# IMPACTS OF CENTRAL BUSINESS DISTRICT LOCATION:

# A HEDONIC ANALYSIS OF LEGAL SERVICE ESTABLISHMENTS

**by**

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**CES 11-21** **July, 2011**

Abstract

This analysis examines the business impacts on law firms of locating in Central Business Districts (CBDs) in major U.S. cities. Specifically, we measure the price premium that law firms pay to locate in CBDs. Using micro-level data from the 1992 and 2007 Census of Services, we find that after controlling for firm size, firm specialization characteristics, and MSA and county attributes, law firms within CBDs pay about 15 to 20 percent more in overhead compared to those firms outside CBDs – a result consistent across time between 1992 and 2007. When including an important additional measure of firm quality, however, we find that this impact is reduced to about 7 to 9 percent, but still statistically significant. Additional results show that there is a significant correlation between firm quality and CBD location. We also find that firm size and firm specialization measures are important factors in the choice to locate within CBDs. We argue that these results indicate that CBD location for law firms may serve as networking, quality sorting, and branding mechanisms.

* We thank James Davis, Wayne Gray, Tom Hubbard, Kristin McCue, Lynn Riggs, and seminar participants at the 2010 Comparative Analysis for Enterprise Data Conference in London, U.K. for helpful comments. Tony Zhang has provided excellent research assistance. Support for this research at the Chicago RDC from NSF (ITR-0427889) is also gratefully acknowledged. This work is unofficial and thus has not undergone the review accorded to official Census Bureau publications. Any opinions and conclusions expressed herein are those of the authors and do not necessarily represent the views of the U.S. Census Bureau. All results have been reviewed to ensure that no confidential information is disclosed.

## Introduction

In the hedonic literature, distance to Central Business District (CBD) is routinely included in housing price models to control for commute time to work and convenience to retail, cultural, and consumptive activities. There have been few studies, however, that directly estimate the business impact of locating within a CBD. This is most likely attributable to the lack of hedonic studies on commercial real estate markets. Unlike housing characteristics, office space characteristics vary greatly by business, from one building to the next and even by floor within a structure. Moreover, these characteristics are difficult to measure, observe, and to assign a theoretical expectation of their impacts on the price of office space. Different businesses will vary substantially in the characteristics they value in commercial real estate markets depending on industry and even within the firm. For example, the number of personal offices is unlikely to serve as an acceptable analogous variable to the number of bedrooms often used in housing models. In this analysis, we attempt to overcome these issues by focusing on the legal services industry.

The legal services industry serves as a convenient market for our analysis for several reasons. First, law firms are homogeneous in terms of their outputs because they are legally prohibited from providing non-legal services. The primary output is service, knowledge and information based, and the quality of output is measurable to an extent. Second, the organizational architecture and internal structure of law firms is relatively consistent across firms and fairly easy to characterize. Finally, while the outputs and organizational set-ups are mostly homogeneous, there exists considerable variation in terms of where firms locate, the types of clients they serve, and how these firms brand their reputation and quality. This paper aims to

model these variances to better understand how law firms network and market their reputation by locating in CBDs and the impacts of these decisions on firm costs.

The main focus of this analysis is to estimate the effects on law firm overhead of locating in a city's CBD using micro data from the Census of Services. We also examine the relationship between firm quality and CBD location and the determinants of the decision to locate in these districts. We hypothesize several reasons why a law firm may locate in a CBD. First, as in retail markets, firms located near each other may lower search costs for clients. Second, CBDs may provide network effects with clients and other law firms clustered together in the same area. Finally, locating in a CBD may serve as a reputation and quality signal in the spirit of the well established literature on branding. We further evaluate the impacts of locating in CBDs by observing how the result varies across time as real transportation and communication costs change. Our empirical analysis attempts to quantify our hypotheses above by identifying law firms within MSAs that locate in CBDs and also those that are likely to engage in branding and reputation expenditure.

This paper proceeds as follows. In the next section we provide a brief background of CBDs and how we define CBDs for our analysis. In the third section, we briefly review the literature on hedonic modeling and the use of CBD in pricing models. We also develop a hypothesis for why firms may locate in a CBD, how this relates to networking and branding, and its impact on firm overhead. Our data and results are discussed in the fourth section, followed by a conclusion.

**Central Business Districts**

In 1982, the U.S. Census Bureau formally defined Central Business Districts:[1]

*A central business district (CBD) is an area of very high land valuation characterized by a high concentration of retail businesses, service businesses, offices, theaters, and hotels, and by a very high traffic flow. A CBD was defined in the 1982 Census of Retail Trade to follow existing census tract boundaries; that is, it consisted of one or more whole census tracts.*

In the 1982 Census of Retail Trade, the U.S. Census Bureau provided a publicly available list of CBDs and the corresponding Census tracts that make up these districts.[2] This list has not been updated by the Census Bureau since 1982, but numerous other sources and academic studies have provided definitions of CBDs for various cities in the U.S. and across the world.

The analysis in this paper focuses on five metropolitan statistical areas (MSAs) and their respective CBDs: Boston, Chicago, Los Angeles, New York, and San Francisco. We chose these MSAs for several reasons. First, there are a large number of law firms in these cities which allow us to have an adequate sample size. There is also a substantial amount of variation in terms of the size of law firms in these areas – ranging from very large corporate-type firms to much smaller firms. Second, these MSAs have large commercial real estate markets where office space structures suitable for law firms are located both within and outside CBDs. Finally, these cities have relatively well defined central business districts which are well known to be the location for many law offices and other service firms. In all of our empirical analyses that follow, we include MSA fixed effects to control for any unobserved location-specific characteristics.

[1] http://www.census.gov/geo/www/cbd.html

[2] While the Census Bureau and other organizations have defined and identified CBDs, there are few statistics and estimates produced about these geographic areas. CBDs seldom correspond to one particular Census tract or block group. Moreover, these districts appear to change and evolve over time as prime business areas develop, expand, and contract within cities. Further analyses about CBDs beyond those of this paper are probably due because of the geographical importance that certain businesses – particularly service firms – place on these areas.

With the CBD Census tracts provided by the 1982 Census of Retail Trade as our starting point, we rely on various academic studies, government agency websites, and our own judgment and knowledge of the downtown areas of these cities to guide us in our CBD definitions.[3] Our definitions are given below:

- Boston: bounded by Atlantic Avenue, State Street, and Devonshire Street. This area is known as the Financial District of Boston.[4]
- Chicago: "The Loop" - bounded by Lake Michigan, the Chicago River, Canal Street and Congress Express.[5] We also include some areas north of the Chicago River (along Kinzie Street and Michigan Avenue) up to E. Lake Shore Drive.
- Los Angeles: bounded by 5th Street, the 110 Freeway, 8th Street and Broadway. This area is known as the Financial District of Los Angeles.[6] We also include Bunker Hill, which covers the area between 5th and 1st Streets and the 110 Freeway and Grand Avenue.
- New York: Our New York CBD is split into two areas: 1) Mid-Town Manhattan which is bounded in the South and North by 31st Street and 59th Street between Third and Ninth Avenues,[7] and 2) Lower Manhattan, which is bounded in the South, East and West by the New York Harbor, East River, Hudson River, and in the North by Canal Street.[8]

[3] In most cases, the CBDs given in the 1982 Census of Services tend to be more restrictive than our chosen definitions. In Boston, New York, and San Francisco, the CBDs given by the Census Bureau only included a subset of our definition. In Chicago, our definition extends slightly north of the Chicago River, while the Census Bureau's 1982 definition extended southward beyond our Chicago CBD. In Los Angeles, our definition is more restrictive because the Census Bureau definition includes other areas such as the Fashion District and the Los Angeles Civic Center.

[4] "Look Up, Boston! A Walking Tour of the Financial District." *Walk the Town.* http://walkthetown.com/page48/page51/page51.html. 10 Sep. 2010.

[5] Hough and Kratz (1982).

[6] DowntownLA.com: Connect." *Downtown Los Angeles Center Business Improvement District.* http://www.downtownla.com/0_0_dcbid_map.asp. 10 Sep. 2010.

[7] Midtown Manhattan Pedestrian Network Development Project http://www.nyc.gov/html/dcp/pdf/transportation/mmp1_part1.pdf.

[8] New York City Economic Development Corp. http://www.nycedc.com/BusinessInNYC/CentralBusinessDistricts/LowerManhattanCBD/Pages/LowerManhattanCBD.aspx

- San Francisco: bounded by Leavenworth Street, Market Street, and the Ocean. This area is known as the Financial District of San Francisco.[9] We also include some areas of "South of Market" bounded by Market, Dolores, and Flosom Streets, but only down to 9th Street.

*Office Rental Rates in CBD Versus non-CBD Areas*

The Society of Industrial and Office Realtors published a report that gives office rental rates for major office real estate markets in the United States. In their report, the *Comparative Statistics of Industrial and Office Real Estate Market* (2000), they give office rental rates for CBD and non-CBD areas for each of the MSAs in our study.[10] Figure 1 shows the *highest* observed office rental rates for CBD and non-CBD areas for each market. The percentage increase (from non-CBD to CBD) ranges from 104 percent (Manhattan) to 29 percent (Chicago). Figure 2 shows the *average* observed office rental rates for CBD and non-CBD areas for each market. The percentage increase ranges from 59 percent (Los Angles) to 23 percent (Manhattan). The biggest differences in percentage changes between *highest* observed and *average* office rent occur in Manhattan and San Francisco.

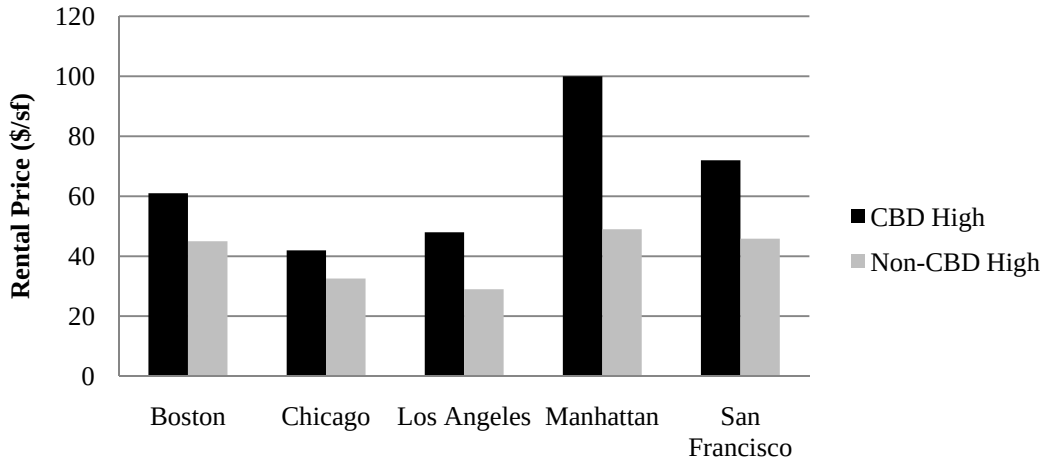
As demonstrated by the large differences in the changes between the *highest* observed and *average* office rents, these figures indicate that high-quality office space is relatively more prevalent in CBDs. In other words the distribution of high-end office space is skewed more towards CBD areas than outside CBDs. Therefore, office buildings with amenities that may help its occupants market their reputation with high-end office space are more likely to be found inside CBDs. Thus some amount of the CBD premium may be attributed to the fact that the

[9] Daganzo and Geroliminis (2008).

[10] We note that the CBD definitions used by the Society of Industrial and Office Realtors may not match the ones we use for our analysis. Moreover, the markets used in our analysis are more broadly defined. For example, we examine the entire New York MSA, whereas the Society of Industrial and Office Realtors only examine Manhattan Island for their CBD vs. non-CBD comparisons.

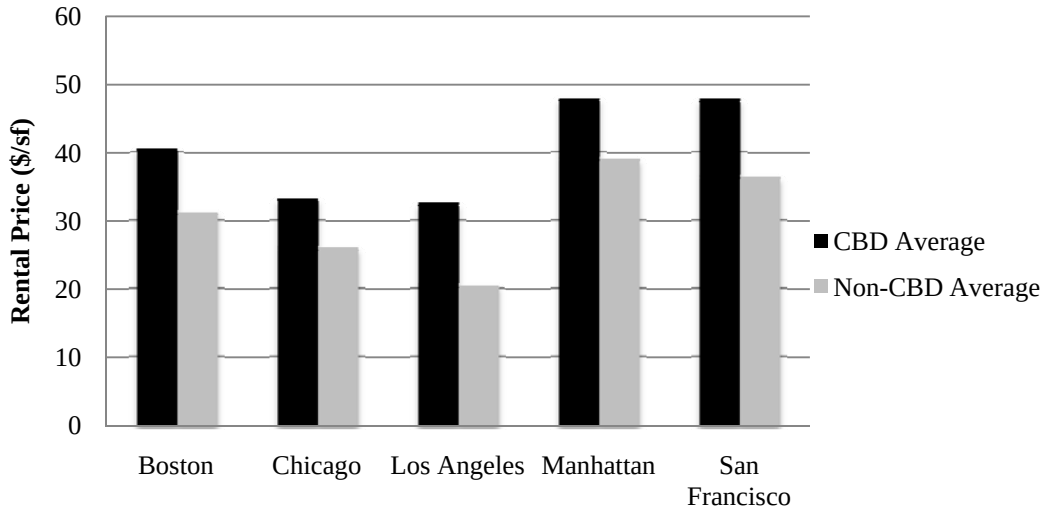
office space within CBDs is of higher quality and not necessarily attributed solely to CBD location. In the empirical exercises that follow, we attempt to control for firm quality in some of our models to distinguish between the direct CBD location premium and other office characteristics that firms may use for branding mechanisms.

**Figure 1: Highest Observed Commercial Rental Rates: CBD vs. Non-CBD**




*Source: Comparative Statistics of Industrial and Office Real Estate Market (2000)*

**Figure 2: Average Observed Commercial Rental Rates: CBD vs. Non-CBD**




*Source: Comparative Statistics of Industrial and Office Real Estate Market (2000)*

**Theory and Related Literature**

Hedonic models are often used to examine the price of a particular component or attribute of a commodity. Housing markets are probably the most widely studied assets using this approach. In addition to home-specific variables (square footage, number of bedrooms, and so forth) these hedonic models typically include location specific attributes that may be desirable (such as quality of schools, water view, location on a golf course, or air quality) or undesirable (such as proximity to a landfill or loud persistent noises). In these models, distance to CBD is often used as a control. Close proximity to CBDs will typically lead to lower commute times to work and also convenience to retail and cultural activities, and thus higher property values.[11] Conroy and Milosch (2009), for example, find this effect when they use distance to San Diego's CBD as a control when estimating the additional value of homes as a result of being located near the coast. Ihlanfeldt and Taylor (2002) use distance to CBD in a commercial real estate analysis when analyzing the impact of hazardous waste sites on property values. As originally noted in Rosen (1974), these traditional hedonic models do not estimate willingness to pay per se. Price differentials of a certain product characteristic may be attributable to either demand or supply/cost shifts resulting from the product's attribute. Rosen and others have suggested techniques to overcome this limitation in the hedonic framework, but few analyses have adopted these methods due to the richness of data required to estimate both marginal benefit and marginal cost functions.[12]

[11] The literature on land rents can be traced as far back to the work of David Ricardo (1817).
[12] Limehouse, Melvin, and McCormick (2010) adopt Rosen's hedonic methodology by simultaneously estimating both supply and demand functions while evaluating willingness to pay for environmentally friendly golf courses.

*Law Firms and CBD Location*

There are several reasons why law firms may be willing to pay a premium to locate in a city's CBD. We office three hypotheses: 1) CBD location for law firms results in a clustering of firms and therefore lowers search costs for the firms' clients, 2) proximity to other law firms may create network effects, and 3) CBD location may serve as a quality sorting and branding mechanism as firms market their reputation. We expand on each of these hypotheses below, but an important caveat is in order. Our empirical analyses do not attempt to directly test for the underlying reasons for CBD location, nor do we aim to identify which one of our hypotheses dominates the others. In fact, as we explain in more detail below, all of our rationales for CBD location likely complement each other. We do, however, estimate our CBD premiums over time as transportation and communication costs have varied – providing more detailed insights into our search cost argument. Moreover, we also include a measure for firm quality in our analysis to proxy for identifying firms that are likely to engage in branding expenditure.

*Search Cost Argument*: The most obvious rationale for CBD location is that this location choice puts the firm at close proximity to the firms' clients and that locating further away (perhaps in less expensive areas of the city) may lead to the loss of these clients to competitors. By locating in the CBD, the law firm increases the demand for its services by reducing the cost of transportation for its clients. In the earliest and most simple spatial models, Hotelling (1929) showed how vendors would logically and economically locate next to each other. In the same way that automobile dealers tend to locate near each other as a device for lowering shopping costs, law firms may locate near each other. Since shopping for lawyers is not so physically dependent, however, this effect is now likely to be small, even if it were previously large owing to higher costs of transportation, telephone, and related communication technologies.

*Networking*: While proximate location to other law firms may create lower search and shopping costs for clients, it might also stand to create network effects. Proximity to other law offices may be valuable as firms may work together or convene for professional reasons.[13] The most obvious node in such a network is the courthouse where lawyers do portions of their work. The courtroom, judge's chambers, clerk of court, and related mandated recording places provide a travel cost based reason for firms to locate near each other and proximate to the court house. Obviously, as email, fax, and other technologies emerge, this incentive is muted. Also, as some of these functions, such as deed recording, are parsed to satellite stations away from the court house, we may expect more diffuse location of law firms.

In two papers similar to ours in spirit and substance, Arzaghi (2005) and Henderson and Arzaghi (2007) use Census Bureau micro-level data on advertising agencies. In Arzaghi (2005), the author studies a sample of agencies that re-locate to urban areas between 1992 and 1997. Using annual payroll as a proxy for firm quality, Arzaghi demonstrates that higher quality advertising agencies tend to locate in high rent areas to sort themselves and shift away from lower quality agencies. In Henderson and Arzaghi (2007), the authors use a sample of agencies that move within Manhattan Island and show that higher quality agencies are willing to pay premiums to locate in high clustered areas with other agencies. As in our analysis, Henderson and Arzaghi hypothesize that these higher quality agencies are the ones who benefit more from networking. In this paper, we attempt to apply this general idea to law firms and we will also estimate the direct premiums that firms pay to locate in areas where networking is likely.

*Branding*: Our final rationale for why law firms may locate in CBDs and pay a premium for this location is because these districts may act as a signaling device to the market through

[13] See Katz and and Shapiro (1986) on network externalities.

quality reputation effects.[14] Casual empiricism and the popular media recognize the fact that law firms and other similar service industries build brand capital by engaging in sunk cost investment expenditure. In addition to advertising and other branding mechanisms, some law firms invest in expensive, high quality office space and over the last decade several of these firms (as well as several major accounting firms) have even purchased the naming rights to buildings.[15] As noted in Klein and Leffler (1981), this investment expenditure serves as collateral that bonds the firm to its contract with clients. As we will explain in the next section, we will attempt to isolate the branding hypothesis by including a quality variable to proxy for how likely law firms are to engage in reputation expenditure.

Land which is located most near the market, the point of sale/consumption, will have the highest land rents.[16] Accordingly, firms which locate nearest the market center will pay the highest prices for land use. Additionally, we expect that such firms will be the most productive and highest paid firms, as they exhaust the intensive margin of rent. Put simply, the best, most productive firms/lawyers, will use the most expensive land in areas that save the greatest amount of travel time and provide for the best networking opportunities. Moreover, the office space markets in CBDs will have high quality space with amenities that enable firms to quality sort and market their reputation through branding investment expenditure.

It is also important to note that it is very likely that for many law firms, our rationales for CBD location complement each other. For example, a firm may attempt to quality sort and brand itself by locating in very expensive front-beach property in Malibu, California. This location, however, is unlikely to provide for networking opportunities and it would not lower search costs

[14] See the well established literature on branding starting with Klein, Crawford and Alchian (1978) and expanded in Klein and Leffler (1981).
[15] See "More Landlords Offer Building Naming Rights," *Wall Street Journal* (1-14-2002). Also note that there is a segment of the marketing industry which targets law firms in building their brand name equity.
[16] Again, see Ricardo (1817) or more recently McCormick (1991), chapter 13.

for clients. Our three hypotheses for CBD location are not mutually exclusive. With the exception of branding expenditure on high-end amenities within the office-space itself (which we show above is likely more prevalent inside CBDs and we also attempt to control for this by including measures of firm quality in some of our models), quality sorting and branding by location, and networking are all likely complementary.

**Data on the Legal Services Industry**

Data for this study come from the 1992 and 2007 Census of Services. As discussed previously, we limit our analysis to law firms located in the Boston, Chicago, Los Angeles, New York, and San Francisco MSAs. The data report values on revenue, payroll, and law firm specialization. The specialization measures, however, differ in the 1992 and 2007 data. In 1992, the Census of Services for legal service establishments report the number of lawyers that specialize in various areas of law. In 2007, the data report the share of revenues (not the number of lawyers) by specialization. Moreover, in 1992 the specialization categories are more detailed than in 2007.[17] In both 1992 and 2007, the data do report the share of revenues by type of client (that is, commercial, individual, or government). In the 1997 and 2002 Census of Services, no information on firm specialization characteristics were collected for legal service establishments – only basic information on revenue, payroll, and employment. We feel that 1992 and 2007 (years where more detailed data are available for law firms) serve well as the two benchmark time periods to compare our modeling estimates – especially since the 15 years between these periods saw significant increases in communication and transportation technologies. With that point in mind, however, we note that we have estimated all of the models presented below using

[17] On the 1992 Economic Census survey form to legal service establishments, there are 15 available lawyer specialization categories for law firms to report the number of lawyers in each category. In 2007, there are 8 specialization categories for law firm to report the share of revenues from each category. These categories for both years are shown in full in Tables 2 and 3 in our empirical results that follow.

the 1997 and 2002 Census of Services data (minus the specialization measures which are not available in those years) and that these results are consistent with our findings using the 1992 and 2007 data.

In our empirical analyses, we eliminate law firms that are classified as partnerships or sole proprietorships since payroll data on these law firms do not include partners at the law firm.[18] This leaves us with a database of law firms operating as corporations, including Limited Liability Companies and Professional Service Organizations, where partners are considered employees of the firm and thus their employment figures, including payroll, are reported in the data. For these firms, the only shareholders of the firm are lawyers and thus there are no retained revenues.

In our empirical analyses below, we closely follow the methodology in Garicano and Hubbard (2008) who examine the determinants of law firm overhead using a cross-sectional national model based on the 1992 Census of Services on law firms.[19] Our analysis, however, models the CBD effects within large MSAs (as opposed to a national sample) discussed in the previous section and in two time periods – 1992 and 2007. A key variable in our models is firm overhead. Since our data contain law offices where there are no residual revenues, we can calculate overhead for each law office as: (total revenue – payroll – fringe benefits).[20]

Consider the following simple model that examines the determinants of law firm overhead:

[18] The unit of observation in our analysis is actually a law office establishment. Some establishments may belong to firms that operate more than one law office. In our data, however, the legal form of operation (cooperate, proprietorship, etc.) is constant across all establishments for any particular firm.

[19] We note that Garicano and Hubbard first used these data in an earlier (2003) analysis where they show that firms become more specialized as market size (measured at the county level and using county employment as a proxy for market size) increases.

[20] As in Garicano and Hubbard's (2008) calculation of law office overhead, we assume that fringe benefits are 15 percent of total payroll. This finding is backed-up by the U.S. Census Bureau's Operating Expenses Survey (1996) and the Annual Service Report (2008), as well as Altman Weil's (1994) Survey of Law Firm Economics.

$$oh_i = \beta_1 + \beta_2 EMP_i + \beta_3 CBD_i + \beta_4 QUALITY_i + \beta_5 L_i + \beta_6 X_i + \varepsilon_i \quad (1)$$

where *oh* is overhead at firm *i*, *CBD* is an indicator variable for whether firm *i* is located in a central business district, *EMP* is the number of employees at firm *i*, *QUALITY* is a measure of firm quality, *L* is a vector of law firm characteristics, and *X* is a vector of MSA/County demographic characteristics. In our hedonic framework, the variable *EMP* controls for the size of the office space - in effect a proxy for square footage. Since the internal organizational structure of law offices is generally homogeneous across firms we believe that this is a suitable proxy for office size. In fact, even if square footage were available in the data, we feel that *EMP* is a more appropriate measure for our purposes. If firms invest in large, elaborate offices or have space dedicated to serve clients as they enter and visit the office, then we would like to pick up this effect in our model and not have it muted by a square footage variable.

For our measure of firm quality, we use total revenue per lawyer. Following the methodology used in the publication *American Lawyer* to rank firms into their listing of *Top 250 Law Firms*, we feel that this is the best measure of quality given the data available.[21] Furthermore, according to discussions we have had with those in the industry, law firms in the *American Lawyer*'s Top 250 (ranked by revenue per lawyer) are the firms likely to engage in reputation branding expenditure by investing in high quality office space. Thus, in our hedonic framework, this becomes an important proxy for physical/office space attributes of higher quality firms.

*Summary Statistics*

As indicated above, we use data on law offices from the 1992 and 2007 Census of Services. We should note that at the time of this analysis, 2007 data were considered preliminary since the

[21] We have experimented with using a dummy variable as an indicator for whether a firm is included in *American Lawyer's Top 250*, but we feel that our continuous variable provides more meaningful results.

Census Bureau had not yet released all of their publications on the 2007 Census of Services. We are therefore unable at this time to report complete summary statistics on our full data.[22] Using 1992 data, however, we report the following descriptive summaries that describe the differences in key variables between firms located within and outside CBDs:

- Law firms located inside CBDs are slightly older that those firms outside CBDs, but this difference is not statistically significant.[23]
- Average overhead per law office (as calculated above) is about 110% greater for firms located inside CBDs compared to those outside CBDs.
- The average number of employees per office is about 80% greater for firms located inside CBDs .
- Average revenue per lawyer (our measure of firm quality) per office is about 13% greater for firms located inside CBDs.

The differences in overhead and revenue per lawyer (between firms within and outside CBDs) are likely explained by firm size and other characteristics about the firm. We now turn to our statistical models where we examine these relationships more carefully.

*Modeling the Choice to Locate in CBDs*

Before implementing our hedonic approach in Equation (1), we first model the decision of law firms to locate within CBDs. Table 1 reports probit (marginal effect) results of the decision to locate in CBDs in both 1992 and 2007. The results in the first column (Model 1) include the firm specialization shares (as noted above these shares are measured differently in

[22] Census Bureau disclosure guidelines specify that only modeling output can be released when data are considered preliminary.

[23] We have experimented with including law firm age in all of our statistical analyses below that use 1992 data, but there is no statistical relationship between firm age and any of the right-hand-side variables in our models. To obtain law firm age in 1992, we match the Census of Services data to the Longitudinal Business Database, which at the time of this analysis was not yet available for 2007 data.

both years).[24] The results in Model 2 include the share of revenue variables by type of client. In both years, larger firms (measured by office employment) and higher quality firms are more likely to locate in CBDs. Examining the specialization variables in 1992, the coefficient associated with law firms with a higher share of corporate lawyers is positive and highly significant. The coefficient on law firms with a higher share of lawyers in negligence law is negative, but only significant for plaintiff law. The coefficient on "general" practice is negative, but not significant. In the 2007 model, we get similar specialization results in that the coefficient on law firms with a higher share of revenues from business law is positive and significant. The only other specialization coefficient that is significant is the wills and estate coefficient. When including the share of revenue variables by source of client (Model 2 in both years), we get very similar and robust results in terms of larger and higher quality law firms being more likely to locate in CBDs. In the 1992 model, law firms with a higher percentage of revenues coming from commercial clients are more likely to locate in CBDs (the other revenue share variables are not significant in 1992). In the 2007 model, law firms with a higher percentage of revenues from government clients are less likely to locate in CBDs. Law offices classified as multi-unit establishments (i.e., belonging to firms with more than one office) are less likely to locate in CBDs in both the 1992 and 2007 models.

*Impacts of CBD Location on Overhead*

Table 2 reports 1992 OLS estimates of the natural log of law firm overhead (net of payroll and fringe benefits) regressed on various law firm characteristics and location controls.[25]

[24] For our models where we include either the law firm specialization or the share of revenues variables, there is an omitted category in each model. For the 1992 field categories by number of lawyers, the omitted category is "other" specialized fields. In the 2007 categories by revenues from type of law specialization, the omitted category is "other civil law." For the share of revenue variables by type of client (for both years), the excluded category is revenue from other sources – including not-for-profit organizations.

[25] It seems logical to perform an explicit two-stage instrumental procedure on the hedonic model using predicted values from the limited probability and probit models in the previous section. We note, however, that the potential

MSA fixed effects and the log of county employment are also included.[26] As noted earlier, we estimate our models separately for 1992 and 2007 due to the differences in the variables on law firm specialization. As shown in Table 2, the coefficient on the natural log of the number of firm employees is positive and highly significant. For most models, the coefficient is around one – indicating that a one percent increase in the number of employees increases overhead by about one percent. Models 1 and 2 include the firm share specialization measures. Models 3 and 4 do not include the specialization measures, but rather the share of revenue variables by source of client, so that the estimates between 1992 and 2007 are more directly comparable (we discuss this later). The coefficient of interest is the dummy variable, *CBD*. Model 1 indicates that CBD location increases overhead by about 18 percent – that is, a coefficient of 0.18, which is highly statistically significant. However, when including our quality measure (revenue per lawyer) in Model 2, the coefficient decreases to 0.07, but is still significant. We interpret this to mean that, while there are real differences in expenses of being located in a CBD, many of these differences are absorbed by quality attributes of the office space.

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first stage models do not yield us with excluded instruments. We have experimented with using law firm age as an instrument, but as noted above, there is no statistical correlation between CBD location and age and thus our instrumental procedure is not properly identified. We recognize the fact that those law firms that get the most out of CBD location are the ones that will choose to locate in these areas and that this would generally raise endogeneity concerns. Given our theory and choice of variables in the model of the impact of CBD location on overhead (including law firm quality), we feel that we have the proper controls to estimate the premium that law firms pay to locate in CBDs. As in most hedonic models, there is a selection process involved for which a premium is estimated (e.g., households that locate near bodies of water, parks, or other environmental attributes), but given that proper controls of household characteristics are included and the fact that structural demand functions are not directly estimated, the estimated premium paid for these attributes is correctly estimated (see Ekeland, Heckman and Nesheim (2004) and Heckman, Matzkin, and Nesheim (2010) for more on identification in hedonic models).

[26] Garicano and Hubbard (2008) also include county employment values to control for location-specific attributes and to examine the impacts of market size (which they define a market to be the county). Our analysis differs substantially in that we limit our data to only include firms inside large MSAs, and within these MSAs we examine the impacts of locating inside CBDs. In effect, we have defined our market to be the MSA and therefore include MSA fixed effects. We realize that some general law firms may market their services to local individuals at a more micro geographic level. Recognizing this fact, we also include county-level employment to control for market size variation within our MSAs.

Using 2007 data, we estimate the same models, but with the different (and less detailed) firm specialization measures provided by the 2007 Census of Services on legal service establishments. Table 3 reports these results. The main differences between the 1992 and 2007 models are on the coefficients for the natural log of county employment and the dummy variable for multi-unit establishment. In the 1992 model, county employment had no statistically significant impact on overhead; in the 2007 model, the coefficient on county employment is positive and significant. The dummy variable for multi-unit establishment switches signs between the two time periods: in 1992 the coefficient is negative and significant and in 2007 it is positive and significant. The other coefficients of interest are robust across both time periods. Again, the coefficient on the natural log of firm employment is around one – indicating that a one percent increase in the number of employees increases overhead by about one percent. The coefficients on CBD are very similar to those obtained in the 1992 model. When revenue per lawyer is not included (Model 1), the CBD effect is 0.17 (down from 0.18 in the 1992 model). When revenue per lawyer is included (Model 2), the effect is 0.09 in 2007 (up from 0.07 in 1992). When the revenue by type of client controls are excluded (Models 3 and 4), we get almost identical patterns with the changes in CBD coefficients between the two time periods.

Table 4 summarizes the coefficients in our models where we only include variables that are common in both 1992 and 2007 (Models 3 and 4 from Tables 2 and 3 where we do not include the firm specialization controls, but instead use the revenue share variables). Again, the estimate on the premium that law firms pay to locate in CBDs is affected by whether or not we include our proxy for firm quality. This premium, however, is robust across both time periods in our analysis and is also robust to our inclusion or exclusion of the firm specialization measures. We estimate that law firms pay about 15 to 20 percent more in overhead to locate in CBDs

within major U.S. cities, but some of this premium is likely absorbed by quality attributes about the firm. Even so, the CBD premium is still statistically significant after controlling for firm quality.

*Impacts of CBD Location on Revenue per Lawyer*

Our final empirical exercise is to model the determinants of our quality measure and to examine whether CBD location has a significant impact on quality. This particular model is included not to imply that we hypothesize that CBD location *causes* increased quality, but rather to examine the relationship between CBD location and quality from a different perspective. Table 5 reports OLS estimates of the natural log of revenue per lawyer regressed on firm and location characteristics. In Model 1, we include the firm specialization measures and in Model 2 we exclude them. In all of our models and in both years, CBD location, controlling for firm size, has a positive and significant impact on law firm quality. In the 1992 model, the coefficient on CBD is 0.14 with the firm specialization shares included and 0.15 without the specialization measures. In the 2007 model, this coefficient is 0.09 and 0.07, respectively. As in the overhead models, the multi-unit establishment dummy variable switches signs between the two time periods. In the 1992 model, the variable for multi-unit establishments has a negative impact on revenue per lawyer, while in 2007 it has a positive impact. Looking at the firm specialization shares in 1992, we note that more "general" law firms have lower revenues per lawyer. Examining the share variables by client, firms with more revenue coming from government sources have lower revenues per lawyer compared to those firms with more revenue coming from commercial and individual clients.

## Conclusion

Using mico-level data from the 1992 and 2007 Census of Services, we have analyzed the business impacts of law firms locating in CBDs as well as the determinants of the choice to locate in these prime business areas. During the 15 years between these two periods, the CBD effect has remained relatively stable, significant, and robust – even after controlling for a wide range of firm and location characteristics and also firm quality. Our analyses show that firm size, quality, and other specialization characteristics are important determinates of the choice to locate inside CBDs. We also show that law firms within CBDs pay about 15 to 20 percent more in overhead compared to those firms outside CBDs. When including an additional measure of firm quality, however, we find that this premium is reduced to about 5 to 8 percent, but still statistically significant. Additional results show that there is a strong and significant correlation between firm quality and CBD location.

There is a saying about the importance of real estate in retail sales that three things matter: "location, location, and location." Our work in this analysis substantiates this often recognized claim for legal service firms. At a somewhat macro level, location seems to matter more for large, high quality, commercial law firms than it does for the general practice law firms. Between 1992 and 2007, there were significant increases in communication technologies and decreases in real transportation costs. The explosion of technology in methods of communication, less expensive long distance phones, mobile phones, email, fax, teleconferencing, overnight delivery services, and more, has had little impact on the location premiums paid for by law firms and the decision to locate in these prime areas. It appears that something more than travel costs is fundamental in determining where law firms locate. While

we have not directly tested for the underlying reasons, networking effects, quality sorting, and branding seem to be prime candidates.

**Table 1: Determinants of Central Business District Location**

| 1992 Probit (marginal effects) | Model 1 | | 1992 Probit (marginal effects) | Model 2 | |
|---|---|---|---|---|---|
| Ln (Office Employees) | 0.0621 | *** | Ln (Office Employees) | 0.0663 | *** |
| | (0.0118) | | | (0.0116) | |
| Ln(Revenue per Lawyer) | 0.1033 | *** | Ln(Revenue per Lawyer) | 0.1060 | *** |
| | (0.0214) | | | (0.0209) | |
| Multi-establishment | -0.0386 | | Multi-establishment | -0.0381 | |
| | (0.0299) | | | (0.0300) | |
| MSA Controls | yes | | MSA Controls | yes | |
| Selected Lawyer Activities: Shares | | | Share of Revenues by Source: | | |
| Corporate | 0.2340 | *** | Corporate | 0.0762 | * |
| | (0.0725) | | | (0.0432) | |
| Negligence (Defense) | -0.0919 | | Individuals | -0.0320 | |
| | (0.0655) | | | (0.0465) | |
| Negligence (Plaintiff) | -0.1321 | ** | Government | 0.0760 | |
| | (0.0621) | | | (0.2257) | |
| General | -0.0593 | | | | |
| | (0.0419) | | | | |
| Number of Other Share Controls | 10 | | | | |
| Observations | 1691 | | Observations | 1961 | |
| Pseudo R-squared | 0.2042 | | Pseudo R-squared | 0.20 | |

| 2007 Probit (marginal effects) | Model 1 | | 2007 Probit (marginal effects) | Model 2 | |
|---|---|---|---|---|---|
| Ln(Office Employees) | 0.0674 | *** | Ln(Office Employees) | 0.0610 | *** |
| | (0.0073) | | | (0.0075) | |
| Ln(Revenue per Lawyer) | 0.0577 | *** | Ln(Revenue per Lawyer) | 0.0481 | *** |
| | (0.0109) | | | (0.0114) | |
| Multi-establishment | -0.0087 | | Multi-establishment | -0.0172 | |
| | (0.0194) | | | (0.0196) | |
| MSA Controls | Yes | | MSA Controls | Yes | |
| Share of Revenues by Specialization: | | | Share of Revenues by Source: | | |
| Criminal | -0.1027 | | Corporate | 0.0653 | |
| | (0.0728) | | | (0.0534) | |
| Real Estate | -0.0331 | | Individuals | -0.0773 | |
| | (0.0519) | | | (0.0552) | |
| Wills/Estate | -0.3507 | *** | Government | -0.1718 | ** |
| | (0.1170) | | | (0.0718) | |
| Family | -0.0584 | | | | |
| | (0.0606) | | | | |
| Business | 0.0600 | ** | | | |
| | (0.0285) | | | | |
| Civil Negligence | -0.0671 | | | | |
| | (0.0409) | | | | |
| Labor | -0.0039 | | | | |
| | (0.0513) | | | | |
| Observations | 2974 | | | 2974 | |
| Pseudo R-squared | 0.1511 | | | 0.16 | |

Notes: Robust standard errors in parentheses.

*** Indicates significance at the 1 percent level

** Indicates significance at the 5 percent level

* Indicates significance at the 10 percent level

**Table 2: Impacts of CBD Location on Overhead Costs: 1992 Data**

(Dependent Variable: Ln(Overhead))

| | Model 1 | | Model 2 | | | Model 3 | | Model 4 | |
|---|---|---|---|---|---|---|---|---|---|
| Intercept | 4.1054 | *** | -0.0175 | | Intercept | 3.6743 | *** | 0.0366 | |
| | (0.4721) | | (0.3595) | | | (0.4645) | | (0.3535) | |
| Ln(Office Employees) | 0.9965 | *** | 0.9266 | *** | Ln(Office Employees) | 1.0040 | *** | 0.9267 | *** |
| | (0.0159) | | (0.0117) | | | (0.0155) | | (0.0116) | |
| CBD | 0.1824 | *** | 0.0672 | ** | CBD | 0.1860 | *** | 0.0679 | ** |
| | (0.0431) | | (0.0315) | | | (0.0427) | | (0.0315) | |
| Ln(Revenue per Lawyer) | - | | 0.8003 | *** | Ln(Revenue per Lawyer) | - | | 0.7739 | *** |
| | - | | (0.0208) | | | - | | (0.0203) | |
| Multi-establishment | -0.1507 | *** | -0.0825 | *** | Multi-establishment | -0.1242 | *** | -0.0955 | *** |
| | (0.0403) | | (0.0293) | | | (0.0405) | | (0.0297) | |
| Ln(County Employment) | 0.0337 | | -0.0136 | | Ln(County Employment) | 0.0409 | | -0.0101 | |
| | (0.0335) | | (0.0244) | | | (0.0331) | | (0.0243) | |
| MSA Controls | yes | | yes | | MSA Controls | yes | | yes | |
| Share of Lawyer Activities: | | | | | Share of Revenue by Source: | | | | |
| Banking | 0.0914 | | 0.1808 | ** | Corporate | 0.3924 | *** | 0.1523 | *** |
| | (0.1163) | | (0.0846) | | | (0.0575) | | (0.0426) | |
| Corporate | 0.2514 | ** | 0.1737 | ** | Individuals | 0.3307 | *** | 0.0156 | |
| | (0.0986) | | (0.0717) | | | (0.0609) | | (0.0454) | |
| Criminal | 0.2487 | | 0.1410 | | Government | 0.0459 | | 0.1734 | |
| | (0.1575) | | (0.1145) | | | (0.3157) | | (0.2313) | |
| Domestic | 0.0166 | | 0.1837 | * | | | | | |
| | (0.1511) | | (0.1100) | | | | | | |
| Environmental | 0.0743 | | 0.1594 | | | | | | |
| | (0.203) | | (0.1476) | | | | | | |
| Government | 0.0613 | | 0.1485 | | | | | | |
| | (0.2218) | | (0.1613) | | | | | | |
| Insurance | -0.1461 | ** | 0.1123 | ** | | | | | |
| | (0.0734) | | (0.0538) | | | | | | |
| Negligence (Defence) | -0.1963 | ** | 0.1553 | *** | | | | | |
| | (0.0818) | | (0.0601) | | | | | | |
| Negligence (Plaintiff) | 0.1421 | * | -0.1088 | * | | | | | |
| | (0.0795) | | (0.0582) | | | | | | |
| Intellectual Property | 0.1168 | * | -0.0302 | | | | | | |
| | (0.0659) | | (0.0481) | | | | | | |
| Real Estate | -0.0684 | | -0.0614 | | | | | | |
| | (0.0563) | | (0.0409) | | | | | | |
| Tax | 0.4556 | ** | -0.0946 | | | | | | |
| | (0.2087) | | (0.1524) | | | | | | |
| Wills/ Estate | -0.4252 | ** | -0.4495 | *** | | | | | |
| | (0.1665) | | (0.1210) | | | | | | |
| General | -0.1413 | *** | 0.0018 | | | | | | |
| | (0.0541) | | (0.0395) | | | | | | |
| Observations | 1691 | | 1691 | | | 1691 | | 1691 | |
| Adjusted R-squared | 0.7733 | | 0.8801 | | | 0.7748 | | 0.8791 | |

Notes: Robust standard errors in parentheses.

*** Indicates significance at the 1 percent level

** Indicates significance at the 5 percent level

* Indicates significance at the 10 percent level

**Table 3: Impacts of CBD Location on Overhead Costs: 2007 Data**

(Dependent Variable: Ln(Overhead))

| | Model 1 | | Model 2 | | | Model 3 | | Model 4 | |
|---|---|---|---|---|---|---|---|---|---|
| Intercept | 2.0675 | *** | -1.7527 | *** | Intercept | 1.7520 | *** | -1.7537 | *** |
| | (0.3313) | | (0.2391) | | | (0.3412) | | (0.2482) | |
| Ln(Office Employees) | 1.0330 | *** | 0.9066 | *** | Ln(Office Employees) | 1.0244 | *** | 0.8963 | *** |
| | (0.0145) | | (0.0103) | | | (0.0146) | | (0.0105) | |
| CBD | 0.1733 | *** | 0.0933 | *** | CBD | 0.1450 | *** | 0.0836 | *** |
| | (0.0457) | | (0.0317) | | | (0.0449) | | (0.0316) | |
| Ln(Revenue per Lawyer) | | | 0.8441 | *** | Ln(Revenue per Lawyer) | | | 0.8397 | *** |
| | | | (0.0149) | | | | | (0.0153) | |
| Multi-establishment | 0.1063 | *** | 0.0972 | *** | Multi-establishment | 0.1142 | *** | 0.0716 | *** |
| | (0.0385) | | (0.0267) | | | (0.0384) | | (0.0270) | |
| Ln(County Employment) | 0.1858 | *** | 0.0992 | *** | Ln(County Employment) | 0.1690 | *** | 0.0950 | *** |
| | (0.0248) | | (0.0172) | | | (0.0244) | | (0.0172) | |
| MSA Controls | yes | | yes | | MSA Controls | yes | | yes | |
| Share of Revenues by Specialization: | | | | | Share of Revenues by Source: | | | | |
| Criminal | -0.0913 | *** | 0.1031 | *** | Corporate | 0.7588 | *** | 0.2169 | *** |
| | (0.1319) | | (0.0914) | | | (0.1031) | | (0.0731) | |
| Real Estate | 0.0837 | | -0.0795 | | Individuals | 0.5788 | *** | 0.0290 | |
| | (0.1032) | | (0.0715) | | | (0.1056) | | (0.0749) | |
| Wills/Estate | -0.3069 | | -0.1692 | | Government | -0.0591 | | 0.0958 | |
| | (0.1622) | | (0.1123) | | | (0.1318) | | (0.0927) | |
| Family | 0.0416 | * | 0.0523 | | | | | | |
| | (0.1115) | | (0.0772) | | | | | | |
| Business | 0.2981 | *** | 0.1321 | *** | | | | | |
| | (0.0582) | | (0.0404) | | | | | | |
| Civil Negligence | 0.0915 | | -0.0186 | | | | | | |
| | (0.0785) | | (0.0544) | | | | | | |
| Labor | -0.0101 | | 0.0271 | | | | | | |
| | (0.0977) | | (0.0676) | | | | | | |
| Observations | 2974 | | 2974 | | | 2974 | | 2974 | |
| Adjusted R-squared | 0.7172 | | 0.8644 | | | 0.728 | | 0.8656 | |

Notes: Robust standard errors in parentheses.

*** Indicates significance at the 1 percent level

** Indicates significance at the 5 percent level

* Indicates significance at the 10 percent level

**Table 4: Direct Comparison of Coefficients: 1992, 2007**

Summary of Models 3 and 4 for both years

| | 1992 | | 2007 | |
|---|---|---|---|---|
| | Model 3 | Model 4 | Model 3 | Model 4 |
| Intercept | 3.6743 *** | 0.0366 | 1.7520 *** | -1.7537 *** |
| | (0.4645) | (0.3535) | (0.3412) | (0.2482) |
| Ln(Office Employees) | 1.0040 *** | 0.9267 *** | 1.0244 *** | 0.8963 *** |
| | (0.0155) | (0.0116) | (0.0146) | (0.0105) |
| CBD | 0.1860 *** | 0.0679 ** | 0.1450 *** | 0.0836 *** |
| | (0.0427) | (0.0315) | (0.0449) | (0.0316) |
| Ln(Revenue per Lawyer) | - | 0.7739 *** | | 0.8397 *** |
| | - | (0.0203) | | (0.0153) |
| Multi-establishment | -0.1242 *** | -0.0955 *** | 0.1142 *** | 0.0716 *** |
| | (0.0405) | (0.0297) | (0.0384) | (0.0270) |
| Ln(County Employment) | 0.0409 | -0.0101 | 0.1690 *** | 0.0950 *** |
| | (0.0331) | (0.0243) | (0.0244) | (0.0172) |
| MSA Controls | yes | yes | yes | yes |
| Share of Revenue by Source: | | | | |
| Corporate | 0.3924 *** | 0.1523 *** | 0.7588 *** | 0.2169 *** |
| | (0.0575) | (0.0426) | (0.1031) | (0.0731) |
| Individuals | 0.3307 *** | 0.0156 | 0.5788 *** | 0.0290 |
| | (0.0609) | (0.0454) | (0.1056) | (0.0749) |
| Government | 0.0459 | 0.1734 | -0.0591 | 0.0958 |
| | (0.3157) | (0.2313) | (0.1318) | (0.0927) |
| MSA Controls | | | | |
| Observations | 1691 | 1691 | 2974 | 2974 |
| Adjusted R-squared | 0.7748 | 0.8791 | 0.728 | 0.8656 |

Notes: Robust standard errors in parentheses.

*** Indicates significance at the 1 percent level

** Indicates significance at the 5 percent level

* Indicates significance at the 10 percent level

**Table 5: CBD Location and Revenue per Lawyer**

(Dependent Variable: Revenue per lawyer)

| 1992 | Model 1 | | 1992 | Model 2 | |
|---|---|---|---|---|---|
| Intercept | 5.1518 | *** | Intercept | 4.7001 | *** |
| | (0.4051) | | | (0.4086) | |
| Ln(Office Employees) | 0.0873 | *** | Ln(Office Employees) | 0.0999 | *** |
| | (0.0137) | | | (0.0137) | |
| CBD | 0.1440 | *** | CBD | 0.1526 | *** |
| | (0.0370) | | | (0.0376) | |
| Multi-establishment | -0.0853 | ** | Multi-establishment | -0.0372 | ** |
| | (0.0346) | | | (0.0356) | |
| Ln(County Employment) | 0.0592 | ** | Ln(County Employment) | 0.0659 | ** |
| | (0.0287) | | | (0.0291) | |
| MSA Controls | yes | | MSA Controls | yes | |
| Selected Lawyer Activities: Shares | | | Share of Revenue by Source: | | |
| Corporate | 0.0970 | | Corporate | 0.3102 | *** |
| | (0.0846) | | | (0.0505) | |
| Negligence (Defence) | -0.4393 | *** | Individuals | 0.4071 | *** |
| | (0.0702) | | | (0.0535) | |
| Negligence (Plaintiff) | 0.3135 | *** | Government | -0.1648 | |
| | (0.0683) | | | (0.2777) | |
| General | -0.1789 | *** | | | |
| | (0.0464) | | | | |
| Observations | 1691 | | | 1691 | |
| Adjusted R-squared | 0.1696 | | | 0.1334 | |

| 2007 | Model 1 | | 2007 | Model 2 | |
|---|---|---|---|---|---|
| Intercept | 4.5260 | *** | Intercept | 4.1747 | *** |
| | (0.2832) | | | (0.2890) | |
| Ln(Office Employees) | 0.1498 | *** | Ln(Office Employees) | 0.1526 | *** |
| | (0.0124) | | | (0.0123) | |
| CBD | 0.0947 | ** | CBD | 0.0730 | * |
| | (0.0391) | | | (0.0381) | |
| Multi-establishment | 0.0107 | | Multi-establishment | 0.0507 | *** |
| | (0.0329) | | | (0.0326) | |
| Ln(County Employment) | 0.1026 | *** | Ln(County Employment) | 0.0881 | *** |
| | (0.0212) | | | (0.0207) | |
| MSA Controls | yes | | MSA Controls | yes | |
| Share of Revenues by Specialization: | | | Share of Revenues by Source: | | |
| Criminal | -0.2304 | ** | Corporate | 0.6453 | *** |
| | (0.1128) | | | (0.0873) | |
| Real Estate | 0.1933 | ** | Individuals | 0.6547 | *** |
| | (0.0882) | | | (0.0895) | |
| Wills/Estate | -0.1632 | | Governement | -0.1845 | * |
| | (0.1386) | | | (0.1116) | |
| Family | -0.0127 | | | | |
| | (0.0953) | | | | |
| Corporate | 0.1967 | *** | | | |
| | (0.0498) | | | | |
| Civil Negligence | 0.1304 | * | | | |
| | (0.0671) | | | | |
| Labor | -0.0440 | | | | |
| | (0.0835) | | | | |
| Observations | 2974 | | | 2974 | |
| Adjusted R-squared | 0.1119 | | | 0.1615 | |

Notes: Robust standard errors in parentheses.

*** Indicates significance at the 1 percent level

** Indicates significance at the 5 percent level

* Indicates significance at the 10 percent level

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