{L}{N}, m\right). \quad (2)$$

Those who pass the exam enter the legal profession and receive the salary w . Once the number of entrants is determined through the entry examination, the supply of legal services is perfectly rigid. This is obviously a simplification of the real world: in reality, some lawyers may adjust the number of hours worked, by working part-time, for example. As a rough estimate, however, the number of lawyers in the market provides a measure

of the amount of services offered in the market.

Outside option salary

Those who fail the exam accept the outside salary $w_0(X)$ of a non-regulated profession (assumed to be sufficiently low as to always be the second-best option), which depends on a set of exogenous variables X . As above, I will assume linearity and rewrite the outside option as

$$w_0 = \beta_0 + \beta_1 X + \eta. \tag{3}$$

The outside option salary w_0 is observed by both the potential entrants and the regulator. However, the researcher only observes X . The researcher does not observe w_0 , the parameters β_0 and β_1 , nor the realization of the random variable η , capturing unobserved heterogeneity in the outside salary.

The outside profession is assumed to be large, and is therefore not affected by changes in the number of lawyers or exam difficulty. It does not necessarily require specific legal training (for example, the generic business market) and the signalling effect of t does not apply to it.¹

The Social Planner

The supply of lawyers is regulated by the licensing board. The social planner aims to set the number of entrants in order to maximize social welfare

$$\underset{L}{Max} \ W(L, t(L)). \tag{4}$$

where welfare is defined as the integral of the difference between the outside salary and consumers willingness to pay (Leland 1979),

$$W(L, t) = \int_0^L \left[w\left(\frac{x}{Z}, t(L), Y, \varepsilon\right) - w_0 \right] dx. \tag{5}$$

¹With respect to Leland (1979), this model emphasizes the effect of the number of candidates and their quality, as well as demand shifters, and allows for a general distribution of scores. However, it simplifies the analysis by assuming that the outside option salary is the same for all who choose the outside profession. This is realistic to the extent that bar exam performance depends on specific skills which do not imply a premium in the outside profession (such as the generic business market).

Since the market is regulated and the licensing board chooses the number of entrants, there is no labor supply curve. Instead, substituting the demand function in (5), the first order condition of the problem (4) describes the behavior of the licensing board,

$$w = w_0 + \alpha_1 \frac{L}{Nf(t(L), m)}. \quad (6)$$

The regulated market is described jointly by the above expression for licensing boards behavior, consumers' demand for legal services (1), and lawyers' outside option (3).

The intuition for the second term in (6) is straightforward. From the point of view of the social planner, admitting one additional candidate by decreasing the standard has a social cost. This is because consumers' valuation is based on the observed minimum standard. This effect is stronger when the number of candidates is low and also depends on where the quality of the marginal candidate is located in the distribution of quality. Lower density of the distribution of candidates implies larger effect on minimum quality, and on salaries as a result. The derivation of the first order condition is described in the Appendix.

The Captured Regulator

According to classic capture theory, the regulator maximizes lawyers' rents by choosing the number of candidates allowed to enter the market. According to classic capture theory, then, the problem of the regulator is

$$\underset{L}{Max} \quad \Pi(L, t(L)), \quad (7)$$

where extra profits (or rents) are the difference between market salary and the competitive outside salary w_0 ,

$$\Pi(L, t(L)) = \left[w\left(\frac{L}{Z}, t(L), Y, \varepsilon\right) - w_0 \right] L. \quad (8)$$

The salary- or labor-setting behavior of the licensing board is described by the relation

$$w = w_0 + \alpha_1 \frac{L}{Nf(t(L), m)} + \alpha_2 \frac{L}{Z} \quad (9)$$

The regulated market is now described by licensing boards behavior (9), consumers' demand for legal services (1), and lawyers' outside option (3).

Note that the only difference between (9) and (6) is the presence of the term $\frac{L}{Z}$. From the point of view of the captured regulator, admitting one additional candidate has two separate effects on salaries. The first is the effect of minimum standards on consumers' valuation. The second is that admitting one additional lawyer implies lower wages for all lawyers. This is due to the fact that the consumers' marginal valuation is decreasing in the number of lawyers in the market.

For the captured regulator, the marginal effect of one additional lawyer on salaries crucially depends on market size and therefore equation (9) distinguishes the two theories.

Summary

In short, the market is described by the demand function () and the supply relation

$$w = \beta_0 + \beta_1 X + \alpha_1 \frac{L}{Nf(t(L), m)} + \vartheta \alpha_2 \frac{L}{Z} + \eta \quad (10)$$

in which the behavioral parameter ϑ is equal to 1 if the regulator is captured, while ϑ is equal to 0 if licensing is efficient. Alternative assumptions on the objective of professional boards are possible. In particular, boards may place some positive weight $0 \leq \vartheta \leq 1$ on both lawyers' rents and social welfare. If this is the case, they face the problem

$$\underset{L}{Max} \quad \vartheta \Pi(L, t(L)) + (1 - \vartheta) W(L, t(L)),$$

which provides the first order condition (10). Therefore, the behavioral parameter can be interpreted as the relative weight given to rent seeking and social welfare by the licensing board.

Additional Effects

Setting minimum standards could also increase or decrease social welfare in other ways. First, there may be positive externalities in the working of the judicial system, because a larger number of more capable professionals may increase the speed and the

efficiency of the courts. Positive externalities are likely to increase with the difficulty of the examination and the size of the profession. Second, higher standards may generate overinvestment in exam specific skills, which may have no other use than increasing the chance of passing the bar exam. In this case, the bar exam generates a waste of resources from the social point of view, which is again increasing in the difficulty of the exam, since more difficult exams require more specific training, as well as in the size of the profession. This two additional effects impact the social planner problem.

Third, the entry examination implies implementation costs, which again increase with the difficulty of the examination and the size of the profession, as the screening process becomes more sophisticated, and coordination more difficult. This third aspect should influence both the social planner and the captured regulator.

To include in the model these additional factors, I assume multiplicative decomposition of the cost and denote the additional social benefit (or cost if negative) by $C(t(L), L) = \delta tL$, and the implementation costs by $I(t(L), L) = \gamma tL$. So that the objective of the board is

$$\underset{L}{Max} \quad \vartheta \Pi(L, t(L)) + (1 - \vartheta)[W(L, t(L)) + \delta tL] + \gamma tL$$

and solving the modified maximization problem, the coefficient of $\frac{L}{Nf(t(L), m)}$ in (10) becomes $\alpha_1 + (1 - \vartheta)\delta + \gamma$, which may be positive or negative depending on the sign of δ , and the additional term $-[(1 - \vartheta)\delta + \gamma]t$ enters in (10), so there is one additional endogenous variable in the supply equation. The identification problem, however, is not substantially affected.

3 Empirical implementation and identification of ϑ

The empirical application focuses on the US market for entry level lawyers. This approach has several advantages in terms of data availability (see Appendix for a detailed description of the data set):

- (1) the market for lawyers is regulated at the state level, so one can exploit variability in regulation across states and over time;

(2) the number of first year lawyers entering the market can be precisely determined, since detailed data is available on the number of successful and unsuccessful bar exam candidates (respectively denoted by $L_{i,t}$ and $N_{i,t}$ for year t and state i);

(3) board decisions are observable, as detailed data is available on the difficulty of the bar exam. In practice, licensing boards choose a numerical threshold, which determines the number of successful candidates;

(4) data on the median salary in the legal profession ($w_{i,t}$) is available from the National Association for Law Placement, which surveys law school graduates one year from graduation.²

Each state and year differs in the number of candidates $N_{i,t}$, market size $Z_{i,t}$ (measured by the population of the state) and exam difficulty $t_{i,t}$. With data on the number of candidates passing the bar exam, $L_{i,t}$, it is possible to compute the number of successful candidates per capita $\tilde{L}_{i,t} = \frac{L_{i,t}}{Z_{i,t}}$ and the pass rate $\frac{L_{i,t}}{N_{i,t}}$. Assuming Gaussian score distributions, I estimate the density of the score distribution evaluated at the minimum standard, $f_{i,t}(t_{i,t})$ and compute the weighted pass rate $\tilde{P}_{i,t} = \frac{1}{f_{i,t}(t_{i,t})} \frac{L_{i,t}}{N_{i,t}}$. I construct a unbalanced panel of 37 states for a total of 448 yearly observations between 1991 and 2005, where each state is observed for 12 years on average, with a minimum of 4 and a maximum of 15. Summary statistics are reported in Table 1.³

I estimate a system of the form

$$w_{i,t} = \alpha_0 + \alpha_1 t_{i,t} + \alpha_2 \tilde{L}_{i,t} + \alpha_3 Y_{i,t} + \xi_i + \varepsilon_{i,t} \quad (11)$$

$$w_{i,t} = \beta_0 + \beta_1 X_{i,t} + \beta_2 \tilde{P}_{i,t} + \beta_3 \tilde{L}_{i,t} + \mu_i + \eta_{i,t} \quad (12)$$

where $w_{i,t}$ is the mean entry salary in the market for lawyers; ξ_i and μ_i are state specific components of the outside salary; X and Y are matrices of exogenous variables; $\varepsilon_{i,t}$ and

²If one looked at the average salary in the profession (considering lawyers of different age), then changes in regulation would slowly affect mean salaries, as the number of generations affected by the change increase in the population. In practice, using this data would require very long time series, which are not available for a number of variables used in this paper (for example exam difficulty).

³Appendix 1 describes the data, sources and construction of the variables. See also Pagliero (2007) for a description of the bar exam procedures and the data.

$\eta_{i,t}$ capture unobserved heterogeneity.

There are three endogenous variables in (11) and (12): $t_{i,t}$, $\tilde{L}_{i,t}$, and $\tilde{P}_{i,t}$. Three conditions must hold for consistent estimation: First, the regressors $\tilde{P}_{i,t}$ and $\tilde{L}_{i,t}$ must not be perfectly correlated. They will not be in my sample, given the variability in market size $Z_{i,t}$ and number of exam takers $N_{i,t}$. Second, the remaining variables, stacked in the matrices of instruments Z_d and Z_s for the two equations respectively, are exogenous in the sense that $E(Z_d'\epsilon) = 0$ and $E(Z_s'\eta) = 0$. Finally, the rank conditions are satisfied.

Although I will estimate (11) and (12) as a system of simultaneous equations by 3SLS, it is useful to think of the estimation process in two steps. First, to identify α_1 and α_2 , I need exogenous variables correlated with the two endogenous variables in (11) but not included in Y . Supply shocks in X are the natural candidates. I use measures of the quality and size of the cohort of students to which bar exam candidates belong. Both quality and size of the cohort are measured 8 years before the bar examination using lagged SAT scores and number of SAT takers. SAT scores are correlated with both the quality and number of bar exam takers after 8 years, with exam difficulty and therefore with the number of passers.

Given the long lag and the fact that SAT scores refer to a large portion of students applying to college (not only those who will eventually earn a law school degree), SAT scores are not plausibly correlated with the error term in (11). This makes the exclusion restriction valid.

Once an estimate of α_2 is available, I can estimate the second equation by exploiting demand shocks in Y . Finally, since $\beta_3 = \vartheta\alpha_2$, one can then compute ϑ . Following the literature (Pashigian 1977), demand shifters include the number of divorces per capita, the state population, Gross State Product per capita and the number of existing lawyers in the state. Depending on whether entry level lawyers are substitutes or complements to existing lawyers, this variable will have a negative or positive impact on demand.

In practice, given the limited number of observations, I need to keep the specification of (3) as simple as possible. While this is obviously a limitation, it is one dictated more by the specific application than by the identification strategy proposed in this paper.

4 Results

Table 2 reports the results of estimating (11) and (12) by 3SLS. The estimated behavioral parameter ϑ is 0.69, with a standard error of 0.3. The order of magnitude of this estimate is consistent with the theory, which predicts that $\vartheta \in [0, 1]$. Note that I do not impose any constraint on the possible values of the parameter ϑ in the estimation. As argued above, one can interpret this result as licensing boards giving on average a weight of 69 percent to lawyers' rents and 31 percent to social welfare. Welfare maximization implies that $\vartheta = 0$, which is rejected at a 3 percent confidence level. Capture theory predicts $\vartheta = 1$, which is not rejected at conventional levels.

Overall, the estimated parameters have the expected sign. The coefficient of the number of entry level lawyers is negative in the demand equation and positive in the supply relation. The implied elasticity of demand for the market for entry level lawyers is 2. In the supply relation, the elasticity of the number of bar exam passers is 0.3, implying that, as demand varies, the licensing board allows a 0.3 percent increase in the number of entry level lawyers only if there is a 1 percent increase in salaries. The impact of exam difficulty on the demand for entry level lawyers is positive, as predicted. The point estimate implies that a 1 percent increase in the exam difficulty implies a 7 percent increase in consumers marginal valuation for entry level lawyers. However, the standard error is large and the coefficient is significantly different from zero at a 15 percent confidence level.

Larger population implies relatively higher demand for legal services, although the magnitude of this effect is small (elasticity equal to 0.3). The impact of Gross State Product per capita is positive, as predicted, but relatively small and not significantly different from zero (elasticity 0.1). The impact of the number of existing lawyers per capita is positive and significantly different from zero at conventional levels (elasticity 0.2). This suggests that entry level lawyers and more senior lawyers are complements in the production of legal services. In the supply relation, the coefficient of the weighted pass rate is negative (elasticity 1), which is consistent with the existence of some external

effects of entry standards, as discussed above. Cohorts of students with relatively high SAT math scores and low verbal scores tend to have higher outside option salaries, while larger cohorts (more bachelor degrees in $t - 3$) tend to have lower outside option salaries.

The results do not change significantly if I estimate the more general specification allowing for the possible external effects of licensing and implementation costs (Table 2, columns 3 and 4), and ϑ is estimated to be 0.70. Also the other parameters are identified, but the standard errors are too large to provide any conclusive evidence on the magnitude of externalities or implementation costs.

4.1 The impact of licensing on entry, salaries and welfare

Having estimated the structural parameters, I can explicitly solve for the number of entrants allowed in the market under the counterfactual hypothesis of efficient regulation, that is with $\vartheta = 0$. This change implies a 22 percent increase on average in the number of lawyers.

The increased supply drives down salaries directly because of increased competition, but also indirectly because of the decrease in consumers' willingness to pay as standards decrease. On average salaries decrease by 46 percent or \$23,000. The increase in the number of lawyers does not compensate for the drop in salaries, and the overall wage bill goes down by 3 percent. The decreased cost of legal services more than compensates for the decrease in minimum standards, and consumer welfare increases on average by 65 percent (over \$800 million in total).

The total effect of licensing, as measured above, is a lower bound for two reasons. First, the analysis focuses on new professionals and entry salaries, and entrants are but a small fraction of the total number of professionals. Second, as salaries increase with seniority, one expects the absolute difference between salaries and outside option to increase.

There may be alternative interpretations of the estimation results. Imperfect competition may exist among law firms, which could generate joint market power independently of entry restrictions. However, this is unlikely to explain the results. In fact, I focus on the entry level market for lawyers, where imperfect competition among law firms has only

an indirect effect. In contrast, the effects of the bar examination are direct, as the stock of entry level lawyers in each year is directly determined by exam difficulty.

Another possible interpretation is that monopoly power is created by educational requirements, rather than by the bar examination. However, educational requirements are almost the same in all states and do not significantly change in the period studied in this paper. Educational requirements may create an additional barrier to entry, but they cannot explain the results of this paper.

5 Conclusions

This paper specifies and estimates a static model of professional licensing. An advantage of my set-up is that a model of licensing is used to guide the empirical analysis, so that the alternative hypotheses are made explicit. This paper shows that the objective of licensing boards can be estimated from available data on a single regulated profession. The estimated parameters are used to measure the weight of rent seeking in professional licensing regulation in the US market for lawyers. The results suggest that rent seeking accounts for almost 70 percent of the licensing board objective, as opposed to social welfare. The null hypothesis of public interest theory is rejected against the alternative of capture theory. The results imply that licensing, as implemented, increases salaries and decreases the availability of lawyers, thus significantly reducing consumer welfare.

There are some drawbacks to this approach. First, no dynamics are considered, this is a problem common to the entire literature on professional licensing. Second, the results obviously depend on the specification of the demand and on outside option equations. Third, I deliberately keep the model specification and estimation as simple as possible, simplifying the description of the economy to the essential relationships among the key variables. With more detailed data, one could possibly add additional layers of complexity. This is the first paper attempting to estimate the objectives of professional licensing boards, and the results should be taken with some caution.

In my model of licensing, the counterfactual scenario of deregulation is implemented

through lower standards, which leads to higher entry into the profession and lower prices for consumers. In practice, more competition comes at the cost of lower quality. Still, the welfare gains from the former more than compensate for the losses of the latter. This setting ignores the possibility of a more radical reform in which certification markets are introduced (Kleiner 2000). If these markets indeed existed, the consumer gains from the reform of the current regulation may be greater, as certification markets could reveal lawyers' quality without creating market power.

From a policy perspective, the results of this paper can be used to inform the ongoing debate on the applicability of competition rules in professional markets, both in the US and in the European Union (Andrews 2002; Paterson, Fink and Ogus 2003; European Commission 2004). The approach taken in this paper could also be applied to the evaluation of the impact of professional licensing in other professions. Detailed data on exam results are available for other professions, and standardized examinations are also commonly used in licensing examinations.

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Table 1. Summary statistics (N=448)

Variable	Mean	Std. Dev.	Min	Max
Median salary (/1,000, 1996\$)	55.2	19.3	23.1	113.8
Successful candidates per capita (*1,000), \tilde{L}	177.7	97.5	48.7	626.8
Bar exam difficulty, t	134.1	4.0	125	145
Population (index)	1.0	0.076	0.91	1.43
Lawyers per capita	0.006	0.014	0.005	0.101
Real GSP per capita (/1,000, 1996\$)	32	12	19	109
Weighted pass rate, \tilde{P}	29.35	11.17	13.32	85.78
Bachelor Degrees (t-3), (/1,000)	25.78	25.82	0.99	125.94
SAT Verbal (t-8)	525.4	32.93	468	607
SAT Math (t-8)	519.9	32.41	449	602
SAT Candidates (t-8), (/1,000)	25.04	33.55	0.28	140.70

Note: median salary is the median entry salary in law firms. The Bar Exam difficulty is measured on a 0-200 scale. The population index is population/mean population in the state.

Table 2. Estimation results (3SLS)

	(1)	(2)	(3)	(4)
	Main Results		Additional Results	
	Demand	Supply	Demand	Supply
Successful candidates, \tilde{L}	-0.134 (0.049)***	0.092 (0.023)***	-0.134 (0.049)***	0.094 (0.035)***
Bar exam difficulty, t	2.822 (1.984)		2.768 (1.993)	0.177 (27.866)
Population index	17.099 (10.157)*		18.188 (10.865)*	
Lawyers per capita (*1,000)	2.28 (0.71)***		2.29 (0.71)***	
Real GSP per capita	278.721 (353.402)		264.311 (357.074)	
Weighted pass rate, \tilde{P}		-1.819 (0.378)***		-1.850 (1.641)
Bachelor Degrees (t-3), (/1,000)		-0.222 (0.339)		-0.375 (1.940)
SAT Verbal (t-8)		-0.829 (0.154)***		-0.843 (0.508)*
SAT Math (t-8)		0.652 (0.163)***		0.655 (0.727)
SAT Candidates (t-8), (/1,000)		0.000 (0.000)		0.000 (0.000)
Constant	-324.757 (242.883)	196.695 (61.283)***	-318.638 (243.849)	183.446 (3,451.710)
Observations	448	448	448	448
theta	0.69 (0.31)**		0.70 (0.38)*	

Note: The dependent variable is median salary (/1,000, 1996\$). Successful candidates is the number of successful candidates divided by the population in for a specific state and year (*1,000). Summary statistics are reported in Table 1.

Table 3. The impact of reducing rent seeking.

	<u>Theta=0</u>
Number of lawyers	+22%
Median Salary	-46%
Consumer Welfare	+65%
Wage bill	-35%

Note: Counterfactual changes deriving from a decrease of theta from 0.69 to 0.