EVIDENCE OF COMPETITION BETWEEN LAW SCHOOLS

by

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ABSTRACT

EVIDENCE OF COMPETITION BETWEEN

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The purpose of this paper is to measure how competition affects tuition rates of law schools. I hypothesize that the tuition rates will go up as concentration of law schools increase. To examine how tuition varies with competition, I need to measure market structure. A variety of measures are available, such as C4, C8, and HHI; all of which have some relationship to the degree of competitiveness in an industry. I primarily use HHI as the concentration measure in this paper. I make two models for my thesis. In my first model I use a statewide measure of competition, assuming each school competes against all the other schools in its state with the exception of the most elite schools. Then I revise my model. I assume that according to the Location model, schools located close to one another geographically and qualitatively compete with one another. Schools whose qualities differ enough and which are located far from each

other are not likely to be in vigorous competition with each other. I first estimate my model using the ordinary least squares (OLS) method. Due to potential endogeneity problem in the OLS method, I also use the Instrumental Variable approach. In both of my models concentration affects tuition negatively.

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CHAPTER 1

INTRODUCTION

There are 191 law schools in the United States. Number of law schools varies between states. Wyoming has just one law school and California has approximately 19 law schools. I assume law schools with more market power may charge higher tuition. I try to estimate whether law schools with more market power act like profit- maximizing firms and engage in monopoly pricing.

Usually, law students attend a law school in the same state where they intend to practice. The primary exception to this rule is that outstanding students are more likely to attend one of the national elite schools such as Harvard or Yale, before returning to their home state to practice. Approximately 2.5% of students graduate from the Ivy League colleges every year (Law School Admission Council)[1].Conversely, a majority of the law graduates do not conform to this exception. Each state tends to represent a different geographic market. Because states differ substantially in size, there is considerable variation across states, in the degree of market competition. As lack of competition tends to lead to higher prices in other markets, states with fewer law schools would also charge a higher tuition than states with many law schools.

I identify price with the standard tuition amount charged at different schools. One possible limitation with this approach is that schools charge different students

[1]http://officialguide.lsac.org/docs/cgi-bin/home.asp

different net prices based on the amount of financial aid and/or scholarships they receive. Law schools offer most of their financial aid in the form of loans. The grants that law schools offer are trivial compared to grants that schools offer in undergraduate studies (U.S news)[2]. Schools assume that their students can borrow the money needed and pay the tuition fee and pay the loan back as soon as they graduate.

1.1 Summary of the Thesis

In this paper I try to estimate how the tuition rates vary with amount of competition between law schools. I hypothesize that increases in the competition of law schools in a certain state leads to higher tuition rates in that state. In other words, law schools will exercise market power by charging higher tuition in states where there are fewer of them and act more like competitive firms where there are many. To examine how tuition varies with competition, I need to measure market structure. A variety of measures are available, such as C4, C8, and HHI; all of which have some relationship to the degree of competitiveness in an industry. I primarily use HHI as the concentration measure in this paper, which will be discussed in detail in the methodology section. I make two models for my thesis. In my first model I use a statewide measure of competition, assuming each school competes against all the other schools in its state with the exception of the most elite schools. Then I revise my model. I assume that according to the Location model, schools located close to one another geographically and qualitatively compete with one another. Schools whose qualities differ enough and which are located far from each other are not likely to be in vigorous competition with

[2] http://www.usnews.com/usnews/home.htm

each other. I first estimate my model using the ordinary least squares (OLS) method. Due to potential endogeneity problem in the OLS method I revise the method and use the Instrumental variable (IV) approach. My data comes from three sources: Law school admission council (LSAC), Geocoder website and U.S Census Bureau.

1.2 Contribution of the Thesis

There is a large literature on concentration and pricing. Economists tried to find out the relationship of concentration and pricing in many industries such as movie theaters, grocery stores, airlines and automobiles. However, there is no literature on concentration of law schools and pricing. Hopefully my study on how tuition rates vary with concentration of law schools will improve upon the existing literature.

1.3 Organization of the Thesis

I organize my thesis as follows: a review of relevant literature is in chapter two. I talk about the theory of Structure-conduct-Performance in chapter three. Chapter four discusses the empirical models and the hypothesized results. Chapter five explains the different data sources. Chapter six gives the results from the empirical model and chapter 7 gives the possible interpretation of those results. Finally, chapter 8 is the conclusion of my thesis. After the conclusion there is the Appendix. Appendix has some regressions and tests I use to come up with my final model.

CHAPTER 2

LITERATURE REVIEW

A relatively small literature on law profession exists. A larger literature discusses the relationship of concentration and prices in other industries such as automobile manufacturing, airline service and railroad service. There is also a large literature that discusses spatial competition and pricing

2.1 Literature on Law Profession

Sauer (1998) studied the life cycle career choices of law school graduates using unique data from the University of Michigan Law School. The model assumes that Law graduates act according to the optimal solution of a dynamic optimization problem in which they sequentially choose among five employment sectors. The employment sectors are differentiated by pecuniary and non pecuniary returns, promotion and dismissal probabilities and the extent of transferability of human capital. Lawyers make their career choices according to their abilities. He used maximum likelihood functions to estimate the probabilities of job offers for attorneys with high abilities and for attorneys with low abilities. Maximum likelihood functions were used to determine the relationship between background characteristics and attorney ability.

2.2 Relationship of Concentration and Price

Bain (1951) discovered that the average profit rate of firms in oligopolistic industries of high seller concentration tend to be significantly larger than that of firms in less concentrated oligopolies or industries of atomistic structure. Other things which seemed to affect profits were barriers to entry. There was a selection bias in the sample. Industries that were included in the sample had national markets specialized firms. Out of 149 industries only 42 industries with 335 firms were included in the sample. Accounting profits which were adjusted for price level changes were used to test the hypothesis. Every industry used different methods to calculate for the profits. Though Bain concluded that there was a positive relationship between high seller concentration and profits, the findings are accepted with some reservations such as: limitations of the data and sample bias. Furthermore, if the conclusions are true for the time period of 1936-40, they might not be true for 2006.

Graham, Kaplan, and Sibley (1983) tested two hypothesis that were central to the argument for airline deregulation: 1) CAB (Civil Aeronautics Board) regulation caused airlines to employ excess capacity relative to the capacity that would be provided under unregulated competition; and 2) that potential competition would keep fares at cost even in highly concentrated markets. At the end of 1978 the Board gave the carriers the ability to serve any routes they wished. The airlines took advantage of these freedoms to change their route networks and pricing strategies. In the airline industry, each city pair route is a market, and each carrier which travels in that route, is a firm. An econometric analysis of these hypotheses based on post deregulation data suggests

that the excess capacity hypothesis is confirmed. However, the data does not support the hypothesis that fares are independent of market concentration. To test the excess capacity hypothesis they compared the relationships between load factor, distance, concentration and traffic volume. They calculated concentration using Herfindahl Hirschman Index. Graham, Kaplan and Sibley estimated the equation using OLS and 2SLS since they thought there might be a possible correlation between the density variable and the error term. Both the estimates show that load factor increases with distance, density, and concentration. To estimate the effect of market concentration on fares they explained the model using variables discussed above distance, concentration, traffic volume, travelers' valuation of time and airline's cost structure. The effect of concentration on fares is not uniform. When the HHI reaches approximately 5000, the percentage increase in fares is very small.

Kwoka (1981) demonstrated that choice of concentration ratios can matter a great deal. Previously choice of concentration ratio was ignored since the concentration ratios are highly correlated. He used different concentration measures for US manufacturing industries and explored their relationships to industry performance. The dependant variable was the price cost margin and different concentration ratios were used as explanatory variables. The parameters were different for each concentration ratio. The coefficient was highest for C1 and lowest for C10. This explains that even with high correlations among the concentration ratios, concentration ratios perform different in the regression relationships. The other implication of this finding is an

industry's ability to raise price cost margins may be determined by not 20, 8, or even 4 firms, but by the leading two.

Lamm (1981) indicated that the choice of a market structure measure is important for determining the nature of the structure price relationship in the food retailing industry. Previously economists have found that a positive relationship exists between food prices and market concentration. Lamm concluded that equal weight scheme inherent in the use of concentration ratios will dilute the important aspects of firm share distribution. Concentration ratios emphasize that each firm is equally important in determining the industry performance (price). He estimated retail food prices on different concentration ratios (C1, C2, C3, C4). He again included each firm's market share separately in a price structure regression and checked whether the resulting coefficients were statistically different from the ratios. Estimated share coefficients differed substantially from concentration ratios. Estimates of the market share coefficients show exactly which firm is responsible to raise the food price.

Kwoka (1984) demonstrated that high concentration in the automobile industry and monopoly power have affected industry decision making with regard to high pricing and poor quality. However, those problems occurred approximately 20 years ago. Due to oil price changes, fluctuations in the economic cycles and change in technology, those problems may no longer be valid. He did not use any regressions or econometric techniques to estimate how levels of concentration in automobile industry affects price. He showed the sales and other characteristics of four leading automobile companies: GM, Ford, Chrysler, and AMC.

MacDonald (1987) investigated the extent and importance of rate competition among railroads for export shipment of three agricultural commodities: corn, soybean and wheat. He found that the further the shipper is from competing water transportation, the higher the rates; and as rail road competition in a region increases, rates fall. Price is the function of marginal cost of the shipment and the elasticity of demand facing the firm. Firm elasticity depends on market elasticity of the demand for that commodity, extent of competition at that location, and the nature of rivalry among sellers. Revenue per ton-mile in cents is used as the dependent variable in the paper. Shipment size and the distance are the determinants of marginal costs of that shipment which is measured in the independent variable as miles. Miles estimated shortest rail distance between origin and the destination points. Costs per ton should decline with increasing tonnage in the shipment. MacDonald used the explanatory variable volume to measure the tonnage shipped between specific origin and destination points. He used two measures of competition, one for water transportation, and the other one for competing rail lines. The measure he used for water transportation is the mileage from the origin point to the nearest location of water transportation. The other independent variable for competing rail lines is calculated as an index of the concentration of all rail shipments of all grain originating in the region. It is the reciprocal of Herfindahl Hirschman index. He also included an interaction term between these two independent variables. He estimated the equation using the weighted least squares, with weights equal to the sampling probabilities. The coefficient values conform to the expectations. The coefficient for competing rail lines is negative and significant which implies that increased competition

is associated with lower rates. The coefficient for water transportation is positive and significant; rates increase as barge competition becomes more remote.

Borenstein (1989) estimated the importance of route and airport dominance in determining the degree of market power exercised by an airline. The results indicate that an airline's share of passengers on a route and at the endpoint airports significantly influences its ability to mark up price above cost. Dominance of major airports by one or two carriers, in many cases results of hub formation. This appears to result in higher fares for consumers who want to fly to or from these airports. Furthermore, the market power of a dominant airline does not spill over substantially to other airlines serving the same airports or routes. This article attempted to explain more clearly the sources of market power in the airline industry. One source of market power on city-pair routes seems to be the size of a carrier's operations at the endpoints of the route. Frequent flyer programs, reward systems for travel agents that pay bonuses when the agent books more travel with one airline, and control of the computer reservation systems used by travel agents provide some reasons to give an airline advantage over its competitors. Finally, if an airline controls most of the slots or gates in a certain airport then that airline can create entry barriers at that airport. Some econometric techniques were used to get unbiased estimates. Some of the explanatory variables were endogenous. Endogeneity problems were solved with instrument variables. Then he ran the regression using two stage least squares to obtain unbiased estimates.

Evans, Froeb and Werden (1993) studied endogeneity in the concentration-price relationship. The cross section of price on output concentration gives biased

estimate for two reasons; first, concentration is endogenous because it feeds back into structure, and this causes simultaneous equations bias. Second, as a function of outputs, concentration is endogenous and correlated with determinants of price such as demand and factor prices. These determinants of price are measured with error, so measured concentration is correlated with the error term. The biases are likely to be negative. The authors showed the bias using panel data from the airline industry. They used a combination of fixed effects and instrumental variable procedure to come up with an unbiased estimate of the effect of concentration on price. It exceeds the OLS estimate by 250 percent.

2.3 Spatial Competition and Prices

Claycombe and Mahan (1992) researched on spatial aspects of retail market structure of beef pricing. The objective of this paper is to test the hypothesis that commuting characteristics have an important effect on the structure and performance of retail markets. If two or more competing firms are along the commute, then they compete without benefit of product differentiation due to location. In traditional spatial model, it is assumed that consumers would buy from an adjacent store. However, Claycombe suggests that retail firms compete with stores that are nearby but not necessarily adjacent. The range of locations in which a store competes depends on the distance that commuters in its area travel. The city with high concentration has the short commuting distance. He assumed a linear market with 4 retail chains interspersed with independent stores. If most consumers pass 5 stores along their commute, then each store competes with 4 other stores for the flow of commuters. If each store has equal

sales, then each store will have 20% of its market and in four- firm concentration each market will be 80%. In a city where 4 chains operate on one end and 4 different chains operate on the other end, and commuters still pass 5 stores of equal size, then each store in a narrow market has 80% concentration. But the concentration for the city is 40%since there are 8 chains with 10% city sales. In the regression the dependent variable was the beef price margin and the independent variables were group travel (mass transit or car pool riders), commuting distance, wage and concentration. Parameter for group travel is positive which suggests that when there is a high proportion of mass transit or carpool riders, those markets are less competitive and prices are high. The negative sign of commuting distance parameter suggests that long commutes by consumers broaden narrow markets and drive down prices. The effect of concentration variable is not important when commuting variables are added. Commuting variables will not affect price unless concentration in narrowly defined markets affects price. The significance of commuting characteristics suggest that if they define markets, then a significant concentration measure will be available.

Emmons and Prager (1997) studied the effects of market structure and ownership on Prices and Service Offerings in the U.S. Cable Television Industry. This article provided empirical evidence on the effects of alternative market structures and ownership modes (private or public) on prices and service offerings in the cable television industry. They analyzed the underlying characteristics and behavior of competing versus monopoly operators on the one hand, and privately versus non-privately owned operators on the other, using data from 1983 and 1989. Using data

from two different years enabled them to evaluate the effects of market structure and ownership on 1) price and quality of basic cable television service under different regulatory system and 2) changes in price and quality over time. The results for both the years were very similar given the changes in regulatory environment and in the nature of basic cable services that took place between 1983 and 1989. Overall competition and non-private owners charge significantly lower prices for basic cable television service than private monopoly operators do in both 1983 and in 1989. Cable television price and quality differences vary with certain characteristics of competing operators, and market structure and ownership status influence changes in price and quality over time. On average their results suggest that quality of competing cable operators do not differ from quality of privately owned monopolists. Their dependent variables were price charged for basic cable service and number of channels in the basic service package (a quality measure). Some of the independent variables included were income, age (how long the firm has been around) and population density (a measure of costs). In this paper population density was used as a proxy for cost and age was used as a proxy for quality. Their basic analysis employed the SUR (seemingly unrelated regression) method to estimate the relationships. They extended the analysis in two directions. First they explored the nature of competition in those markets served by more than one cable system operator, examining how factors such as duration of competition, relative timing of market entry, and size of competitors influence outcomes. Second, they examined changes in price and quality from 1983 to 1989. They found out that there is no significant difference between the prices charged by firms that have been competing for

a short time and those that have been competing longer. Relative size has no effect on pricing behavior. They also concluded that entrants charge a lower price than the incumbents but they offer a higher quality than the incumbents.

Claycombe (2000) studied the effects of market structure on prices of clothing and household furnishings. In this paper prices of clothing and household furnishings are explained using commuting variables and market concentration of department stores. The study of both furnishings and clothing prices present a unique opportunity to test the effects of commuting behavior on structure and retail prices. The concentration variable has a strong effect on prices of both product types. However, commuting variables only effect furnishing prices but not clothing prices. In this model, price of each of the products (furnishings and clothing) is a function of concentration, income, population, commuting variables and whole sale cost of goods. There are regional differences in consumption patterns and differences in climate. So, regional dummy variables are included to control for regional variation in consumption patterns. Population density may serve as a proxy for store density and be inversely related to price. Regression results of furnishing price suggest concentration has a strong positive effect on price. Markets are more competitive when a high proportion of commuters travel alone in cars and can shop along their commutes. The population density variable has a strong negative correlation on furnishing price. Then the parameters are estimated with the GLS model to correct for the auto correlation. The GLS results are similar to OLS results except the parameters are stronger. Clothing price regression results suggest there is no strong effect on commuting variables, while the concentration effect

is strong. It is expected to have weak effects for commuting variables because clothing often cannot be bought along a commute. Usually students who do not commute are consumers of clothing. Regional dummy variables were deleted to apply The GLS procedure. In the GLS model commuting variables all have weak correlations on price and concentration has strong correlations on price. This paper also examines market structure effects on price by using panel fixed effects techniques. Fixed effects corrects for unobserved heterogeneity. Pooled data models have stronger effects than fixed effects.

Davis (2001) analyzed spatial competition in retail markets and movie theaters. Retail markets are very important, but economists have few practical tools for analyzing the way dispersed buyers and sellers affect the properties of markets. In this paper he developed an econometric model of demand, a model in which products are location specific and consumers have preferences over both geographic and other product characteristics. Product characteristics include the number of screens, the type of sound system, whether the theater operates a consumer service line. Demand model can help explain observed variation in market shares across stores. By directly incorporating the distribution of population within each market in the model, variation in population density helps explain observed variation in demand across theaters with in each market. Using data from movie theaters, he evaluated the effect of choices about theater characteristics (price and quality) on rivals. The first stage price instrument regression demonstrates the ways prices vary with theater characteristics. For instance theaters with high quality sound systems or large number of people living close to them charge

higher admission prices. The estimates show that the instrument used to identify the price coefficient in the demand model, the number of digital theater sound systems operated by rivals is correlated with adult admission price as required. He also estimated the parameters using the multinomial logit model with unobserved product characteristic. The results aim to demonstrate that there are clear relationships between the observed market share data and both theater product characteristic and geographical distribution of consumers from theaters. Consumer service lines, digital sound system all provide positive marginal utility. Geographic characteristics are included in the regression. People tend to go to a theater located closer to them than further away. Multinomial logit helps to explain observed variation in market shares across theaters. After that parameters were estimated for the full model. The results are very similar to the Multinomial logit model, except full model has substitution patterns that depend directly on the distribution of consumers from theaters. The full model suggests travel cost reduce sales. In the full model consumer tastes were allowed to vary in a systematic way with their demographic characteristics. Younger and richer consumers have greater preference to watch movies in movie theaters than poorer and older contemporaries. He found that business stealing effects across theaters are small and significantly decrease with distance. Next, he used theater cost data to estimate an hedonic theater cost function. Davis combined the demand and supply models to consider retailers optimal store scale decision. The estimates suggest that market may substantially under provide movie screens relative to the socially optimal size of movie theaters because theaters are

frequently close to being local monopolists. This article had one limitation. He did not consider that people will travel a longer distance to go to a theater of superior quality.

Asplund and Friberg (2002) examined retail grocery price levels with large panel of stores in Sweden. They explained price variation of stores by market structure variables to capture differences in competition intensity and a number of stores, and region specific factors. Most of the price variation is caused by specific factors such as size and chain affiliation. Overall, relationship between market structure and food price is weak. Yet, higher local concentration of stores, higher regional wholesaler concentration and a lower market share of large stores are all correlated with higher prices. They had price information of approximately 1000 stores; they also had specific information on revenue, chain affiliation and store type. They also had detailed information on location to reflect regional competition among chains; such as they had dummy variables for urban, west, south, Stockholm and Gothenburg. Prices of five well defined products were used to picture the price level of that store. Asplund and Firberg used the Hirfindahl index to calculate for the concentrations. In the paper a narrowly defined area is a locality such as equivalent to a postal area. They assumed that price level will depend upon the concentration of stores in the locality. They also assumed that price reflected in the concentration of chains in a locality and chains in a region. They also took market shares of supermarkets and hypermarkets to explain price in the presence of large stores. Variation in price will depend on cost and demand factors as well as store specific factors, such as store type, store size and chain affiliation. Population density was used as a proxy for cost of floor space that differs even within

towns. Transport costs were captured by dummy variables of regions. The results suggest that retail monopoly at the store level and chain monopoly at the regional level would lead to a higher price compared to where concentration is less. However, in percentage terms the price effects are small. The assumption that the presence of large stores exerts a downward pressure on prices in other stores is supported. Population density that was a proxy for costs of sales space has positive influence on price. Prices are lower in Gohenburg and western areas than the rest of the country due to more intense competition.

Davis (2005) estimated the effect of local competition on admission prices in the U.S. Motion picture exhibition market. He found there is a statistical relationship between geographic distribution of movie theaters in a market and the admission prices they are able to charge. However, he found that there is no evidence that an increase in market concentration lead to increased adult admission prices. The price of admission to a movie theater depends directly on the distribution of locally competing theaters within the market. The cross sectional evidence suggested that substantial decreases in concentration might be associated with larger declines in the top admission price. He constructed the counts of the number of new screens in a variety of distance bands from each theater that are owned by the same theater circuit and also for the set of theaters that are owned by the rival circuits. Results show that the predicted effects are relatively small and negative and decline with distance. There is little evidence that intra competition has smaller price effects than inter competition. The presence of rival theaters appears to have a smaller predicted effect than presence of own theaters on the

prices a theater can charge. However, this conclusion might be a special case for the movie theater market. Theater chains typically want to charge a lower admission price than the film distributors will allow. As film distributors do not share their box office revenues with the exhibitors, exhibitors do not share their concession revenues with the film distributors. Therefore, the exhibitors charge a low price for admission, thus they can sell more snacks to the larger number of attendees.

These are the studies done to explain how concentration and spatial competition affect pricing. While economists have performed analysis of the effects of competition on price for automobile, railroad, airline industries and movies theaters, there are no studies done on law schools. This paper is unique to examine how competitions between law schools affect tuition. Findings from this research will hopefully improve upon the existing literature.

CHAPTER 3

THEORY

Competition tends to lead to lower prices. Mason hypothesized that a direct relationship exists between market structure, market conduct and market performance (Mason 1939). This hypothesis is known as Structure- Conduct- Performance paradigm, which is emphasized in this chapter. Microeconomics usually emphasizes perfect competition, where atomistic market structure results in efficient economic performance, price equals to marginal cost, inefficient firms are driven out of the market and long run economic profits are zero. On the other hand with monopoly market structure, economic performance is inefficient, such that there is misallocation of resources, price exceeds marginal cost, inefficient firms may remain in the market and economic profits are positive in the long run.

3.1 Structure- Conduct- Performance

Structure-Conduct-Performance extends the relationship to monopolistic competition and oligopoly. Demand and supply determine market structure. Demand side conditions include direct and cross-elasticity's of demand, market growth in its trend, and purchasing habits of consumers. Supply side conditions include location and ownership of raw materials, technology, unionization, product durability, industry history, and the legal, ethical and the political framework within which business activity takes place. Market structure in turn determines conduct, and conduct in turn determines

performance. The assumption that causality is from structure to conduct to performance is debatable. The causality can also be from performance to conduct to structure. So, mutual causation and feedback effects are possible rather than simple one-way causation. I have given examples of feedback effects later in this chapter.

Seller concentration, product differentiation, diversification, scale economies, barriers to entry and exit and cost conditions usually characterizes market structure. Of these, the seller concentration has received the greatest attention to determine market structure. I discuss few statistical measures of concentration, in the methodology section. As the number of substitutes increase the seller concentration goes down. Market structure determines conduct. Under conduct one conventionally looks at: how price is set, the way in which volume, quality, and range of products are determined, advertising and marketing strategy, research and development and legal tactics. Usually conduct is assumed to take some simple form like profit maximization, by quantity variation. Conduct helps determine performance. The level of profits, employment creation, technological progressiveness and consumer surplus generated in the market characterize performance.

Structure- Conduct -Performance becomes more complicated when there are feedback effects. An oligopolist may direct his conduct at attempting to achieve a change in market structure. By aggregate advertising (conduct), it may force rivals out of the market and thus promote an increase in concentration; such that a change in structure. Equally, the attempt to attain performance goals such as high profits, innovation and product quality improvement is likely to influence both the way the firm

conducts itself and ultimately the structure of the market in which it operates. For example, higher profits (performance) might result in increased advertising (conduct) and increased advertising might result in an increase in barriers to entry (structure). In this case, performance has an impact on conduct and conduct may have an impact on structure. These are some of the examples of the feedback effects.

There are problems of feedback effects. I can take the same example written above for the discussion of causality. Suppose the concentration C (an aspect of structure) causes firms to adapt an aggressive advertising policy A (an aspect of conduct) in order to compete with their rivals. This can be expressed formally as A= f (C). It is important for us to notice that causality can occur in the opposite way. It can be discussed that the pursuit of an aggressive advertising policy leads to an increase in concentration to force the rivals out. The following also holds: C= F (A). This runs up against the classical econometric problem of lack of identification (Reid 1987). One way to get out of this problem is by introducing additional exogenous variables in to the model. The approach to solve this problem is known as the Instrument variable approach.

3.2 Location Model

Market definition for concentration measures can have both geographic location and the product characteristic dimensions. Location models are monopolistic competition models where consumers view each firm's product as having a particular location in geographic or product characteristic space. The closer two products are to each other geographically and qualitatively, the better substitutes they are (Carlton,

Perloff 2005). For example, both Wendy's and MacDonald fast food shops located in the same neighborhood are in competition with each other since the transaction costs are low and their product differentiation is trivial. However, a Thai restaurant and MacDonald located in the same neighborhood may not compete as vigorously due to substantial product differentiation. Market power stems from a customers preference to purchase a product from the nearest firm or purchase their preferred product.

In this paper I make two models. In my first model, each of the fifty states and each academic year represent a market; the law schools in a state are the firms. In my second model law schools of similar quality located geographically close to one another in a state and each academic year represent a market, and the law schools in the market are the firms. In my first model, number of law schools in a state represents the market structure. In my second model, number of law schools (seller concentration) in the market represents the market structure.

The size of the geographical area that law schools compete within depends on their quality. By taking commuting effects into account and quality constant, law schools compete with law schools that are located nearby. However, some schools that are located close to each other geographically may not be competing vigorously since their qualities differ much. In Texas, SMU and Texas Wesleyan are close to each other geographically, yet they are not close substitutes due to perceived quality difference. Keeping the quality of the schools the same people are more likely to go to a school that is located closer to them than to a school that is far away.

The range of locations in which a law school competes depends on the quality of the law schools. Education is an investment that pays off later. Usually a law degree from a prestigious school will pay off much better than a degree from an average law school. In this case an able student will be willing to increase his/her transportation cost to go to better quality school rather than going to a school that is just located near by. There are a few elite law schools that attract students from all over the country. Therefore, those elite schools are largely in competition with one another regardless of the geographical area they are located in. For example Yale located in Connecticut, might not face any severe competition within its state due to its superior quality; yet faces competition from all the other elite schools in different states such as Harvard, Stanford, Cornell and Columbia.

In higher education, such as for law schools, quality (product differentiation) does not only depend on the producers, but the quality of students. Thus, even if a law school wants to improve their quality by hiring good faculty and facilitating the campus with good libraries, they typically cannot improve their quality unless good students want to come to their schools. That can only happen through the development of a good reputation. The attractiveness of new law school entrants depends on market growth and demand. If a state is growing bigger, then it will demand more lawyers and so more law schools will tend to enter the market. Some states have not grown much in population such as Wyoming, and so are served by just one law school (state population facts)[3].

[3] http://www.npg.org/states/wy.htm

3.3 Conduct of Law Schools

Conduct of law schools depends on their profit-maximizing behavior. A relationship exists between the monopoly markup and the firm's price elasticity of demand. The percentage change in quantity that results from a 1 percent change in price defines the elasticity of demand. If the elasticity of demand is high, then the curve is said to be elastic. With elastic demand, a small price change induces a very large change in quantity demanded. If the elasticity is low, the demand curve is inelastic, and a price change of 1 percent has relatively little effect on the quantity demanded. In my paper, the elasticity will depend on the number of law schools that are in competition. A large number of close substitutes will make the demand very elastic, and few substitutes will make the demand inelastic. Marginal revenue for monopolist can be written as:

$$MR= p\ (1+1/\varepsilon)$$

where ε is the elasticity of demand. Thus the marginal revenue is positive if the demand curve is elastic ($\varepsilon<-1$). It is negative if the demand curve is inelastic ($-1< \varepsilon<0$). The elasticity of demand, in general, depends on not only the particular curve but also the point on the demand curve. The elasticity of demand could decrease as price becomes lower. By equating the above equation to marginal costs and rearranging, I can write the profit-maximizing condition for the monopoly can be written as:

$$(P-MC)/P= -1/\varepsilon$$

The left hand side of the above equation is the price cost margin, the difference between price and marginal cost as a fraction of price. The equation shows that price cost margin depends on only the elasticity of demand the monopoly faces. The price cost margin is

also called the Lerner Index of market power. The right hand side of the equality holds because the elasticity of the market demand ε is (dQ/dp)(p/Q). The left hand side of the equation is Lerner's measure of market power: the ratio of the price markup over marginal cost to the price. If the market is competitive then P=MC, the Lerner's measure is 0.

In my paper, elasticity facing any one school is ε. The elasticity of each law school depends on the number of close substitutes. As number of substitutes approaches infinity, approaching perfect competition, the elasticity facing the law school approaches negative infinity; Lerner's measure approaches 0 and the price-cost markup reaches the competitive result (Carlton, Perloff 2005). In this case, as the number of law schools competing in an area increases, the market power for each law school decreases and tuition rates fall.

3.4 Determinants of Performance of Law Schools

The performance of the law schools directly depends on the market structure (seller concentration), quality, cost of inputs and governance (private/public). The tuition rates of law schools depend on concentration, quality, cost and governance. According to the theory, if law schools are profit-maximizing organizations, a law school facing little competition will charge a higher tuition and behave like a monopoly whereas a school facing much competition will tend to charge a more competitive price.

Price (tuition) is a function of seller concentration, cost of inputs, quality and governance. Market structure (seller concentration) is exogenous and price (tuition) is endogenous; so, the theory fits into the assumption. There might be an endogeneity

issue as price can also be a function of market structure; but traditionally, in Structure-Conduct Performance assumes that market structure is a function of price (Davis 2005).

CHAPTER 4

METHODOLOGY

As explained in the previous chapters, I attempt to measure the effect of competition of law schools on tuition rates. In my first model I use a measure of statewide competition, assuming each school competes against all the other schools in its state, with the exception of the most elite schools. Then I revise my model, and assume that, according to the Location model, schools close to one another geographically and qualitatively compete with one another. Schools whose qualities differ enough and which are located far from each other are not very likely to be in competition with each other. I first estimate my model using the ordinary least squares (OLS) method. Due to a potential endogeneity problem in the OLS method, I also use an Instrumental variable (IV) approach. The models I use to measure the tuition of law schools are described in the following sections of this chapter.

4.1 Empirical Model

I assume tuition is a function of seller concentration, quality (LSAT scores), cost of input per student (section size), a dummy variable governance (private/public), and an error term. All the variables appear in the model in their levels.

Seller concentration is regarded as a potentially significant aspect of market structure through its hypothesized relationship to market power. Several statistical

measures of concentration (C4, C8, HHI) within a market are available and there are strengths and weaknesses of each of these measures (Kwoka 1981).

One possible measure of seller concentration is simply the number of firms in the industry. Competition ought to increase as the number of firms within an industry increases. The number of firms is most useful as a measure of concentration in the extreme cases of perfect competition and monopoly (Waldman, Jensen 1998). However, this measure does not take into account differences in firm sizes. For example consider two industries, each containing five firms. Suppose that in one industry the market is equally divided, each firm has a share of 20%. In the second industry suppose that one firm controls 80% of the market and the remaining four firms each have market shares of 5%. It is likely that pricing would be different in these two industries. Therefore, the number of firms may not be a good measure of market structure as it does not account for any inequality in market shares.

Two measures of concentration that take both the number of firms and the distribution of firms' sizes into account are the concentration ratio and the Hirfindahl-Hirschman Index (HHI). The K firm concentration ratio is the cumulative share of the K largest firms in the market, where K is usually 4, 8 or 20. Thus, C4 is the sum of the market shares of the largest four firms in the industry. The most common measure of market size is sales, although concentration ratios can be calculated using other measures of size such as assets. Value of asset is a proxy for capacity. A firm's ability to serve more customers than it currently serves indicates that the market is more competitive. For example, an industry in which firms with a 10% market share is fully

utilizing its capacity which means that these firms cannot increase production if dominant firm(s) tries to raise the price. However, an industry of firms with a 10% market share with 75% capacity utilization means they are able to increase sales if the dominant firm(s) raises the price. This makes the dominant firm's residual demand and prices closer to marginal cost. One way to take account of this in Structure Conduct Performance is to use shares of capacity rather than of actual sales.

Concentration ratios are relatively easy to understand. It approaches 0% for a perfectly competitive market and is 100% for a monopoly. The Concentration ratio describes the percentage of market shares held by a specific number of firms. However, concentration ratios are not affected by changes in market shares outside the largest firms. Concentration ratios also do not give consistent rankings of the degree of competition within an industry. It is possible for one industry to appear to be more concentrated in a four- firm concentration ratio but be less concentrated in an eight-firm concentration ratio. Another problem with concentration ratios is that they provide no information about the distribution of market shares among the top firms. Knowing that the top four firms have 60% of the market tells us that all four firms dominate 60% of the market, but it does not tell us whether each firm has 15% of the share or one dominant firm has 30-40% (Waldman, Jenson 1998).

The Herfindahl Hirschman Index (HHI) takes into account both the number of firms and the inequality of market shares. The HHI is calculated as the sum of the squares of the firms' market shares in percentages. The HHI of perfect competition is nearly 0 and HHI of a monopoly is 10,000. HHI takes a lower value when there are

more firms in a market, all else equal. Also, the HHI increases as market shares of firms become less equal (Waldman, Jenson 1998). This is an advantage of the HHI compared to the concentration ratio. Although concentration measures are highly correlated, no single measure of concentration is best for all purposes, the choice depends on the type of data in hand.

In this study I can rule out the concentration ratio because some of the states do not have four law schools or even two law schools. Since market share is not accounted for when using the number of firms, the HHI will be used to calculate seller concentration. I will calculate HHI for all the schools in the market. The details of the calculations are explained in the data section. The number of JD's graduated from each school is used to calculate the market shares.

As mentioned in the previous chapter, in higher education, product differentiation does not only depend on the producers. Even if the law schools hire good faculty and provide the campus with good libraries, they cannot improve their quality unless they admit good students to their institutions. Therefore, I use students' LSAT scores as an explanatory variable to measure the quality of law schools. The higher the students' LSAT scores, the better the quality of the school.

Tuition rates also depend upon the governance of law schools, i.e., whether the law schools are public or private. Private schools can charge more tuition than public schools, regardless of competition or product differentiation, as they do not get funded from states.

Tuition also likely depends on the cost of inputs. I use section size (class) as a proxy for cost of input per student. Fewer teachers are needed if section sizes (classes) are large; thus schools require fewer faculty members per student if their section sizes are larger. Thus, the larger the section size, the lesser the cost of input per student and therefore they can charge a lower tuition. Therefore, I use section size as an explanatory variable to measure the cost of input per student in a crude way. My specification model looks like:

Tuition $=\beta_0 + \beta_1$Concentration$+ \beta_2$LSAT scores$+ \beta_3$Governance$+ \beta_4$Section size$+ \hat{e}$

Initially, I use each of the fifty states and an academic year as a market, and all the law schools in a state are the firms. I divide the number of JDs (Juris Doctor) in each school by the number of JDs of the entire state to come up with the market share of each school. After that, I use HHI to measure the concentration of schools in a particular state. Then I run an OLS model to estimate the parameters.

Then I revise my initial model because not all law schools in a particular state are close substitutes for one another. As I have mentioned before, law schools that are close to one another geographically and qualitatively are close substitutes for one another.

In my second model, I do not use each of the fifty states as a market. I categorize the schools according to their quality. I assume that each of the law schools is competing in a circle. I make the radius of the school a function of its LSAT scores. Schools of superior quality have larger radii compared to schools of average quality.

Then I calculate the distance of a school from each of the 191 law schools. Schools that are located geographically close to one another and have trivial product differentiations are included in the market. Most of the schools that are in the market are in their states with the exception of the most elite schools. There are fourteen elite schools that are in competition with one another, regardless of their geographic location. The details of the calculations of how I generate "in the market" are discussed in the data section. I use the same equation from my first model in my second model. After that I run an OLS to estimate the parameters.

Performance feeds back on structure, so there might be an endogeneity problem. In this case the Ordinary Least Squares (OLS) will give biased and inconsistent results. Usually high concentration leads to higher tuition fees; in the long run higher tuition fees might in turn attract new law schools to enter the market, if there is demand for it. In this case performance affects structure. Thus, concentration is also a function of tuition, cost, quality and governance. In this case, there might be some bias in the estimates if I use the OLS to estimate the parameters.

In this endogeneity problem concentration will be correlated with the error term. This violates the full ideal conditions. There is a solution to fix this problem. I have to use an instrumental variable that is correlated with concentration but not correlated with the error term to return to full ideal conditions. I use an instrumental variable that determines the demand for law schools. I use population in the market as the demand for law schools. I sum up the population of the counties in an area from where a school receives potential students. The details of calculations are explained in the data section.

In my second model, I use the instrumental variable approach to estimate the effect of tuition on concentration of law schools in a two stage least square model. In the first stage least square the specified model looks like below:

Concentration= β_0 + $\beta_1$population in the market + β_2LSATscores + $\beta_3$governance + $\beta_4$section size + β_5 population in the market squared.

In the second stage least squares the specified model is as follows:

Tuition= $\beta 0$ + β_1<u>concentration</u> + β_2LSAT scores + β_3Governance + β_4Sectionsize + ê

The underlined concentration means it is the estimated value of concentration which do not include tuition as a function. Therefore, in the two stage least square model, I solve the problem of endogeneity. The results using the OLS and IV approach are in the results section.

4.2 Hypothesized Results

The above models allow me to estimate and examine what relationship concentration of law schools has on tuition. It helps us to answer the following questions: Does concentration have an impact on tuition? Does quality have an effect on tuition? Do governance and cost have an impact on tuition?

The expectations on the coefficients from the estimates are described as follows: In the OLS model I expect the sign of concentration to be positive. Less competition in a market will lead to higher tuition rates if law schools are profit-3maximizing organizations.

I expect that schools of superior quality will also charge a higher tuition since quality is expensive. Market for higher quality products is thin. Therefore better schools can charge a higher tuition compared to average schools.

I expect the coefficient of governance to be large and positive. I expect that private schools will charge a much higher tuition than public schools regardless of their product differentiation, since they do not get funded from the state.

Finally, I expect the coefficient of section size to be negative. Bigger sections mean cost of input per student is low. If the cost of input per student gets lower, then law schools will make more profit. Higher profits will signal more law schools to enter the market and thus tuition will be lower.

I expect an improvement in my coefficient estimates and significant levels as I move from the state wide competition to the revised model. I expect further improvement in the coefficients and their significant levels when I move to the Instrumental variables approach.

CHAPTER 5

DATA DESCRIPTION AND THEIR SOURCES

The data I use in this research comes from three sources: Law school admission council (LSAC), Geocoder website and U.S Census Bureau. This chapter describes different variables gathered from each data source and how they are used in generating the variables I use in the research analysis.

5.1 Law School Admission Council (LSAC)

The Law School Admission Council (LSAC) is a nonprofit corporation whose members are more than 200 law schools in the United States and Canada. All law schools approved by the American Bar Association are LSAC members. Fifteen Canadian law schools recognized by either a provincial or territorial law society or government agency are also members of the Council. Its headquarter is in Newtown, Pennsylvania.

The Council is best known for administering the Law School Admission Test (LSAT). An average of 140,000 prospective law students takes this test each year. With the guidance and support of volunteers representing its member schools, LSAC provides a growing number of important services and programs for law schools and their applicants. One of the basic goals of LSAC is to expand educational opportunities for minorities, educationally disadvantaged people, and people with disabilities.

The main data I use in my analysis comes from LSAC. I have a cross sectional data with information from 191 law schools. The information is for the year 2006. From LSAC I collected data on tuition of schools, JDs graduated from a school, students' LSAT scores, employment after graduation, library titles, and governance (private/public). I use this information to calculate the market share of each school in my initial model. Market share is calculated as:

Market share = Total JDs in $school_i$ / total JDs in the $state_i$

After that I square the market shares and sum them up for each state to measure the concentration of law schools in each state.

In the second model I do not assume that all law schools in a particular state compete with one another. As mentioned in the previous chapter, I assume that schools that are located close to one another geographically and qualitatively compete with one another. In the second model I categorize the law schools based on their students' LSAT scores as follows:

Category =1 if LSAT scores are between 139&147.

Category =2 if LSAT scores are between 148 &150.

Category =3 if LSAT scores are between 151 &153.

Category =4 if LSAT scores are between 154 & 156.

Category =5 if LSAT scores are between 157&159.

Category =6 if LSAT scores are between 160&162.

Category =8 if LSAT scores are between 163&165.

Category =12 if LSAT scores are between 166&168.

Category =80 if LSAT scores are greater than 168.

Each school competes within a certain geographic area. I call that geographic area a circle. I make the radius of a circle a function of a school's LSAT scores. Better schools will compete in a bigger circle compared to average schools. The formula for the radius is as follows:

R=50(miles)* category

Most of the schools are competing in their own states with the exception of schools that fall in category 80. Those Schools are considered national elite schools. After that I calculate distances of one school from another.

5.2 Distances of each School

I use the geocoder website to calculate the latitude and longitude of each school. After that I use those latitude and longitude to calculate the distance of one school from each of the 191 schools. I use the formula $d= ((x_2-x_1)^2-(y_2-y_1)^2)^{1/2}$. Then I calculate the schools that are in the market; such as schools that are in competition with one another. I separate schools by their states, unless they are category 80. I look at each school's radius. Then I consider the distances of all the other schools in that state. Those schools, whose distances are less than the radius of a particular school I am looking at, I include those schools in the circle. Then I look at the LSAT scores of the schools that are in the circle. If the difference in LSAT score is less than 5 points I include those schools in the market. Market share is calculated as:

Market share = total JDs in $school_i$ / total JDs in the $market_i$

I square the market shares and sum them up for each market to come up with an improved concentration measure. I modify my model further to solve the problem of endogeneity. I use population as an instrumental variable to solve the problem. I collected data for the population from the U.S. Census Bureau.

5.3 U.S. Census Bureau

U.S Census Bureau provides quality data on nation's people and economy. The main goal of the Census Bureau is to collect information about individuals and establishments to compile statistics.

I collect the data for latitudes and longitudes for each of the 3219 counties from the Census Bureau. After that I calculate distance of every school from each of the 3219 counties. Those counties whose distances are less than the radius of the school and are located in the same state as the school, I sum up the population for those counties. I call the variable population in the market. The regression results are in chapter 6.

5.4 Summary Statistics

I have cross sectional data of 191 observations. Table B in the appendix gives the summary statistics. The mean of my primary variable concentration is 2389. The mean of tuition is $22,300. The mean of my primary variable to measure quality LSAT scores is 139.

CHAPTER 6

RESULTS

This chapter describes the results I estimate in each of my models and compares it with the hypothesized results. Table 6.1 gives the description of the variables that I use in my final model, while the Appendix A has a description of all the variables I use in my thesis.

Table 6.1 Variable Description

Variable	Description
Tuition	Gross tuition of schools
Concentration	Concentration of law schools (Hirfindahl Hirschman Index)
LSAT scores	75^{th} percentile LSAT score of admitted students
Governance	A dummy variable that takes a value of 1 for private schools and 0 for public schools
Section size	Number of students per class
Population in the market	The sum of population of the counties that fall in the area that the school receives potential students from.
Concentration (statewide)	Concentration of law schools in a statewide competition (Hirfindahl Hirschman Index).
Population in the market squared	Square of the population in the market

Table 6.2 contains the estimates for tuition on concentration of law schools, where the schools are in a statewide competition. I have the results for both the OLS model and the Instrumental variable approach. The first column reports the results using the OLS model and the second column reports the results using the Instrumental

variable approach. Table C.1 in the Appendix section reports the results of the same model in the log linear form.

Table 6.2 Tuition Estimates of Statewide Competition

	OLS	IV[+]
	Tuition	Tuition
Concentration (statewide)	-0.455*	-0.853*
	(0.124)	(0.188)
LSAT score	585.384*	555.443*
	(55.215)	(57.674)
Governance	15,120.234*	14,536.982*
	(622.134)	(670.506)
Section Size (Full-Time)	25.602	25.765
	(16.459)	(16.910)
Constant	-80,690.276*	-74,449.415*
	(8,684.866)	(9,182.334)
Observations	191	191
R-squared	0.83	0.82

Standard errors in parentheses
** Significant at 5%; * significant at 1%
[+] Concentration is instrumented by population in market and population in market squared

In the OLS model concentration, quality (LSAT scores), governance (Private or public) are significant and cost (Section size) is insignificant. The coefficient of concentration is negative, which implies that more competition in a market leads to higher tuition and less competition in a market leads to lower tuition. This is counter intuitive to my hypothesized result. The coefficients of the variables for quality and governance are positive, which imply that schools of better quality and private schools charge higher tuition. Thus quality and governance effect tuition positively as expected. Contrary to my expectation, section size is insignificant. Thus I reject that this measure of cost of input per student affects tuition. I expect the Instrumental variable to be a

stronger test because it solves the problem of endogeneity. However, the signs and the significant levels for each of the variables are the same in the IV model as it is in the OLS model.

I also tested for the relevance and the validity for the instruments. Table 6.4 in the Appendix section suggests that there is no problem with endogeneity. Thus OLS is more efficient than the IV approach via the Gauss Markov Theorem. Table 6.5 and 6.6 are the results for relevance and validity. Results in table 6.5 suggest that the instruments population in the market and population in the market squared are significant. I run the Hansen Sargan test to test the validity of the instruments. This test has a joint null hypothesis. It tests whether the instruments are uncorrelated with the error term and it also tests whether the instruments are correctly excluded from the estimated equation. Results in table 6.6 show that the instruments are valid. It also suggest that population does not have a direct effect on tuition.

To achieve the results as I hypothesized, I revise my model. This model includes the schools that are closely located geographically and qualitatively. The estimates of my second model are shown below:

Table 6.3 Tuition Estimates of the Revised Model

	OLS	IV
	Tuition	Tuition
Concentration	-0.463*	-0.883*
	(0.105)	(0.186)
LSAT score	509.671*	409.779*
	(59.212)	(71.227)
Governance	15,012.710*	14,309.001*
	(612.645)	(685.812)
Section Size (Full-Time)	26.809	28.075
	(16.229)	(16.915)
Constant	-67,535.391*	-49,100.135*
	(9,539.784)	(11,914.572)
Observations	191	191
R-squared	0.83	0.82

Standard errors in parentheses.
** Significant at 5%; * significant at 1%.

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In the OLS model, concentration, quality and governance are significant and section size is insignificant similar to the initial model. Even in the second model concentration effects tuition negatively contrary to my expectation. Quality and governance have a positive affect on tuition as expected. Contrary to my expectation, I reject that this measure of cost of input per student affects tuition. I expect the Instrumental variable to be a stronger test because it solves the problem of endogeneity. However, the signs and the significant levels for each of the variables are the same in the IV model as it is in the OLS model. I run a Hausman test to test for the endogeneity. Result for the Hausman test is as follows:

Table 6.4Test for Endogeneity for the Second Model

	Coefficients		Difference	Standard error
	IV estimates	OLS estimates	(IV-OLS) estimates	
Concentration	-.883	-.463	-.420	.153
LSAT scores	409.778	509.671	-99.892	39.589
Governance	14309.000	15012.710	-703.709	308.228
Section size	28.075	26.809	1.266	4.768

Test H_0: Difference in coefficients not systematic
Chi2 (4) = 7.55
P-value = .1094

Hausman test suggests that there is no problem with endogeneity. Concentration is not correlated with the error term. I also test for the relevance and the validity for the instruments. Thus OLS is more efficient than the IV approach via the Gauss Markov Theorem. Table 6.5 and table 6.6 show the results for the relevance and the validity.

Table 6.5 Test for Relevance for the Second Model

	Concentration
LSAT scores	-146.417*
	(31.888)
Governance	-790.710**
	(341.989)
section size(Full time)	4.397
	(9.134)
Population in the market (thousands)	-.490*
	(.065)
Population in the market squared (thousands)	9.85e-06*
	($2.21*10^{-06}$)
Constant	31,649.316*
	(4,927.131)
Observations	191
R-squared	0.51

Standard errors in parentheses
** Significant at 5%; * significant at 1%

Results in table 6.5 suggest that the instruments population in the market and population in the market squared are significant.

Table 6.6 Test for Validity for the Second Model

	Tuition
Concentration	-0.883* (0.183)
LSAT scores	409.779* (70.289)
section size(Full time)	28.075 (16.692)
Governance	14,309.001* (676.776)
Constant	-49,100.135* (11,757.588)
Observations	191
Centered R^2	0.816
Uncentered R^2	0.971
Instrumented	Concentration
Included Instruments	LSAT scores, Governance, Section size
Excluded Instruments	Population in the market, Population in the market squared
Anderson canon. Corr. LR statistic (identification/IV relevance test): 82.115	
Chi-sq (2) P-value = 0.0000	
Sargan statistic (overidentification test of all instruments): 2.103	
Chi-sq (1) P-value = 0.1470	

Standard errors in parentheses
** Significant at 5%; * significant at 1%

I run the Hansen Sargan test to test the validity of the instruments. This test has a joint null hypothesis. It tests whether the instruments are uncorrelated with the error term and it also tests whether the instruments are correctly excluded from the estimated equation. Results in table 6.6 show that the instruments are valid. It also suggest that population does not have a direct effect on tuition.

The estimates of the same model using the log linear form are reported in table C.2 in the Appendix section. I use other variables to measure for the quality of schools, such as employment after graduation, library titles, first time bar passage rate and age. I report those estimates in tables C.3 and table C.4 in the Appendix section. I also estimate tuition for private schools and tuition for public schools separately. Those results are reported in table C.5 and C.6 in the Appendix section. In all the models concentration has a negative effect on tuition. Diagram 1 gives the scatter plot graph of tuition and concentration and Diagram 2 gives the histogram of tuition.

CHAPTER 7

POSSIBLE INTERPRETATIONS

7.1 Possible Econometric Reasons for my Counter Intuitive Results

My counterintuitive results could be due to possible problems in regression. The possible problems that can arise from classical model are omitted variables bias, measurement error, multicollinearity, specification errors, non-spherical error terms and stochastic regressors.

In omitted variable bias, mean of the error term is not equal to zero. It creates biased, inefficient and inconsistent results. I might have omitted some variables in my model that directly affects tuition. I run the Ramsey RESET test to test for the omitted variable bias. Test results in table C.7 suggest that there is no omitted variable bias.

At times there are measurement errors in one or more variables. In my paper I can have a measurement error in concentration. It might not measure competition correctly. If concentration is uncorrelated with the error term then the parameters are unbiased but inconsistent and inefficient. If concentration is correlated with the error term, then parameters are biased, inconsistent and inefficient. However, I can have unmeasured quality differences. If I as a researcher cannot control for the unobserved quality differences of what the potential customers already know, I would have omitted variable bias. In a cross-sectional data I cannot control for the unobserved

heterogeneity. If I had a panel data I could control for it through fixed effects. I assume that concentration is positively correlated with unobserved quality measures.

There can be specification errors in the model. The most common is the inclusion of an irrelevant variable. Including an irrelevant variable does not affect any of the properties of the OLS parameter estimates. Including an irrelevant variable that is correlated with other independent variables can reduce the efficiency of the parameter estimates. Other specification errors focus on the functional form used to estimate the model. If I estimate a non-linear relationship using a linear model, linear model will provide biased estimates. I run a Linktest to find out the accurateness of my specification model. Table C.8 gives out the results for my specification test. Linktest is based on the idea that if regression is properly specified, then there should not be any additional independent variables that are significant except by chance. Linktest creates two variables, variable of prediction and the variable of squared prediction. If the linear model is correct then the squared prediction should be insignificant. Results in table C.8 show that squared prediction is insignificant, thus I conclude that there are no specification errors in my model.

If one of the independent variables is correlated with the error term then the parameter estimates are biased. In my paper, I expect concentration to be correlated with the error term. I think there is a potential problem of endogeneity. Thus, I use two Instrumental variables (IV) to solve this problem. I test for the randomness of concentration using the Hausman's Specification Test. This tests whether β_{OLS} is significantly different from β_{IV}. If β_{OLS} is not different from β_{IV}, then both are

consistent yet β_{OLS} is more efficient via the Gauss-Markov Theorem. In the previous chapter Table 6.4 suggests, there is no problem with OLS. Therefore, concentration is not correlated with the error term.

There can also be a problem of multicollinearity in classical model. In this case, I measure the correlation among the independent variables and find that none of the independent variables are highly correlated with one another. Table C.9 shows the correlation among the independent variables. Therefore, I do not have any problem with collinearity in my data.

7.2 Economic Reasons for my Counterintuitive Results

Results suggest that as concentration of law schools in a market increase tuition rates decrease. Results in table C.10 suggest as concentration of law schools increase total number of students also decrease. In this case both price and quantity are decreasing. Both price and quantity decrease in either a leftward shift of the demand curve or an upward sloping demand. I can rule out the concept of an upward sloping demand curve since law schools are not a decreasing cost industry and law education is not a giffen good. Shift of demand curve implies that I do not have the demand curve constant in my model. The theory of Structure Conduct Performance holds for constant demand curve. Therefore, in this case my model is miss-specified. One possible reason for this could be that I have unmeasured quality differences among schools, such as prestige.

There are a few reasons why Law schools may charge higher tuition when competition is more. One of the reasons could be that an excellent lawyer teaches a

class in a certain school. All the other schools geographically located close to that school may allow their students to take the class from that professor and transfer their credits. In this way all the schools in that area will improve their quality and charge a higher tuition. The average schools can free ride on some of the privileges of the good school. For example, students from the average school can use the library of the good school. Thus the average school can earn a good reputation and charge a higher tuition. Better schools in an area can have a positive spillover effect on average schools. Table C.11 in the Appendix measures the spillover effect. To measure for the spillover effect, I calculate the number of better schools and the number of worse schools located within 20 miles from a school. Results suggest better schools do not have any positive effect on tuition. Thus, schools cannot raise their tuition because they are located next to a good school.

Another reason why law schools may charge higher tuition with more competition is because price is a signal for higher quality (Spence 1973). In this case, if I as a researcher cannot control for the unmeasured quality differences and potential students are also unaware of these unmeasured quality differences, then law schools would use tuition to signal for their superior quality. The OLS model in Table C.11 suggests schools can raise their tuition if they are located near worse schools. A school located near worse schools can increase tuition to signal for its superior quality. In this case, an average school can also raise its tuition, but that school cannot keep its tuition high for a long time.

Law schools may not be profit-maximizing organizations. Law schools may not engage in monopoly pricing. However, even if they are possibly non-profit-maximizing organizations, they are utility maximizing (Alchian 1950). For example, if their motive is to educate poor students and not to earn a maximum profit. In order to achieve this goal, law schools have to maximize their profits through third degree price discrimination. Therefore, whatever their motive might be they have to engage in profit-maximizing behavior to achieve that goal. One exception to this rule is if law schools are earning all their money from donations. In this case law schools do not have to engage in profit-maximizing behavior. However, this situation is very unlikely.

CHAPTER 8

CONCLUSION

In this paper I try to estimate how the tuition rates vary with amount of competition between law schools. I hypothesize that the tuition rates will increase as the concentration of law schools increase. However, the results did not support my hypothesis. Both the OLS model and the IV model predict that concentration affects tuition negatively. This implies that tuition increases as more law schools compete. This does not agree with the theory that competition tends to lead to lower prices.

One of the reasons for my counter intuitive results is due to the measurement error. Concentration may not be measuring the level of competition as I predict it will.

The major problem in my model is the estimated demand curve is not being held constant. In Structure Conduct Performance demand is supposed to be fixed. I cannot keep the demand fixed due to the unmeasured quality differences among schools.

As an extension to my thesis, I can gather a panel data over 30 to 40 years to see the changes in concentration of law schools over the years. Then I can run fixed effects to capture the unobserved heterogeneity. That might give me the expected results. However, demand will not remain constant over the years. In this case I will have another problem.

APPENDIX A

VARIABLE NAMES

Table A Variable Names

Variable	Description
Tuition	Gross tuition of the students.
Lntuition	Log of tuition.
Employment after graduation	% of students' employed after graduation.
First time Bar passage	% of Students' passing the Bar exam the first time.
Library Titles	Number of titles in the library.
LSAT scores	LSAT scores in the 75^{th} percentile of Students' admitted in the schools.
Governance	A dummy variable that takes a value of 1 for private schools and 0 for public schools.
Section size	Number of students per class.
Population in the market	The sum of population of the counties that fall within the area that the school receives potential students from.
Population in the market squared	Square of population in the market
Concentration	Concentration of law schools (Hirfindahl Hirschman Index)
Age	Number of years since the schools has been approved by ABA.
scholarship	% of people receiving scholarship.
Concentration (statewide)	Concentration of law school competing within its state schools (Hirfindahl Hirschman Index).
Better schools	Number of better schools located within 20 miles
Worse schools	Number of worse schools located within 20 miles
Total number of students	Total number of Juries Doctors graduated from each school

APPENDIX B

SUMMARY STATISTICS

Table B Summary Statistics

Variable	Observations	Mean	Std. Dev.	Min	Max
Concentration (state wide)	191	2831.39	2509.19	564.838	10000
Age (years)	191	57.99	25.45	1.00	83.00
Concentration	191	2831.39	2509.19	564.88	10000.00
Better schools	191	.74	1.45	0.00	8.00
Worse schools	191	.74	1.51	0.00	9.00
Population in the market squared	191	$1.3*10^{14}$	$2.1*10^{14}$	0.00	$1.1*10^{15}$
Tuition ($)	191	22300.90	9561.12	3144.00	39172.00
LSAT scores	191	159.99	5.61	139.00	176.00
Section size(Full time)	191	74.87	18.65	0.00	135.00
Library Titles	191	1428.00	96635.70	13354.00	828559.00
% Employed after graduation	191	87.69	11.78	0.00	99.00
First time Bar passage (%)	190	78.61	13.46	35.00	100.00
Population in the market	191	8676994.00	7213905.00	0.00	$3.39*10^{7}$
Total number of Students	191	736.99	369.906	224	3252

APPENDIX C

ECONOMETRIC RESULTS

Table C.1Tuition Estimates in the Log-Linear form for the Statewide Model

	OLS	IV[+]
	Log of tuition	Log of tuition
LSAT score	0.028* (0.004)	0.026* (0.004)
Concentration (statewide)	-0.000* (0.000)	-0.000* (0.000)
Governance	0.804* (0.040)	0.769* (0.043)
Section Size (Full-Time)	0.001 (0.001)	0.002 (0.001)
Constant	4.927* (0.561)	5.299* (0.591)
Observations	191	191
R-squared	0.76	0.75

Standard errors in parentheses
** Significant at 5%; * significant at 1%
[+] Concentration is instrumented by population in market and population in market squared

Table C.2 Tuition Estimates in the Log-Linear form for the Second Model

	OLS	IV[+]
	Log of tuition	Log of tuition
LSAT score	0.024* (0.004)	0.018* (0.005)
Concentration	-0.000* (0.000)	-0.000* (0.000)
Governance	0.798* (0.040)	0.757* (0.044)
Section Size (Full-Time)	0.002 (0.001)	0.002 (0.001)
Constant	5.682* (0.619)	6.767* (0.767)
Observations	191	191
R-squared	0.76	0.75

Standard errors in parentheses
** Significant at 5%; * significant at 1%
[+] Concentration is instrumented by population in market and population in market squared

Table C.3 Tuition Estimates for the Second Model using Different Quality Measures

	OLS	IV[+]
	Tuition	Tuition
Concentration	-0.404* (0.105)	-0.794* (0.189)
Age	3.963 (14.227)	7.850 (14.838)
% of students receiving scholarships	-24.188 (33.145)	-20.460 (34.416)
LSAT score	606.758* (92.123)	499.416* (104.512)
Section Size (Full-Time)	16.972 (16.476)	19.507 (17.121)
Library Titles	0.005 (0.004)	0.003 (0.004)
Employed after graduation	28.993 (33.063)	32.335 (34.325)
First time bar passage	-95.859* (30.283)	-85.114* (31.700)
Governance	14,821.864* (612.786)	14,222.917* (678.112)
Constant	-78,124.020* (12,694.019)	-59,963.436* (14,987.912)
Observations	190	190
R-squared	0.84	0.83

Standard errors in parentheses
** Significant at 5%; * significant at 1%
[+] Concentration is instrumented by population in market and population in market squared

Table C.4 Log-Linear Tuition Estimates for the Second Model using Different Quality Measures

	OLS	IV[+]
	Log of tuition	Log of tuition
Concentration	-0.000* (0.000)	-0.000* (0.000)
Age	-0.000 (0.001)	-0.000 (0.001)
% of students receiving scholarships	-0.000 (0.002)	0.000 (0.002)
LSAT score	0.028* (0.006)	0.021* (0.007)
Section Size (Full-Time)	0.001 (0.001)	0.001 (0.001)
Library Titles	0.000 (0.000)	0.000 (0.000)
Employed after graduation	0.004 (0.002)	0.004 (0.002)
First time bar passage	-0.005* (0.002)	-0.005** (0.002)
Governance	0.777* (0.040)	0.742* (0.044)
Constant	5.119* (0.826)	6.179* (0.968)
Observations	190	190
R-squared	0.78	0.76

Standard errors in parentheses
** Significant at 5%; * significant at 1%
[+] Concentration is instrumented by population in market and population in market squared

Table C.5 Tuition Estimates in the Log-Linear form for Private Schools for the Second Model

	OLS	IV[+]
	Log of tuition	Log of tuition
Concentration	-0.000 (0.000)	-0.000* (0.000)
Age	0.001 (0.001)	0.000 (0.001)
% of students receiving scholarships	-0.000 (0.002)	-0.001 (0.002)
LSAT score	0.023* (0.006)	0.018* (0.006)
Section Size (Full-Time)	0.000 (0.001)	0.000 (0.001)
Library Titles	-0.000 (0.000)	-0.000 (0.000)
Employed after graduation	-0.000 (0.003)	-0.001 (0.004)
First time bar passage	-0.003 (0.002)	-0.001 (0.002)
Constant	6.782* (0.737)	7.686* (0.869)
Observations	110	110
R-squared	0.41	0.31

Standard errors in parentheses
** Significant at 5%; * significant at 1%
[+] Concentration is instrumented by population in market and population in market squared

Table C.6 Tuition Estimates in the Log-Linear form for Public Schools for the Second Model

	OLS	IV[+]
	Log of tuition	Log of tuition
Concentration	-0.000**	-0.000**
	(0.000)	(0.000)
Age	-0.000	0.000
	(0.002)	(0.002)
% of students receiving scholarships	0.002	0.003
	(0.004)	(0.005)
LSAT score	0.050*	0.043*
	(0.013)	(0.014)
Section Size (Full-Time)	0.000	0.000
	(0.002)	(0.002)
Library Titles	0.000	0.000
	(0.000)	(0.000)
Employed after graduation	0.004	0.004
	(0.003)	(0.003)
First time bar passage	-0.011*	-0.011*
	(0.004)	(0.004)
Constant	1.995	3.210
	(1.788)	(2.117)
Observations	80	80
R-squared	0.52	0.50

Standard errors in parentheses
** Significant at 5%; * significant at 1%
[+] Concentration is instrumented by population in market and population in market squared

Table C.7 Test for Omitted Variables for the Second Model

Ramsey RESET test using powers of the fitted values of tuition
Ho: model has no omitted variables
F (3, 183) = 2.27
P-value = 0.0821

Table C.8 Test for Specification Errors for the Second Model

	Tuition	P-value
Predicted value	.9402836	0.000
Squared predicted value	$1.37*10^{-6}$	0.757
Constant	544.7932	0.778
R^2	.83	

Table C.9 Correlation among Independent Variables for the Second Model

	Concentration	ft75lsat	Governance	Section size
Concentration	1.0000			
LSAT scores	-0.4146	1.0000		
governance	-0.2547	-.0167	1.0000	
Section size	-0.1275	0.2796	0.1016	1.0000

Table C.10 Relationship of Concentration on Students for the Second Model

	Total number of students
Concentration	-0.018** (0.009)
LSAT scores	6.656 (4.965)
Governance	183.750* (51.372)
section size(Full time)	4.172* (1.361)
Constant	-652.136 (799.930)
Observations	191
R-squared	0.20

Standard errors in parentheses
** Significant at 5%; * significant at 1%

Table C.11 Relationship of Tuition on Spillover Effect for the Second Model

	OLS	IV
	Tuition	Tuition
Concentration	-0.410*	-0.856*
	(0.107)	(0.196)
Governance	14,707.816*	14,122.459*
	(619.902)	(681.591)
LSAT scores	450.964*	358.564*
	(68.152)	(78.638)
section size(Full time)	21.938	25.686
	(16.263)	(17.060)
Better schools	121.306	-27.400
	(212.040)	(228.099)
Worse schools	530.531**	398.126
	(241.331)	(256.823)
Constant	-58,350.887*	-41,032.412*
	(10,936.678)	(13,023.399)
Observations	191	191
R-squared	0.84	0.82

Standard errors in parentheses

** Significant at 5%; * significant at 1%

[+] Concentration is instrumented by population in market and population in market squared

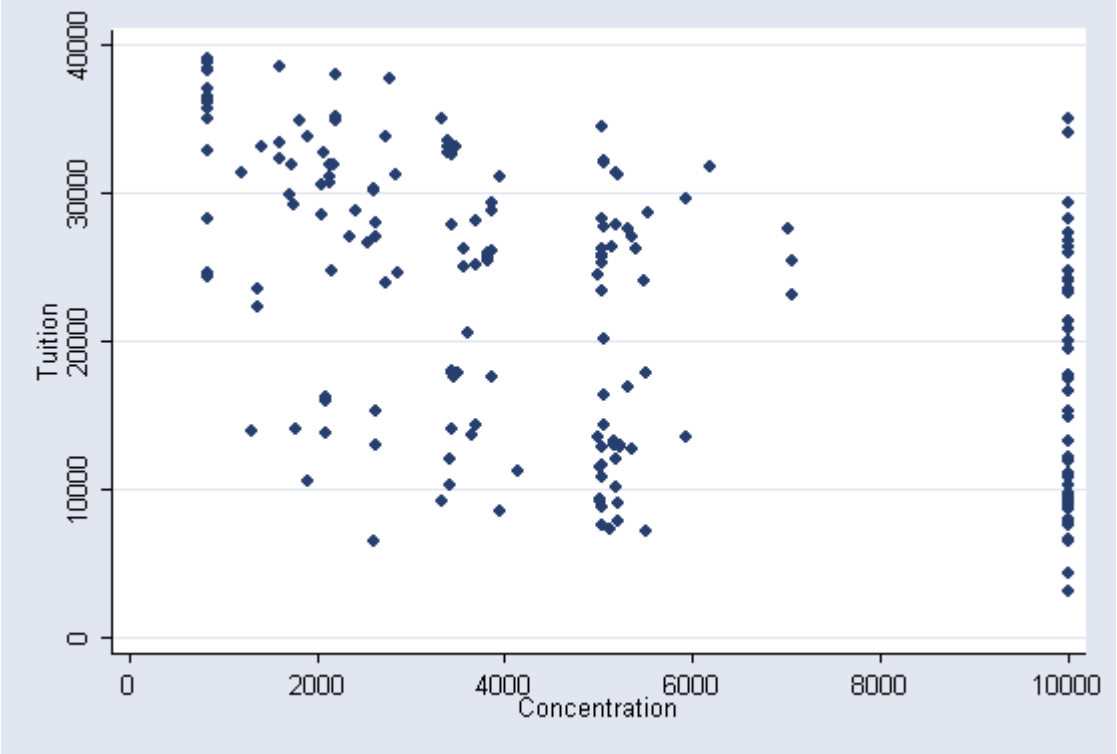

Diagram 1 Scatter Plot of Tuition and Concentration

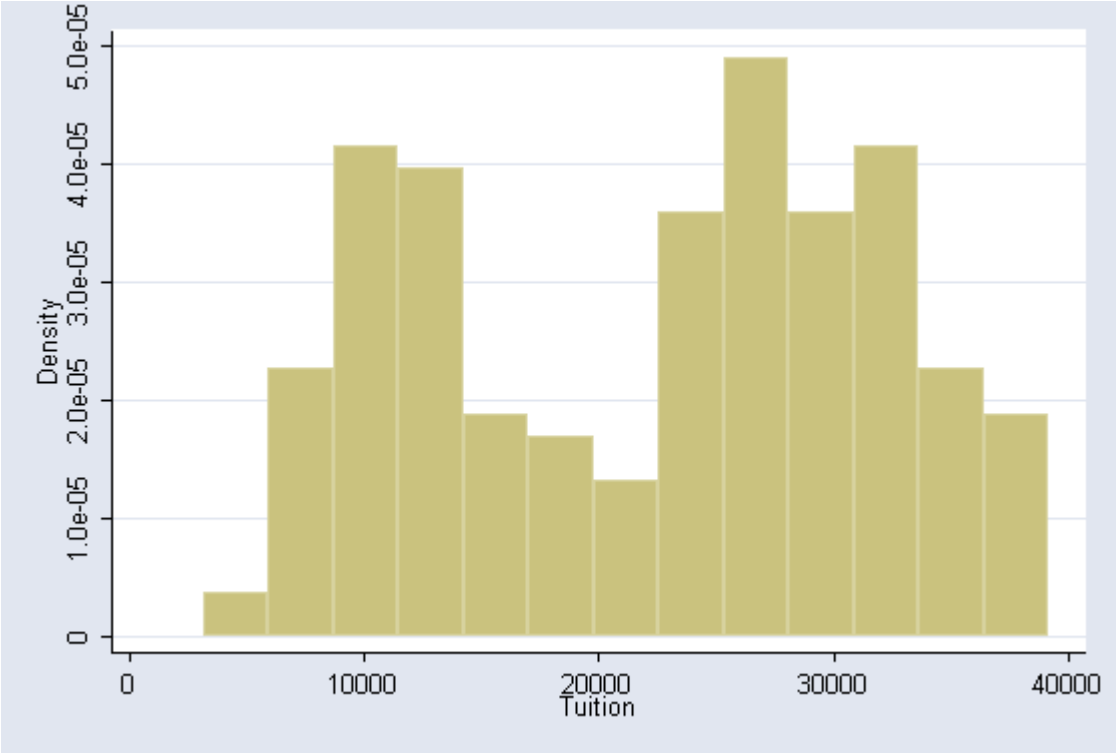

Diagram 2 Histogram of Tuition

REFERENCES

Alchian, A.A. (1950). Uncertainty, Evolution and Economic Theory. The Journal of Political Economy, 58(3), 211-221.

Asplund, M. & Friberg, R. (2002). Food Prices and Market Structure in Sweden. Scandinavian Journal of Economics,104, 547-566.

Bain, J.S. (1951).Relation of Profit Rate to Industry Concentration: American Manufacturing, 1936-1940. The Quarterly Journal of Economics, 65 (3), 293-324.

Borenstein, S. (1989).Hubs and High Fares: Dominance and the Market Power in the U.S Airline Industry. The RAND Journal of Economics, 20 (3), 344-365.

Carlton, D.W. & Perloff J. M. (2005).Modern Industrial Organization. Addison Wesley Educational Publishers, Massachusetts.

Claycombe, R.J. &Mahan, T.E. (1993). Spatial Aspects of Retail market Structure Beef Pricing Revisited. Industrial journal of Industrial Organization, 11, 283-291.

Claycombe, R.J. (2000). The Effects of Market Structure on Prices of Clothing and Household Furnishings. Industrial Journal of Industrial Organization, 28, 827-841.

Davis, P. (2001). Spatial Competition in Retail Markets Movie Theaters. MIT, working paper.

Davis, P. (2005). The Effect of Local Competition on Admission Prices in the U.S Motion Picture Exhibition Market. Journal of law and Economics, XLVIII, 677-708.

Emmons W.M. & Prager.R.A. (1997). The Effects of Market Structure and Ownership on Prices and Service offerings in the U.S. Cable Television Industry. The RAND Journal of Economics, 28 (4), 732-750.

Evans W.N., Froeb L.M. &Werden G.J. (1993). Endogeneity in the Concentration-Price Relationship: Causes, Consequences, and Cures. The Journal of Industrial Economics, 41 (4), 431-438.

Graham, D. R., Kaplan, D. P. & Sibley, D. S. (1983).Efficiency and Competition in the airline industry. The Bell Journal of Economics, 14 (1), 118-138.

Hart, P.E. & Morgan, E. (1977). Market Structure and Economic Performance in the United Kingdom. The Journal of Industrial Economics, 25(3), 577-593.

Kwoka. J. E. (1981).Does the Choice of Concentration Measure Really Matter?. Journal of Industrial Economics, 29 (4) 445-453.

Lamm, M.R. (1981). Prices and Concentration in the Food Retailing Industry. The Journal of Industrial Economics, 30 (1), 67-78.

MacDonald, J. (1987).Competition and Rail Rates for the Shipment of Corn, Soybeans and Wheat. The Rand Journal of Economics,18 (1) 151-163.

Mason, E. S. (1939). Price and Production Policies of Large- Scale Enterprise. American Economic Review, 29 (1), 61-74.

Reid. G. C. (1987). Theories of Industrial Organization. Basil Blackwell Publishers, Oxford.

Sauer, R. M.(1998).Job Mobility and the Market for Lawyers. Journal of Political Economy,106 (1) 147-171.

Spence, M. (1973). Job Market Signaling. The Quarterly Journal of Economics, 87 (3), 355-374.

Waldman, D. E.& Jenson, J.E.(1998). Industrial Organization Theory and Practice. Addison Wesley Educational Publishers, Massachusetts.

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