# Cobweb Adjustment and the Market for new Lawyers

**Patrick W. Spangler**

## I. Introduction

In the late 1990's, there was a noticeable trend of students who decided to skip graduate school and take high paying jobs and big signing bonuses at dot-com companies. A strong job market, coupled with rising tuition costs led many students to consider the returns to a graduate school education and many found the expected benefits of entering the job market exceeding those of obtaining a graduate degree.

Since the economic downturn of late 2001 to present, there has been a surge in applications across many post-graduate disciplines. With opportunity costs low, law schools have received more applications than ever before. Applications are up 17.9% for 2002-2003, the biggest increase in 20 years. The University Of Connecticut Law School saw an increase of 46% since last year, receiving over 2,900 applications (Dale 2002). The latest administration of the Law School Admissions Test (LSAT) recorded 66,906 registrations, up nearly 11% from last year. The Law School Admissions Council (LSAC) is currently preparing for the largest LSAT administration ever since the previous record set in the descending economy of October 1991 (Vanderkam 2002).

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As medical school applications stagnate, or increase only by marginal amounts, why do law school applications respond to macroeconomic indicators so rapidly? For one reason, the decision to go to medical school can not be made at the "spur of the moment" since entrance into medical school requires premed or hard-science background and is a longer commitment. Students applying to law school come from a variety of fields and do not have to participate in personal interviews thus, making law school a popular choice for continuing education, but also a popular place to analyze labor market reactions.

Due to these changes in the returns to a legal education, law school enrollments constantly fluctuate. Since there is a time lag between the decision to enter law school and actual entrance into the labor market, there may be boom and bust cycles in the market for workers with a legal degree. Labor market adjustment of this type has been explained using the "Cobweb Model," which estimates the supply trend of workers in highly technical occupations. Because of the time lag nature or the specialized occupation, the supply adjustment often overshoots, and then undershoots the long-run equilibrium creating a "cobweb-like" trend of market adjustment giving the theory its name (Ehrenberg, Smith 2002).

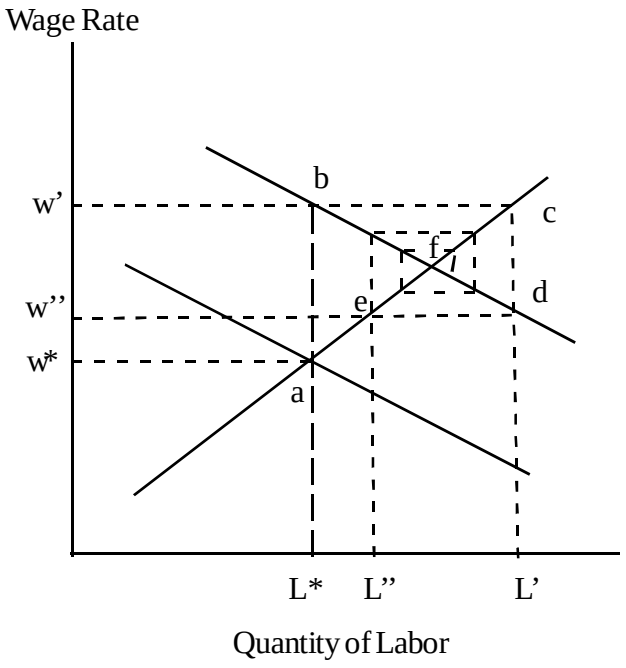
This paper will investigate whether or not the law school enrollment trends reflect economically responsive supply behavior according to factors such as salary and other market indicators. Specifically, this paper will determine whether or not the supply trends of law students reflect "cobweb-like" labor market adjustments due to the time lag associated with entering the labor market. The second section will review the relevant literature and provide a theoretical framework in which to analyze enrollment trends. In the third section, the empirical model will be discussed and an explanation of the data will be given. The fourth section will provide the results and conclusions of the paper.

## II. Theory and Review of Literature

The main theoretical pretext for this paper is the "Cobweb Model." This theory was developed primarily to explain labor market adjustment in specialized fields and for some time was only applied to engineering workers. The theory explains that if demand for lawyers goes up in a given year, raising wages, then supply won't be affected until 3-4 years later owing to the time it takes to finish a law degree (Ehrenberg, Smith 2002).

For example, in Figure 1 the wage for lawyers is at equilibrium at wage W* and the number of workers is L*. Assume that there is a change in the demand for lawyers from Ld1 to Ld2. In the short term, the supply cannot adjust to the increase in demand, because of the time it takes to finish law school. During this lag, the L* supply of lawyers can earn a wage of W " thus, creating a vertical supply curve until a few years later when new lawyers finish school. This wage of W' is above the equilibrium wage at point f, which is the new long run equilibrium created by the intersection of Ld2 and S. If people are naïve and assume that this new wage (W") is the equilibrium wage, then supply will reach L'. When supply adjusts, (after school completion) there will be a surplus of lawyers, since W' is above the long run equilibrium (Ehrenberg, Smith 2002).

**Figure 1: Cobweb Market Adjustment**




At this point, the supply of lawyers is temporarily fixed at L'. Due to the surplus, the wage will fall to W". This wage is below the new long-run equilibrium at point f, therefore supply will adjust by people moving out of the field and less students deciding to go to law school. This completes the trough cycle bringing the new short run supply to L" at point e. The cycle will then repeat itself giving the supply points the appearance of a cobweb.

Cobweb theory was developed to explain labor market adjustments that do not gravitate smoothly and quickly toward the market equilibrium. One of the first applications of this theory was for the market of the highly trained workers in the field of engineering (Freeman, 1971). Although not much empirical work has connected cobweb theory with the market for law students, there have been several applications, and it seems to be accepted by economists that the field of law is subject to cobweb supply adjustments (Ehrenberg, Smith 2002).

Richard Freeman (1975) studied the "cobweb model" as it pertains to the market for law students. The study incorporated a multiple regression model adapted from previous studies on the labor market for engineers. As mentioned earlier, cobweb theory suggests that if wages were to go up in the legal sector, the supply of lawyers would not be affected for 3-4 years (owing to the time it takes to finish law school). If during this time lag wages were to fall, then students would be understandably reluctant to leave law school. Since students have already entered law school and invested time and money, they will choose to finish school and receive a degree.

In addition, Freeman separates the determinants of the market for law students into several sections: supply of first year students, supply of graduates and salary determination. Using the results from these sections, Freeman derived a cobweb cycle model that relates the amount of enrollment for a given year to demand shift variables and most importantly to the number of graduates for that year. This basic approach has been used in other studies and theoretical papers that discuss cobweb theory (Freeman 1971, Pashigian 1970). The general framework of analysis and eventual cobweb model of this paper references the work mainly, of Freeman but the models and data sources vary significantly.

Although the applications of cobweb theory to the market for law students are minimal, other analyses of the market are useful. Ron Ehrenberg (1988)

has analyzed supply shifts in the market for lawyers from a human capital theoretical perspective. His study used primarily salary data to account for the rational expectations of a career in the legal field. In addition, Ehrenberg cites the difficulty of finding reliable salary data for attorneys or workers with a legal degree. His study was mainly referenced to determine data sources and possible avenues for the estimation of substitute fields.

The discovery and analysis of cobweb cycles is important from a policy perspective. This is due to the fact that they may create boom and bust cycles that can create surpluses and shortages of labor. Without this information, the Deans and Board of Trustees at law schools may be increasing admissions when in fact they should be decreasing or vice versa. Faced with a potentially overcrowded market, it is necessary for policy makers to fully understand the method of adjustment in the complex market for workers with a legal degree.

**Figure 2: Variables and Data Source**

| Variable Name | Explanation | Source |
|---|---|---|
| LSAL | Number of first year enrollees at ABA-approved law schools | American Bar Association Abanet.org (2002) |
| ASAL1 | Weekly earnings for workers in the legal services industry | Bureau of Labor Statistics. Employment and Earnings. (1987-2002) |
| ASAL2 | Weekly earnings for workers in the business services industry | Bureau of Labor Statistics. Employment and Earnings. (1987-2002) |
| LGRAD | Weekly earnings for workers in the miscellaneous business specialty industry | American Bar Association Abanet.org (2002) |
| LOUT | Revenue in the legal services industry taken as a fraction of total GDP | U.S. Census Bureau *The Statistical Abstract of The United States* (1993 - 2001) |

## III. Empirical Model

This study will separate the determinants of the market for law students into several different sections: Supply of first year law students, supply of graduates, and determinants of salaries in the legal field. Using these results, this paper will derive a model to determine whether or not the market for law students exhibits "cobweb" like market adjustment when relating the supply of first year law students to factors that affect overall demand. In all equations, the variables are in log-linear form due to the double-log model employed in order to analyze coefficients in the form of elasticities. The variables used and their sources are listed in Figure 2:

*A.. Supply of First Year Law Students*

According to cobweb theory, more students will decide to enter law school if legal salaries are high, and less when legal salaries are low. Therefore we would hypothesize the salaries of legal professional to have a positive relationship with first-year enrollment. On the other hand, we would expect the salaries in alternate fields to have a negative relationship with enrollment since they would cause a supply shift in the short run. To determine the supply of first year law students, this study uses the dependant variable LENT, which is the total number of first year law students enrolled in a given year. This data was acquired from the American Bar Association for the time period 1987 to 2001 (abanet.com). The supply of first year students is determined by the following equation:

*Equation 1: Enrollment Decision*

$$LENT = b_1LSAL - b_2ASAL1 - b_3ASAL2 + u_1$$

Where LSAL is the weekly earnings of workers in legal services converted to yearly earnings and adjusted using the Consumer Price Index (chained 1984 dollars). This data is divided by industry so it includes other workers in the industry that may not have a legal degree such as court clerks, court reporters, paralegals and legal secretaries. However, it does include some occupations that are not included in occupational data such as judges, magistrates, and arbitrators. The data for legal services proved to be the best proxy of wages in the sector since there is no consistent, compatible data for all workers possessing a legal degree.

The estimate of salaries of other industries that would affect the enrollment decision are business services (ASAL1) and miscellaneous services (ASAL2), which includes accountants, bookkeepers, architects, engineers, and various computer-related occupations. Those choosing not to enroll in law school have a range of other industries to pursue. The ASAL1 variable is a proxy for workers who enter into the general

business field. The ASAL2 variable is also a general proxy for occupations that would serve as alternates for those who do not decide to attend law school. These variables do not account for all career paths open to those who choose not to attend law school but should serve as an appropriate proxy.

This equation is basically the same as Freeman's model for determining salary effects on enrollment (Freeman 1975). However, this study uses two variables to approximate salaries in alternate fields where Freeman uses one. Also, the variables and data used are from a more current time period and are from different data sources.

*B. Supply of Graduates*

The second equation will relate the supply of graduates in a given year (LGRAD) to salaries during the first and second year of school. The supply of graduates also depends on the level of enrollment 3 years prior. Using this equation, we test the hypothesis that there is a time lag between the decision to enter law school (enrollment) and actual entrance into the workforce (graduation). According to cobweb theory, we would expect that salary variables would have little or no effect on graduation rates because the value of the training depends upon the receipt of a degree. The equation appears below:

***Equation 2: Supply Determination***

$$LGRAD(3) = b_1[LSAL(1) + LSAL(2)] - [ASAL(1) + ASAL(2)] + LENT(0) + u_2$$

The dependent variable is LGRAD or the total graduates that received a legal degree in a given year. This data was acquired from the ABA and include only ABA approved law schools. The number of graduates depends on the sum of the salaries[1] of the two years prior. The coefficient for this variable should be positive since there would be greater incentive to graduate if the salaries in legal services are higher. However, the coefficient should be small or not significant to prove our hypothesis. The number of graduates also depends on the sum of the salaries in alternate fields for 2 years prior. Elasticities with respect to the summed-salary variables should be relatively small since students would have already invested in education where the returns depend upon receipt of a legal degree. Also, the coefficient of the salary variable for other fields should be negative. The key variable is the number of enrollees three years prior, which we would expect to have an elasticity close to one to prove our hypothesis that the supply of graduates for a given year depends on the enrollment of three years prior, thus proving the time lag characteristic of the cobweb model.

This equation is basically Freeman's model of retention in law school (1975). He also used this same basic equation in his application of cobweb theory to the market for engineers (1971). The main difference in this study is the use of different salary variables and the application of the model to a more recent time series.

*C. Salary Determination*

In equation 3, the salaries for legal services are made a function of the level of demand and of the level of graduates during that year. To estimate the level of demand this study employs industry revenue data as a percentage of GDP (LOUT), which is available through the *Statistical Abstract of the United States* (1993-2001). This is assumed to be an incomplete estimate of demand but may explain some of the variance in salaries as a proxy for demand. The equation is as follows:

***Equation 3: Salary Determination***

$$LSAL = -b_1 LGRAD + b_2 LOUT + u_4$$

Previous studies suggest that demand shift variables (LOUT) will have a positive effect on the salaries of workers with legal degrees (Freeman 1971, 1975). In this equation, LSAL is also made a function of the number of graduates during that year (LGRAD) which should have a negative effect on salaries of workers with legal degrees since an increase in graduates would mean an increase in supply.

This equation was taken from Freeman (1975). However, this study only uses one demand proxy and one supply proxy. The concept is basically the same, but applied in a simpler form.

*D. Cobweb Evaluation*

By substituting the salary equation 3 into the original enrollment equation 1, cobweb phenomena can be observed.

***Equation 4: Cobweb Analysis***

$$LENT(0) = -b_1 LGRAD(0) + b_2 LOUT(0) - b_3 ASAL(0) + u$$

This equation allows us to analyze the cyclical characteristic of the model and allows us to estimate in absence of a more specific variable for salary. This method can be expressed as a complementary non-salary model where individual decision depend more on job opportunities and the numbers seeking work rather than on salaries in a given field. In earlier applications of the cobweb model, both salary factors and job opportunity variables affected enrollment decisions (Freeman 1971, 1975).

The most important independent variable in this equation is LGRAD, which is related to the level of first-year enrollment in a given year. If the market does exhibit cobweb supply adjustment, the LGRAD variable will explain at least some of the changes in enrollment in a given year. We would expect when more graduates enter the workforce that fewer students would choose to enter law school. Therefore, we would hypothesize a negative relationship between the number of graduates in a given year and the enrollment for that year.

## IV. Results

The initial enrollment decision equation showed that the salary variables were not significant except ASAL2. The expected sign for salaries in legal services was correct with a coefficient of .259 but was not significant according to the standard tests.The results for ASAL1 were not as expected since the coefficient was positive indicating that a rise in the business services industry will raise the enrollment of first year law students. This may be due to the generality of the data or maybe a correlation between some of wages paid to clerical workers in both industries.

Table 1 shows the coefficients and significance values for LSAL, ASAL1, and ASAL2. The salaries for alternate fields measured by ASAL2, engineering and miscellaneous professional specialty, showed to be highly significant and displayed a large coefficient.

***Table 1: Results of Initial Enrollment Equation for the Years 1987-2001[a]***

| Equation 1 | Constant | LSAL | ASAL1 | ASAL2 |
|---|---|---|---|---|
| Coefficien | 13.572 | .259 | .370 | -1.082 |
| (Sig) | (.00) | (.19) | (.13) | (.04) |

$R^2$ = .261

[a] The dependent variable is the number of first year enrollees (LENT).

All variables are in log form. The numbers in parentheses are significance values.

This most likely is due the inclusion of computer engineering and computer related occupations in the ASAL2 data. During the late 1990's there was an increase in demand for computer workers during the proliferation of dotcom companies, which may have lured many potential law students to the computer industry.

In equation 2, we attempt to prove that while in law school students are generally not willing to leave since the value of the training is dependent upon the receipt of a degree. The dependent variable is the number of graduates in a given year, which is then dependent on salaries in the legal field and alternate fields, as well as the number of entrants three years prior or LENT(-3). The results prove several important aspects of our cobweb market structure.

***Table 2: Results of Supply of Graduates for Years 1987-2001[a]***

| Equation 2 | Constant | LENT(0) | ASAL1 (1+2)b | ASAL2 (1+2)b | LSAL (1+2)b |
|---|---|---|---|---|---|
| Coefficient | 1.061 | .869 | -.169 | .103 | .0072 |
| (Sig) | (.760) | (.016) | (.30) | (.660) | (.64) |

$R^2$ = .938

[a] The dependent variable is the number of graduates from ABA approved law schools or LGRAD(3).

The coefficient for LENT(0) is the variable for first year enrollment lagged 3 years. The coefficient shows that a large amount of current graduates depends on enrollment three years earlier and is highly significant. In order for the time lag aspect of the cobweb model to function properly, we must prove the hypothesis that a significant portion of graduates depends on enrollment 3 years earlier. This allows for the situation where students are unable to respond to market changes while enrolled due to an investment that depends upon graduation. The results of this equation show that this hypothesis is true. The salary values should have low coefficients. The data show that the salaries for alternate fields are generally not significant and the salary coefficient for legal salaries is very small but not significant.

To determine what factors affect the earnings of workers with a legal degree, Equation 3 relates the salaries of workers in the legal field to a demand shift proxy variable and the number of graduates in a given year.

The coefficient and significance of the LOUT variable, which was used as a proxy for the demand for legal professionals, is somewhat surprising given that earlier studies had estimated this coefficient between .30-.45. The coefficient of LGRAD, or the number of graduates in a given year, was significant at the .10 level and has a coefficient of -.565. With an $R^2$ of .747, this means that output and the number of graduates in a given year have a significant effect on the salary variable. Specifically, a 1.4% increase in the amount of graduates in the industry would decrease salaries by 1%.

***Table 3: Results for Determination of Legal Salaries 1987-2001[a]***

| Equation 3 | Constant | LGRAD | LOUT[1] |
|---|---|---|---|
| Coefficient | 14.764 | -.565 | .677 |
| (Sig) | (.00) | (.08) | (.00) |

$R^2$= .747

[a] The dependent variable in Equation 3 is salaries for legal services converted to yearly earnings and adjusted using CPI (chained 1984 dollars).
All variables are in log form. Numbers in parentheses are significance values.
[1] This variable is yearly revenue in the legal services industry as a fraction of total GDP and then converted to log form.

Using the first three equations, we can then substitute equation 3 (salary determination) into equation 1 (enrollment decision) to create a model that is based more on job opportunities and the amount of graduates in the field, and not purely on salary data. The level of enrollment in a given year can then be regressed against the amount of graduates for other demand shift variables. Table 4 displays the results.

***Table 4: Cobweb Analysis of Market for New Lawyers for Years 1987-2001[a]***

| Equation 4 | Constant | LOUT | LGRAD | ASAL2 |
|---|---|---|---|---|
| Coefficient | 8.378 | .561 | -.252 | -1.082 |
| (Sig) | (.01) | (.06) | (.12) | (.04) |

$R^2$= .570 [a]The dependent variable is the number of first year students enrolled in law school. All variables are in log form. Numbers in parentheses are significance values.

The results from the final equation show that the output of legal services (LOUT) has a significant effect on the level of first-year enrollment. The most important variable, LGRAD, shows that the number of graduates in a given year has a significant effect on the first-year enrollment for that year. This is the main cause of the cyclical characteristic since those entering the field as graduates made the decision to enter under different market conditions and may not reflect demand. To further demonstrate this, I replaced the number of graduates with the enrollment variable lagged 2 and 3 years and the results were similar showing fairly significant coefficients ranging from -.22- (-.28).

## V. Conclusion

The results of this study generate several conclusions. First, there is some degree of salary effect on the level of first-year enrollment in law schools. In equation 1, an $R^2$ of only .27 was obtained, possibly exhibiting the need for better specification and a better estimation of alternate career paths for potential law students. However, the coefficients for alternate salaries were also higher than expected displaying a greater effect on enrollment than the salaries for workers in that field. These results are somewhat contrary to previous literature (Freeman 1975) that tests and proves a hypothesis of equal effects of salaries in the field and in an alternate field. The variable for legal salaries was not significant, but the high coefficient of alternate salaries may suggest that the market has been influenced heavily by supply shift(s) during the time period of 1987-2001.

In addition, the second equation of the study showed a high degree of correlation between the number of graduates and the number of first-year enrollees three years earlier. The results showed an elasticity of almost 0.9 where we would expect an elasticity close to unity. However, the results were better than some previous studies (Freeman 1975) but with a slightly smaller $R^2$. Also, the variables used to estimate salaries in the legal field and in substitute fields during the years of enrollment proved not significant and gave inconclusive results. These results are consistent with the cobweb model, which assumes that once a student makes the decision to enroll they will not leave due to market conditions (salaries of legal professionals and alternate occupations).

The results of equation 3 showed that graduates and a proxy for demand had a significant effect on the salaries of those in the legal services industry. Using these results, equation 3 was substituted for salaries in legal services in the initial enrollment equation to obtain a cobweb-supply equation. The results

showed that graduates of a given year had a negative effect on enrollment for that year. By running multiple regressions and substituting enrollment lagged 2 and 3 years, the model showed that past enrollment has a negative effect on enrollment a few years down the line. This shows that the time lag necessary to obtain a legal degree causes endogenous cyclical cycles that affect enrollment. This proves the hypothesis that the market for law students displays cobweb like supply adjustments. Also, due to the coefficient for salaries in alternate fields being so high, it is possible that there was a significant supply shock(s) that has decreased enrollments.

This is important to policy makers of law schools and proponents of the legal industry as enrollments skyrocket during 2002-2003. This study suggests that a large part of the supply of law students may be due to the low level of graduates from this year and the last couple of years that are now obtaining salaries above the equilibrium. This shortage of sorts, coupled with shrinking salaries in alternate fields may cause a boom that will then drive down salaries for workers with a legal degree and leave many unemployed. Current salaries may be overstating the true demand for legal professionals.

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