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Personnel-Economic Geography: Evidence from Large US Law Firms

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Preliminary and Incomplete!

Abstract

We examine the role of hiring networks stemming from information asymmetries or co-worker complementarities in determining the personnel-economic geography of large US law firms. We show, using the Ellison and Glaeser (1997) index of concentration, that large law firms tend to be concentrated with regard to the law schools they hire from. There is substantial across-firm heterogeneity in law-school concentration. Office-level concentration is substantially greater than firm-level concentration. Office-level concentration is greater for associates than it is for partners, which may be consistent with various theories of employer learning. It seems that around two-fifths of observed office-level concentration can be explained by simple measures of office-school geographic proximity and firm-school reputation matches. We also find a strong relation between partner concentration (at the office level) and associate concentration even controlling for firm, school, and firm/school match characteristics. This suggests that hiring networks may be important in this labor market.

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1 Introduction

Selecting employees is one of the greatest personnel challenges most firms face, especially in high skill industries. Economists have been modeling the employee selection and firm/work matching processes for decades, but the empirical literature has been less developed. Recently there has been a burgeoning literature on the importance of networks in hiring (as well as other areas such as organization of the workplace).[1] In this paper, we explore the importance of networks in the formation of large American law firms. We analyze how and why lawyers from specific schools congregate at different firms.

Our analysis of networks considers the degree to which lawyers from schools are grouped within firms in a way that varies from the distribution of law schools we might expect if firms hired at random (at least in terms of law school attended). To do this, we adapt the Ellison and Glaeser (1997) measure of geographic concentration of industries to our context. We then use this measure to gauge the law school concentration of lawyers within individual firms, within individual offices of a given firm, and within rank (that is, partners or associates) of a given firm.

Our estimates of concentration lead to conclusions that are remarkably similar to the conclusions Ellison and Glaeser (1997) drew regarding industry geographic concentration. We find that lawyers are concentrated to some degree in most firms and offices. That is, firms hire from groups of law schools in a way that does not appear to be random. Conditional on having some number of lawyers from a single school, another lawyer at that firm is more likely to have gone to that school. However, these network effects are not large at most firms. Many firms hire from schools in a manner that is fairly similar to the distribution as a whole for all firms. We conclude that law school networks are important in matching lawyers to firms, but not a dominant factor in these matches at most firms.

We go on to take a preliminary step toward decomposing the sources of concentration. Using the terminology from Ellison and Glaeser (1999), we attempt to isolate the importance of "natural advantage" caused by physical proximity between a law school and a law office

[1]The importance of referrals in hiring has been well known for a long time. See, for example, Montgomery (1991) for a discussion of earlier work in economics. He also discusses work from sociology. The work of Mark Granovetter (for example, Granovetter, 1974) and a few other sociologists has influenced prior economic studies. For more recent discussion of economic theories of networks, see Jackson (2007). For a recent empirical study of networks in another high skill industry, see Tervio (2007). See Lazear and Oyer (2007) for a discussion of the broader economic literature on employee selection.

that employs attorneys. We show that concentration is greater for associates than for partners, which is consistent with natural advantage being greater in the initial hiring process. We go on to run regressions that allow us to control for natural advantage in individual school/office pairs and then we recompute our concentration measure adjusting for these controls. This simple correction reduces concentration by about a third. W then adjust our concentration measure for crude measures of the degree to which firms and law schools "match" in terms of quality and prestige. This reduces our concentration estimates somewhat more. Finally, we also find a strong relation between partner concentration (at the office level) and associate concentration even controlling for firm, school, and firm/school match characteristics. Our point estimate of the effect of partner concentration on associate concentration is near 0.6, and it is statistically significant at well better than the 1% level. Were we to be confident we had properly controlled for sources of "natural advantage" and firm/school match factors, we would conclude that hiring "networks" and/or complementarities in working with graduates of the same school (see Hayes et al., 2006 on co-worker complementarity) appear to be important in this labor market. But we feel that conclusion would be premature at this point and hope to refine our analysis in subsequent drafts.

The firms that we analyze are all "up-or-out" partnerships. We will not attempt to explain why these firms are organized the way that they are. Numerous theoretical explanations exist, including Kahn and Huberman (1988) who emphasize the importance of inducing investments in firm-specific human capital, Levin and Tadelis (2005) who focus on the importance of partners protecting the value of the firm's reputation, and Rebitzer and Taylor (2007) who consider how law firm organization may relate to the notion of property rights. Galanter and Palay (1991), among others, cite the Lazear and Rosen (1981) tournament model as a justification for legal partnerships.[2] There have also been empirical studies of the labor market for lawyers. Garicano and Hubbard (2005b) study the relationship between market size, the organization of law firms, and the specialization of lawyers. They find that firms and lawyers are more specialized in larger markets. In related work, Garicano and Hubbard (2007) analyze the relationship between market size and the decision of lawyers to work alone or together. They argue that the patterns in their data indicate that lawyers become more specialized and take greater advantage of organizational hierarchies as market size increases. Garicano and Hubbard (2005a) show that lawyers tend to work in firms with lawyers from schools of similar quality,

[2]Kordana (1995), however, argues that tournament theory is not relevant to law firms. That paper is one of many in the legal literature looking at the market for lawyers and the structure of law firms.

both within and across levels of the firm hierarchy. We measure this and other sources of law school concentration within firms. Landers et al. (1996) study the work habits of lawyers and argue that the standard partner-track organization of firms such as those in our analysis induces young lawyers to work inefficiently hard in order to earn promotion. For historical perspectives on the evolution of large law firms and their demand for lawyers, see Hobson (1986), Galanter and Palay (1991), and Baker and Parkin (2006).

2 Data

Our data primarily come from the web pages of law firms.[3] We downloaded information from lawyer bios for all lawyers at fifty-eight large American law firms. The information we collected included the lawyer's name, which law school she graduated from, the date of graduation, and the person's rank at the law firm. We also gathered details about the areas of law in which the person specializes, but do not make use of this information in this draft. We dropped all lawyers that work in foreign offices.[4] Among those who work in US offices, we drop anyone who is not either an associate, a partner, or "of counsel." We also drop lawyers for whom we do not know the law school attended (4.8% of those with web bios, though this includes many non-lawyers), and lawyers that received their law degrees outside the United States (about 1% of those with web bios). Many lawyers have multiple law degrees, adding an LLM or LLB after obtaining a JD. We use the law school of the person's first US law degree.

The sample of firms is based on lists of the largest American law firms published by American Lawyer and of the most prestigious American law firms as ranked by Vault Inc. (see www.vault.com). The American Lawyer rankings are based on gross revenues (including international revenue) and Vault rankings are based on a survey of associates at leading law firms who are asked to rank firms based on how prestigious it would be to work there. We gathered data from as many of the top 50 firms in the *American Lawyer* 200 as we could. We were unable to gather information from eight firms, either because they did not have individual bios for all lawyers, they did not include the date of law school graduation, or other reasons. We then gathered information for sixteen firms on Vault's Top 100 list that were not in the top of

[3]Throughout the paper, we refer to firms by the first two names. For example, we refer to Akin, Gump, Strauss, Hauer, and Feld LLP as "Akin Gump." The only firm we refer to by a single word is Dechert LLP. We continue to use the name "Piper Rudnick" for the firm that is now, due to mergers, known as "DLA/Piper."

[4]See Mukherjee (2006) for an analysis of firms' decisions to disclose information regarding employees.

50 of the *American Lawyer* 200 (though, to date, we have only reached as far as number 64 on Vault's list). All the Vault firms for which we have data are included in the *American Lawyer* 200 and all the firms in our sample are on Vault's Top 100. As a result, our current list of firms includes large firms of varying "prestige" and prestigious firms of varying size. We expect our ongoing data collection efforts to generate a dataset of about 200 firms that will represent a fairly wide distribution on both the size and prestige dimensions.

We supplement the lawyer data we gathered on the internet with information about law firms and law schools. We assigned each lawyer to a metropolitan area based on their office location (for example, New York City, Salt Lake City, or Silicon Valley.) Using the zip code of the largest law office in each metropolitan area, the zip code of each law school, and internet mapping programs, we calculated the approximate distance between where each lawyer works and her law school. We used *US News and World Report's* 2006 rankings of law schools to divide schools into "quality" quartiles and we used Vault's rankings to divide firms into prestige quartiles. We also performed some analyses where we categorized firms based on their profit or compensation per partner (as reported by *American Lawyer*) and where we categorized schools based on average LSAT scores of entering students. This did not change any of our conclusions, so we do not report results of these analyses.

Table 1 shows some basic information for each of the 58 firms in our sample, covering a total of 40,443 lawyers. Firms vary widely in the number of offices, their revenues per lawyer, and the fraction of their lawyers that are partners. For example, "leverage" is quite high at Cravath Swain where 26% of lawyers are partners while more than half of Foley Lardner's lawyers are partners. Some of the leverage differences are due to differences in organizational structure. Some firms have "income" partners that do not own part of the firm and still face an up-or-out promotion to " equity" partner. At Foley Lardner, about half of the partners are income partners (based on comparing our count of partners to *American Lawyer*'s count of their equity partners) while Cravath Swain makes no such distinction. Unfortunately, we cannot distinguish equity partners from income partners which will introduce some measurement error when we analyze partners and associates separately.

Figures 1 and 2 provide a geographic perspective on our overall set of lawyers. In Figure 1, each square is a geographic area (again, this could be New York, Salt Lake City, Silicon Valley, etc.) The size of the box is proportional to the number of lawyers in our data that work in that area and at any firm. In several areas, including Colorado Springs, Fargo, and Knoxville, only one firm has an office. At the other extreme 55 of the 58 firms have a New York office and 53

Table 1: Law Firms

Firm Name	Offices	Attorneys	Partners	Revenue per Attorney	Vault Ranking
Akin Gump	10	720	297	780	31
Alston Bird	5	721	326	595	57
Arnold Porter	5	497	217	815	19
Baker Botts	5	639	256	695	40
Bingham McCutchen	9	819	347	790	67
Bryan Cave	8	718	304	545	76
Cleary Gottlieb	2	453	105	910	8
Cooley Godward	6	484	186	720	52
Covington Burling	3	380	129	775	10
Cravath Swaine	1	333	87	1280	2
Debevoise Plimpton	2	411	104	925	13
Dechert	12	581	228	700	55
Dewey Ballantine	4	303	81	780	30
Dorsey Whitney	15	542	257	565	81
Fish Richardson	10	410	174	805	62
Foley Lardner	16	927	488	685	66
Fulbright Jaworski	10	856	374	630	43
Goodwin Procter	5	697	261	750	54
Greenberg Traurig	21	1365	676	645	71
Heller Ehrman	9	581	261	805	59
Hogan Hartson	9	804	408	735	29
Hunton Williams	12	763	327	595	70
Irell Manella	2	191	86	955	58
Jenner Block	4	465	219	730	50
Jones Day	14	1615	532	600	21
Katten Muchin	6	616	301	670	83
Kaye Scholer	5	411	133	805	64
Kirkland Ellis	5	1063	455	985	11
K&L Gates	15	1113	517	560	79
Latham Watkins	8	1160	407	875	7
Leboeuf Lamb	10	481	149	720	53
Mayer Brown	8	999	444	750	26
McDermott Will	9	910	527	775	46
Morgan Lewis	13	1132	391	685	41
Morrison Foerster	9	836	305	735	23
Munger Tolles	2	175	67	935	49
O'Melveny Myers	6	817	219	825	20
Orrick Herrington	8	617	252	765	38
Paul Hastings	8	828	236	765	32
Pillsbury Winthrop	9	727	332	665	48
Piper Rudnick	19	1368	661	685	65
Proskauer Rose	6	652	213	745	44
Reed Smith	9	876	431	615	86
Ropes Gray	5	799	256	840	24
Shearman Sterling	4	332	97	990	12
Sidley Austin	6	1255	515	775	15
Simpson Thacher	4	661	145	1125	6
Skadden Arp	9	1558	364	995	4
Sonnenschein Nath	10	522	286	675	61
Squire Sanders	13	577	243	605	91
Sullivan Cromwell	4	401	128	1625	3
Vinson Elkins	5	641	293	790	51
Wachtell Lipton	1	178	76	2395	1
White Case	6	507	167	600	22
Williams Connolly	1	223	96	895	16
Willkie Farr	2	397	118	860	37
Wilson Sonsini	8	571	165	750	35
Winston Strawn	5	765	389	715	34

have an office in Washington. Great Falls MT, Jefferson City MO, Missoula MT, and Santa Fe, NM have the fewest lawyers (that is, are the smallest boxes on the map) with two each. New York has 10,359 (25.6% of the sample), Washington has 6,723, and Chicago has 4,164. Naturally, these lawyers are primarily working in large metropolitan areas. Also, state capitals are over-represented with several firms having reasonably large offices in, for example, Austin TX, Tallahassee FL, and Columbus OH.

In Figure 2, each circle is a single law school and circle size is proportional to the number of lawyers in our sample that graduated from that school. The map shows that law schools are also concentrated in or near metropolitan areas. The overall geographic distributions between the two maps looks quite similar, in fact, though there are a few lawyers from each of many law schools in states and areas that do not have large law firms. For example, seven lawyers in the sample graduated from University of Arkansas at Little Rock, 60 from the University of Kansas, and 41 from the University of Oklahoma, despite fact that these schools are all quite far from the nearest office in our sample. Law school representation in our sample varies from one each from the University of South Dakota, Florida International University, and William Howard Taft University to 3,143 from Harvard and 2,102 from Georgetown.

Figures 3-6 show maps of where lawyers at single firms practice and where they went to law school. Figures 3 and 4 show two different firms that we will show below are not "concentrated" in terms of where they source their lawyers. That is, the distribution of their lawyers' schools is similar to that of the sample as a whole. Skadden Arps, shown in Figure 3, is a large firm known for its finance work (including, for example, restructuring and mergers.) The firm has nine offices in large metropolitan areas, as well as Wilmington DE. As the distribution of circles on the map indicates, Skadden Arps lawyers went to law school all over the country. The firm has at least ten lawyers from each of Boston College, University of Connecticut, Vanderbilt, and Syracuse. Figure 4 maps Piper Rudnick, whose lawyers have a similar distribution of law schools. However, unlike Skadden Arps, these lawyers work in nineteen offices spread out in small and large cities including Baltimore, Raleigh NC, and Sacramento CA.

Figures 5 and 6 show firms that hire lawyers from a concentrated set of schools. Figure 5 maps Vinson Elkins which has a large office in Houston, smaller offices in Dallas and Austin, and a few other even smaller offices. This firm is focused on the Texas market and focuses its recruiting on Texas schools. Over a third of its lawyers went to the University of Texas, with another substantial set from the University of Houston and Southern Methodist University. Munger Tolles, mapped in Figure 6, only has offices in San Francisco and Los Angeles. However,

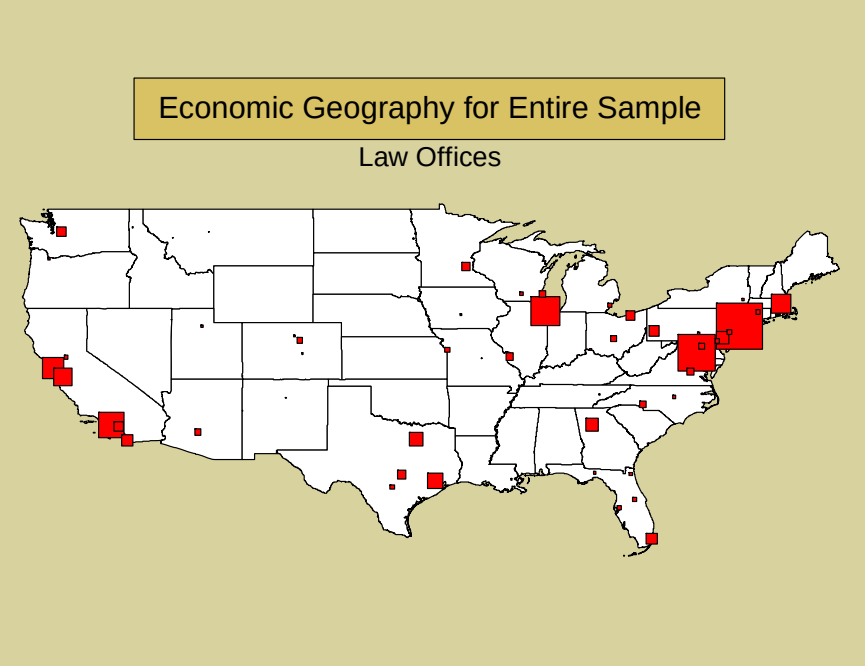

Figure 1: Law Offices

while nearby schools are highly represented in this firm, they recruit a substantial fraction from top schools that are far away. So, whereas Texas is the common factor bringing lawyers together at Vinson Elkins, prestigious law schools is the common factor at Munger Tolles.

3 Analysis

3.1 Measuring Concentration

We first describe how we measure the concentration of a law firm's attorneys by law school. We employ a measure developed by Ellison and Glaeser (1997) to examine geographic concentration of US manufacturing by state. They develop a model in which a firms in an industry select states in which to locate, and devise a measure to facilitate cross-industry comparisons in concentration. Their model can be adapted readily to fit our context. In their context the unit of analysis is an industry, and firms within that industry are assumed to select a profit-maximizing location from the set of possible locations. Here, the unit of analysis is a firm, and each employee is drawn from the profit-maximizing law school. The Ellison-Glaeser index can thus be used to make cross-firm comparisons in law-school concentration.

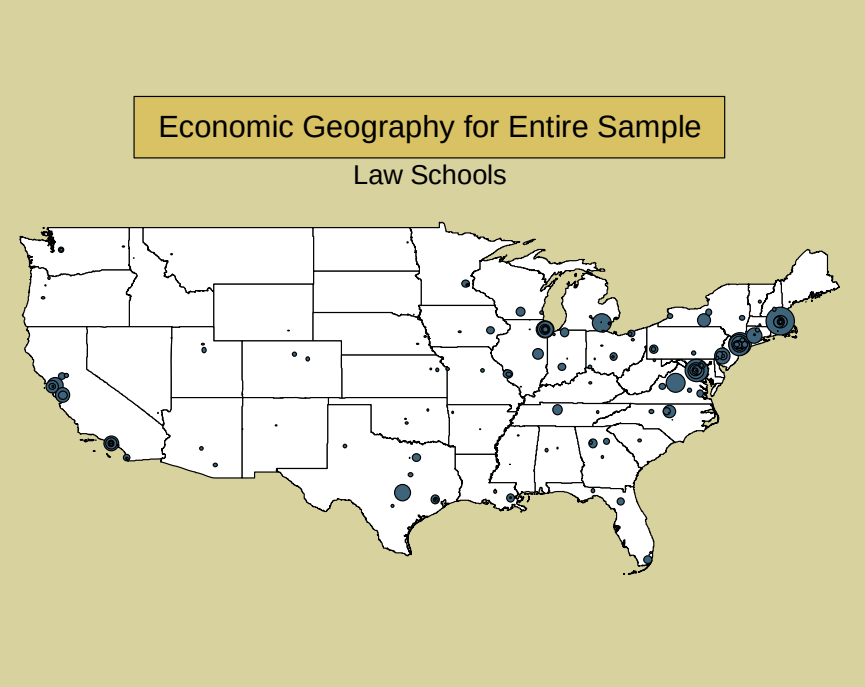

Figure 2: Law Schools

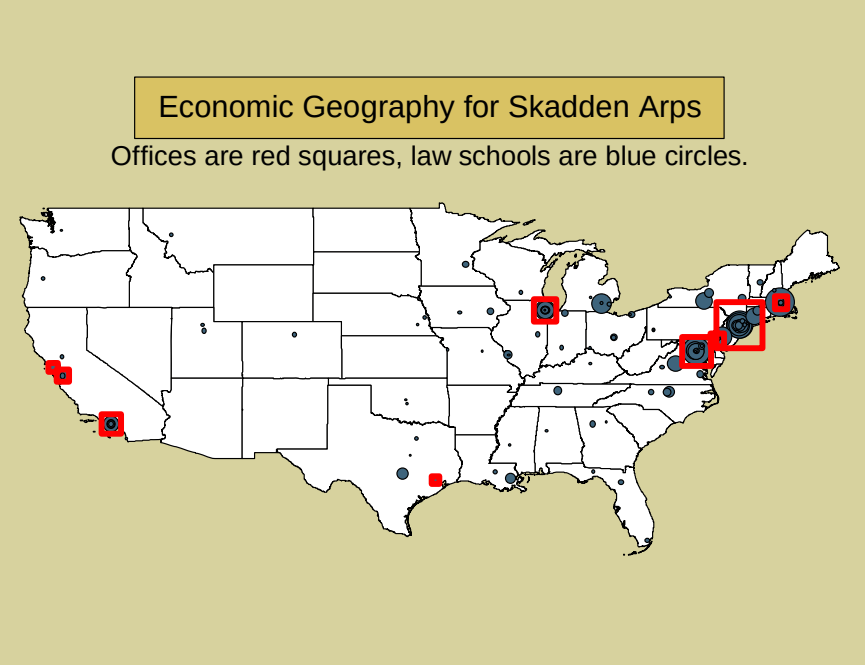

Figure 3: Skadden Arps

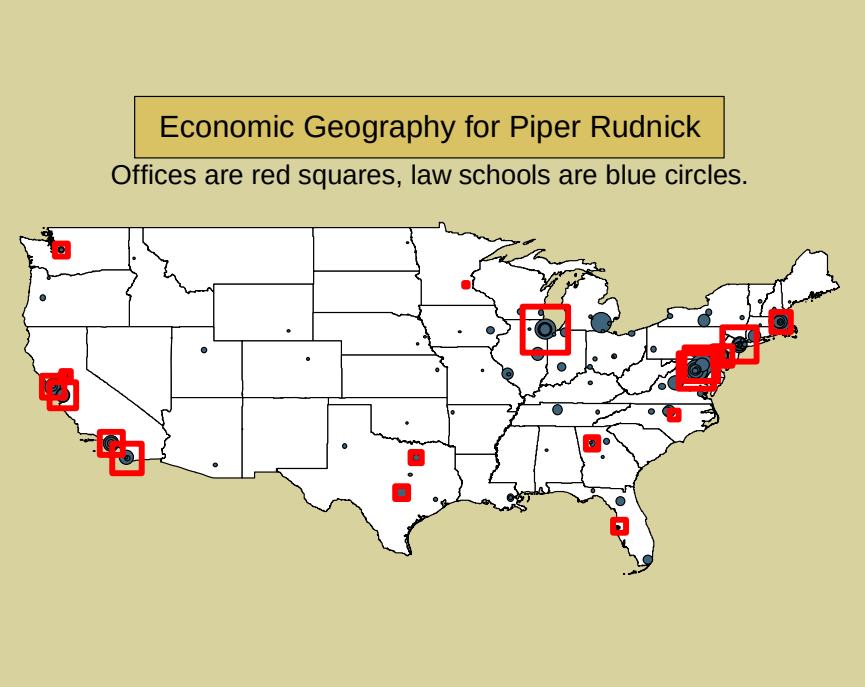

Figure 4: Piper Rudnick

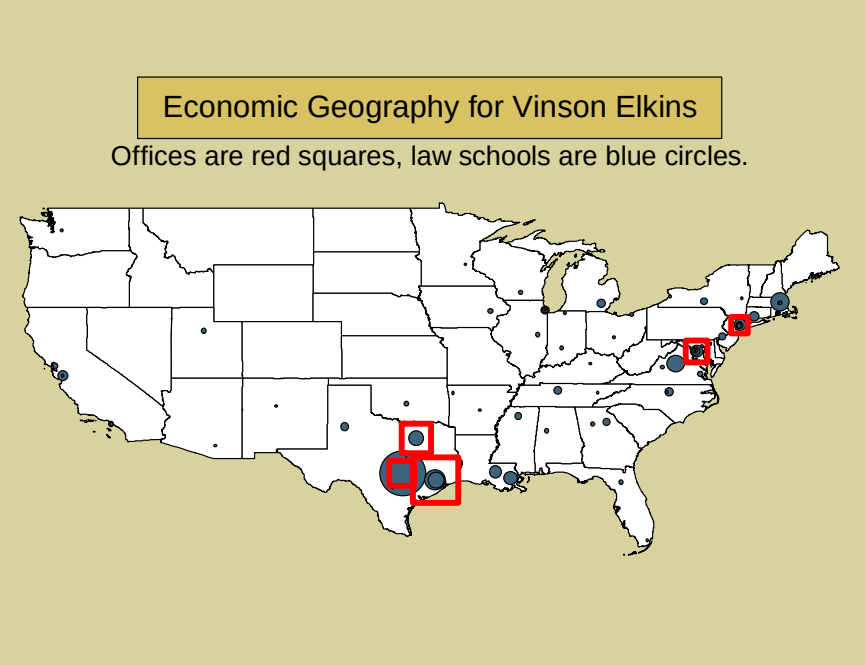

Figure 5: Vinson Elkins

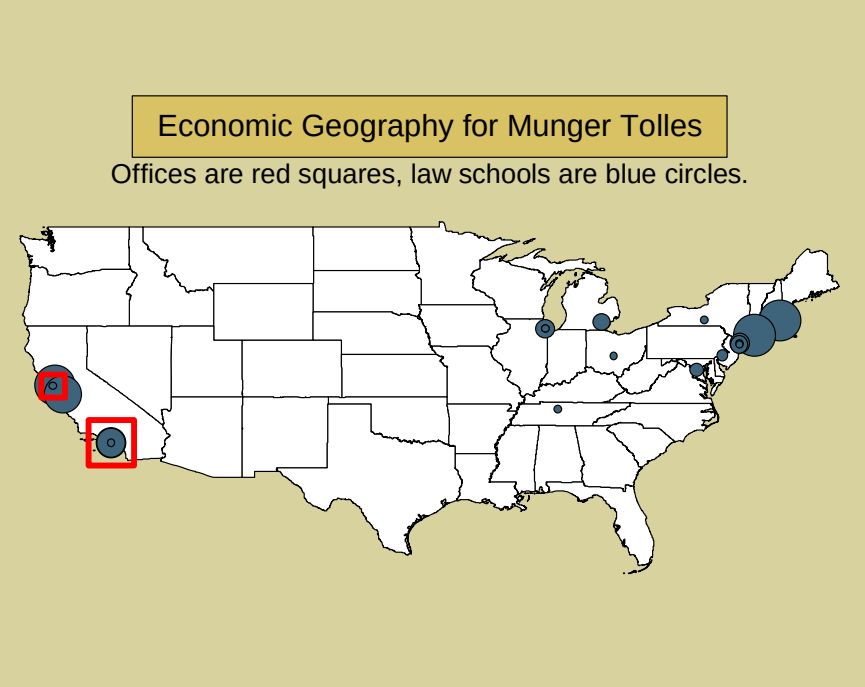

Figure 6: Munger Tolles

To define the index, we first introduce some notation. Define s_{ik} as the "law-school k share" for firm i; that is, it is the fraction of firm i's attorneys who earned their first US law degree at law school k. Let x_k be the overall share of attorneys in our sample at who received their first US law degree at law school k. Let N_i be the number of attorneys working at firm i. Our index of firm i's law school concentration is

$$\gamma_i = -\frac{1}{N_i - 1} + \frac{N_i}{N_i - 1} \frac{\sum_f (s_{ik} - x_k)^2}{1 - \sum_f x_f^2}. \quad (1)$$

(See also Ellison, 2002.)

This index has several useful properties. First, the measure explicitly accounts for the fact that under random selection of attorneys by firms, we would still observe some concentration in realized law-school shares. The Ellison-Glaeser index is calibrated so that $\gamma_i = 0$ if firm i is as concentrated as one would expect if the firm selected at random from the set of available attorneys. Second, the scale of the index can be given an economic interpretation. A value of $\gamma_i = 0.10$ means that the observed frequency with which any pair of firm i's attorneys went to the same law school matches what would be expected if 10 percent of firms selected all of their attorneys from a single law school and 90 percent of firms selected their attorneys at random from the aggregate distribution of law schools.

3.2 Firm- and Office-Level Concentration

We begin by looking at the law school concentration of firms as a whole. We first generate the law school share (s_{ik}) for each firm/school combination, including those where $s_{ik} = 0$, and the law school share for the sample as a whole (x_k). Then we compute γ_i for each sample firm, using Equation 1. Table 2 shows provides information about the distribution of gamma among the 58 firms and Figure 7 shows this distribution graphically. γ varies from basically zero to 0.1215. The mean is 0.0217 and the median is 0.014. For comparison purposes, this indicates that the law school distribution within these 58 firms is about half as concentrated as the geographic concentration of four-digit industries (as measured by Ellison and Glaeser, 1997). We draw two conclusions that are quite similar to those they draw about manufacturing industries. First, there is significant concentration within law firms in terms of which law schools they recruit from because gamma is greater than zero by a meaningful amount for most firms. Second, we might characterize the degree of concentration as meaningful but not large. Our estimates of γ generally indicate that, while firms are more likely to hire a new lawyer from schools from which they already have lawyers, the effect of the current school distribution is marginal. The

Table 2: Law School Concentration at the Firm Level

Mean γ		0.0217	
Standard Deviation		0.0205	
First Quartile		0.0083	
Second Quartile		0.0140	
Third Quartile		0.0286	
N		58	
Most Concentrated Firms	Vinson Elkins	0.1215	Texas (34.7%)
	Munger Tolles	0.0695	Harvard/Yale (16.6% each)
	Wachtell Lipton	0.0666	Columbia (20.8%)
	Baker Botts	0.0539	Texas (22.0%)
	Debevoise Plimpton	0.0506	Columbia (18.9%)
Least Concentrated Firms	Skadden Arps	0.0030	Harvard (8.0%)
	Pillsbury Winthrop	0.0053	Harvard (8.0%)
	Arnold Porter	0.0056	Harvard (10.6%)
	Paul Hastings	0.0059	UCLA (5.9%)
	Piper Rudnick	0.0061	Harvard (4.9%)

See text for definition of concentration (γ) and description of sample. The right column in the lists of most and least concentrated office indicate which school has the highest share of lawyers at that firm and, in parentheses, the share from that school.

Table 3: Law School Concentration at the Office Level

Mean γ		0.0652	
Standard Deviation		0.0646	
First Quartile		0.0254	
Second Quartile		0.0464	
Third Quartile		0.0776	
N		338	
Most Conc. Offices	Piper Rudnick, Austin	0.4656	Texas (69.6%)
	Fish Richardson, Austin	0.3869	Texas (62.5%)
	Foley Lardner, Jacksonville	0.3790	Florida (59.0%)
	Akim Gump, San Antonio	0.3869	Texas (61.8%)
	Vinson Elkins, Austin	0.3508	Texas (59.8%)
Least Conc. Offices	Ropes Gray, San Francisco	0.0076	Harvard (16.7%)
	Fish Richardson, New York	0.0080	Fordham/Hofstra/NYU (8.6% each)
	Sidley Austin, San Francisco	0.0083	Columbia/Hastings/Stanford (9.1% each)
	Kirkland Ellis, San Francisco	0.0085	Harvard (14.3%)
	Akin Gump, Los Angeles	0.0092	UCLA (9.0%)

Sample includes 338 different offices in the U.S., from a total of 58 firms, with at least twenty lawyers that graduated from U.S. law schools. The right column in the lists of most and least concentrated office indicate which school has the highest share of lawyers at that firm and, in parentheses, the share from that school.

outliers in Figure 7, as well as the examples of two highly concentrated firms in Figures 5 and 6, indicate that this effect is quite large at some firms. But they are the exceptions.

Another comparison that helps put the results in Table 2 in some context is to look at law firm concentration relative to the concentration of where economists within universities' economics departments went to graduate school. Using the data from Tervio (2007), we calculated γ for 102 economics departments that have at least 15 faculty members. That is, we perform calculations analogous to our law firm concentration calculations, but treat economics departments similar to law firms and institutions that grant PhDs to economists the same as law schools. We found that educational backgrounds are somewhat more concentrated in economics departments than in law firms. Average γ in the economics sample is 0.0246 (0.0176), which is higher than the analogous 0.0217 (0.0140) in Table 2.[5]

In Table 3 and Figure 8, we change the unit of analysis to an office. We look at the 338 offices of our 58 firms which have at least twenty lawyers that graduated from U.S. law schools. Defining s_{jk} as the law-school k share for office k, we now define γ_j as the Ellison-Glaeser index of concentration for office j. The geographic advantage of a law school will be greater for a single office than for a multi-office firm, so it is not surprising to find that the γ's in Table 3 are about three times as large as those for whole firms. The most concentrated offices have γ's several times the highest firm-level concentration.

A few comparisons can be made that help put the concentration indexes in Tables 2 and 3 in some context. First, office-level concentration is similar to the geographic concentration of four-digit industries measures by Ellison and Glaeser (1997) and the highest levels of office concentration are similar to the highest levels of four-digit industry geographic concentration. Second, as the figures from Tervio (2007) that we discussed above indicate, law offices are substantially more concentrated (in terms of where employees went to graduate school) than the typical economics department faculty.

We analyze and decompose office-level concentration in more detail in Section 3.4 below. However, we can identify a few patterns by looking at the most and least concentrated offices in Table 3. Clearly, offices are highly concentrated near a large law school and where the lawyer population of a city is small relative to the size of the law school. Also, when a law school such as the University of Texas is relatively isolated from other schools, the geographic advantage of

[5]The variance in concentration is much higher for economics departments than law firms. While this could reflect the fact that some economics departments are highly concentrated, it is also likely to be due to the fact that economics departments are typically much smaller than the law firms we analyze.

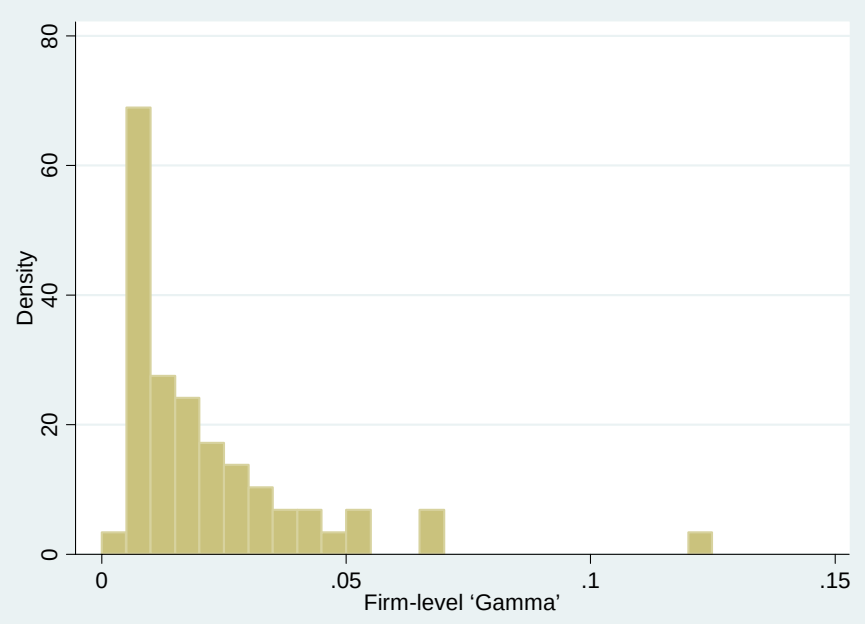

Figure 7: Histogram of Firm-Level γ

that school appears to be quite large for local offices. The fact that so many Austin offices are so concentrated while Madison and Columbus offices are not may be because there are other law schools near Madison and Columbus besides the large university in those cities.[6] While offices in San Francisco and New York tend to have low concentration largely because they recruit from across the country, the Fish Richardson New York office shows that another reason firms in some cities will have low concentration is due to a large group of law schools in the area. Fish Richardson draws heavily on local law schools, in the way that firms do in Austin, but there are several New York schools to choose from.

3.3 Concentration by Rank

We now consider partners and associates separately. If all partners had worked at their current firm since graduating from law school, then we might expect the concentration of partners and associates to look similar. However, lawyers move from firm to firm, from office to office within a firm, or into law partnerships from other areas altogether. As a result, models of employer learning may apply where firms use certain proxies for employee ability when lawyers are leaving school but get more exact signals of an individual's ability over time. Farber and Gibbons (1996)

[6]Of course, other explanations for this difference, such as some idiosyncrasy in Texas law, are possible as well.

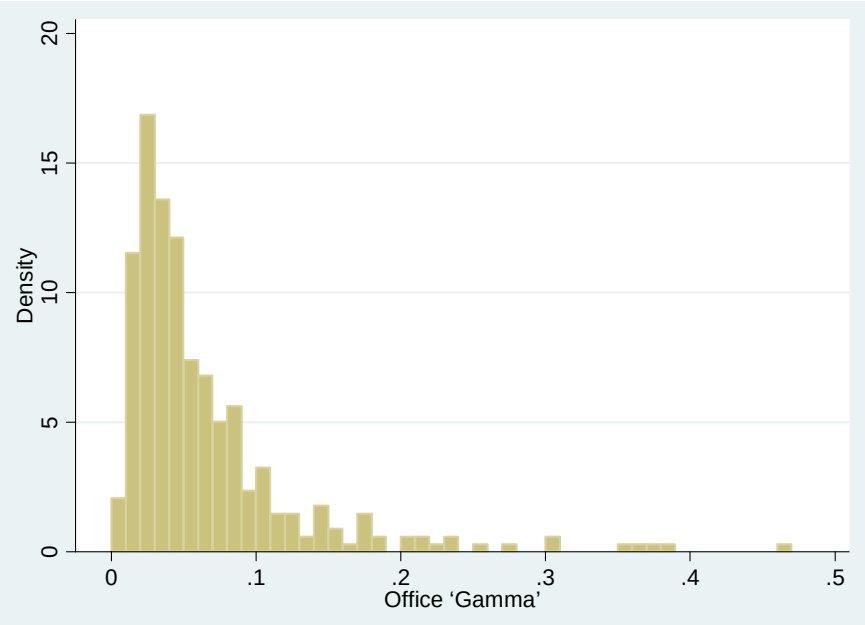

Figure 8: Histogram of Office-Level γ

Figure 9: Vinson Elkins Austin

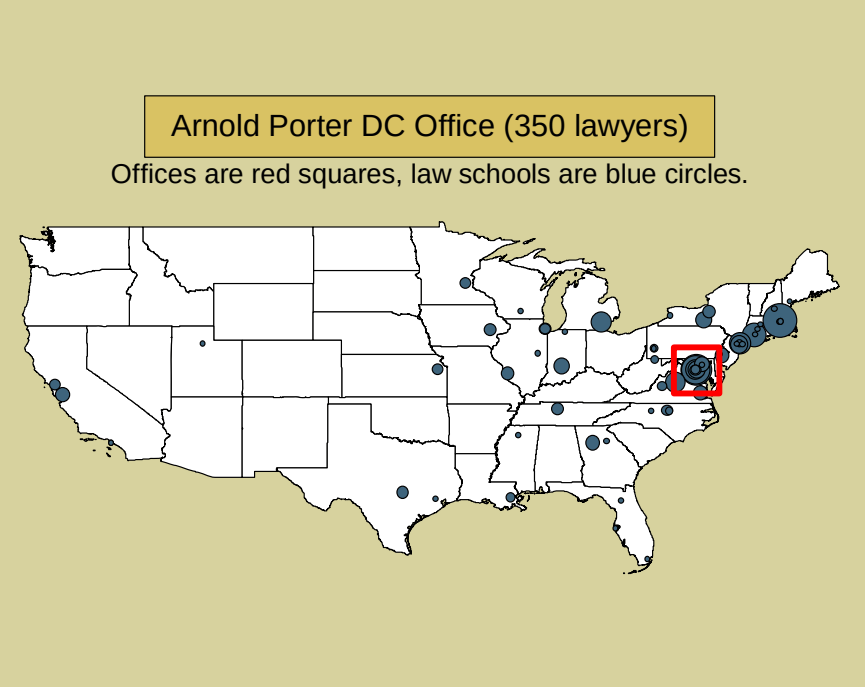

Figure 10: Arnold Porter DC

and Altonji and Pierret (2001) develop and estimate models of employer learning using data from representative samples of all US workers. They show that, as workers age, observable factors such as schooling become less important predictors of wages, presumably because firms set pay to the worker's individual marginal product rather than an initial imperfect estimate based on observable characteristics.

In our context, employer learning may suggest that firms will use where a potential hire went to law school to pick associates but then focus more on the person's actual productivity in choosing partners. Further, firms may have an informational advantage in choosing among potential lawyers at a particular school either based on local knowledge or their own school-specific knowledge. This informational advantage is likely to be less valuable in picking partners. Recent on-the-job performance is likely to be more important when hiring partners or moving them from one office to another within a firm. Therefore, we might expect law school concentration ratios to be lower for partners than for associates.

Tables 4 and 5, as well as Figures 11 and 12, show that school concentrations, when measured at the firm level, are slightly greater for partners than for associates. The average gamma is 0.0257 for partners and 0.0225 for associates. The table shows that there is significant overlap in the list of firms with highest and lowest gammas for each rank and, comparing these tables to Table 2, for the sample as whole. Also, while concentration is slightly higher within rank than for firms as a whole, the general magnitude is similar. This suggests that, at a broad firm level, the networks based on law school are at least as strong for partners as for associates.

We now look at the office level. Figures 13 and 14 revisit two firms that we used as examples of extremes in overall concentration. As these figures show, when looking only at associates in the firm's biggest office, Skadden Arps continues to be quite diffuse in the law schools from which it hires while Vinson Elkins is extremely concentrated. Tables 6 and 7, as well as Figures 15 and 16, show the broader patterns for all office/rank combinations with at least twenty lawyers. This includes 231 offices for partners and 267 for associates. These tables and figures support the notion that concentration will be greater at the associate level. The average gamma is about a third higher for associates and associate gammas are noticeably higher at all points in the distribution. Note that associate gammas are similar to those for the sample as a whole (see Table 3) while partners are less concentrated than offices as a whole.

The patterns in concentration by rank for firms and offices are consistent with the idea that firms have some degree of networks among partners based on their law school roots. However, at individual offices, law school networks are stronger for associates because of geographical

Table 4: Law School Concentration at the Firm Level — Partners Only

Mean γ		0.0257
Standard Deviation		0.0244
First Quartile		0.0092
Second Quartile		0.0175
Third Quartile		0.0356
N		58
Most Concentrated Firms	Vinson Elkins	0.1370
	Wachtell Lipton	0.0800
	Munger Tolles	0.0698
	Covington Burling	0.0641
	Williams Connolly	0.0616
Least Concentrated Firms	McDermott Will	0.0044
	Piper Rudnick	0.0044
	Leboeuf Lamb	0.0048
	Orrick Herrington	0.0053
	Pillsbury Winthrop	0.0055

This table is similar to Table 2, except the sample is limited to people identified as partners on firm web sites.

Table 5: Law School Concentration at the Firm Level — Associates Only

Mean γ		0.0225
Standard Deviation		0.0186
First Quartile		0.0106
Second Quartile		0.0160
Third Quartile		0.0300
N		58
Most Concentrated Firms	Vinson Elkins	0.1093
	Munger Tolles	0.0711
	Wachtell Lipton	0.0632
	Baker Botts	0.0509
	Debevoise Plimpton	0.0508
Least Concentrated Firms	Skadden Arps	0.0026
	O'Melveny Myers	0.0040
	Mayer Brown	0.0045
	White Case	0.0059
	Paul Hastings	0.0068

This table is similar to Table 2, except the sample is limited to people identified as associates on firm web sites.

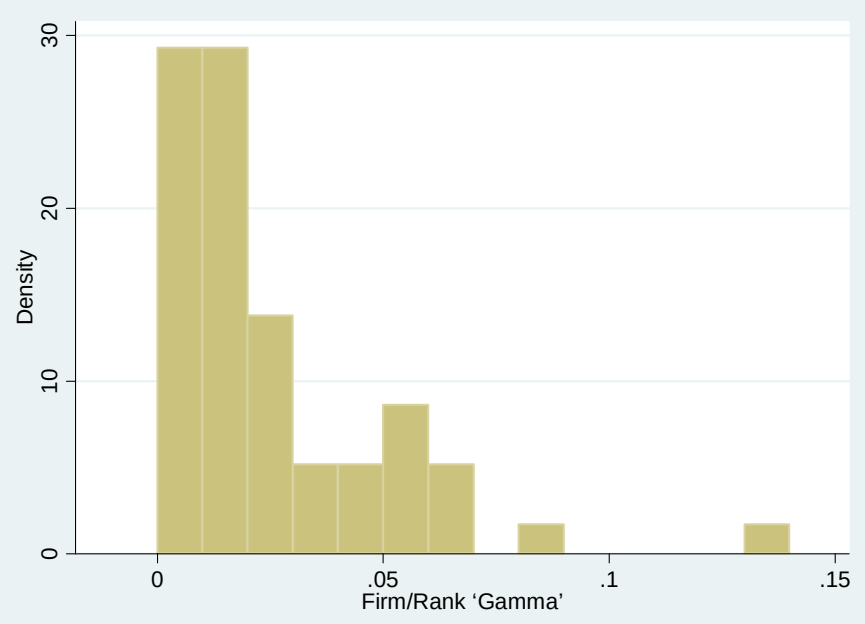

Figure 11: Histogram of Firm-Level γ, Partners Only

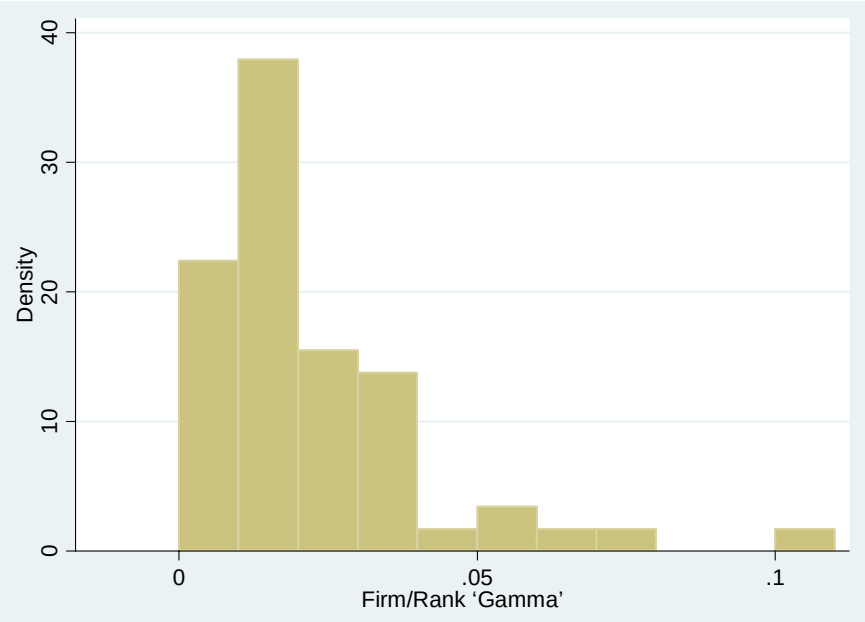

Figure 12: Histogram of Firm-Level γ, Associates Only

Table 6: Law School Concentration at the Office Level — Partners Only

Mean γ		0.0488
Standard Deviation		0.0487
First Quartile		0.0203
Second Quartile		0.0366
Third Quartile		0.0586
N		231
Most Concentrated Offices	Jones Day, Columbus	0.3400
	Baker Botts, Austin	0.3047
	Vinson Elkins, Austin	0.2604
	Fulbright Jaworski, Austin	0.2258
	Foley Lardner, Madison	0.2205
Least Concentrated Offices	Akin Gump, Los Angeles	-0.0042
	Heller Ehrman, DC	-0.0039
	Fulbright Jaworski, DC	-0.0036
	Morrison Foerster, DC	-0.0017
	Bryan Cave, Los Angeles	0.0016

This table is similar to Table 3, except the sample is limited to people identified as partners on firm web sites. It includes 231 offices with at least twenty partners that graduated from U.S. law schools.

Table 7: Law School Concentration at the Office Level — Associates Only

Mean γ		0.0664
Standard Deviation		0.0567
First Quartile		0.0288
Second Quartile		0.0515
Third Quartile		0.0889
N		267
Most Concentrated Offices	Vinson Elkins, Austin	0.3901
	Fulbright Jaworski, Austin	0.3311
	Greenberg Traurig, Phoenix	0.2891
	Baker Botts, Austin	0.2830
	Fish Richardson, Minneapolis	0.2767
Least Concentrated Offices	Sonnenschein Nath, New York	0.0033
	Morgan Lewis, Princeton	0.0047
	Sidley Austin, San Francisco	0.0049
	Kirkland Ellis, San Francisco	0.0060
	Winston Strawn, DC	0.0077

This table is similar to Table 3, except the sample is limited to people identified as associates on firm web sites. It includes 231 offices with at least twenty associates that graduated from U.S. law schools.

Figure 13: Skadden Arps, Associates Only

Figure 14: Vinson Elkins, Associates Only

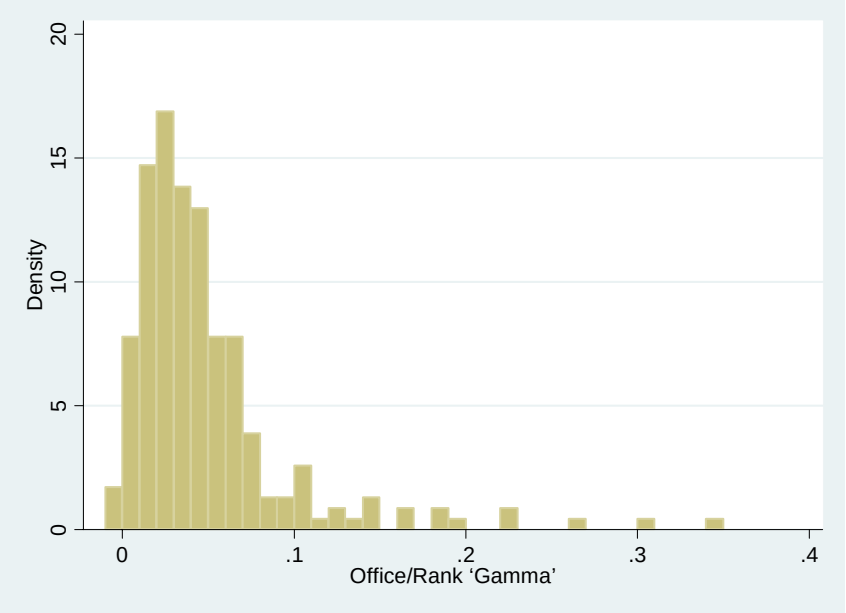

Figure 15: Histogram of Office-Level γ, Partners Only

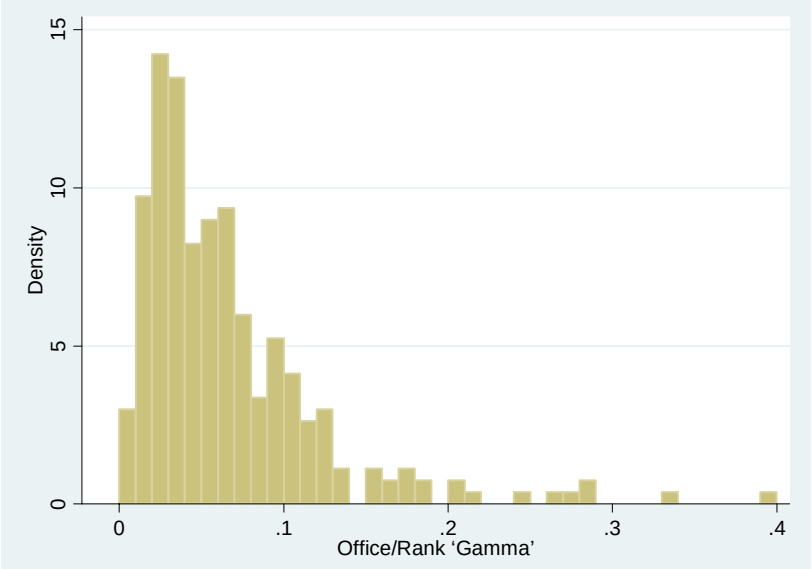

Figure 16: Histogram of Office-Level γ, Associates Only

and informational advantages to using law school in picking associates. As a lawyer ages, her individual ability becomes a more important means of allocating her to the appropriate position, so there may not be as much value in grouping lawyers from the same school. These ideas require further investigation, however.

3.4 Concentration, Distance and Reputation

Next, we follow Ellison and Glaeser (1999) by examining the extent to which concentration is explained by "natural advantage." Specifically, in their study of manufacturing industries, they allow state-industry employment shares to be related to state-level variation in natural resource, labor and transportation costs.

As an example of how such costs may affect industry agglomeration, they point out that the aluminum industry, which uses electricity intensively, is quite concentrated in the Pacific Northwest, where electricity prices are low. Thus, firm-to-firm"spillovers" of the type commonly discussed with regard to Silicon Valley likely do not explain geographic concentration in aluminum production. Ellison and Glaeser (1999) show that at least one-fifth of observed industry-level concentration of firms is attributable to natural advantage.

Given our eventual aim of understanding the role of hiring networks and co-worker complementarities in firms' hiring decisions, it is important to first examine how much of the observed within-firm concentration of employees by school is attributable to natural advantage.

As an example of natural advantage in our context, note that the cost to a firm of identifying a promising job candidate is likely related to the distance of that candidate's law school from the firm's office. It may be that, all else held constant, law schools located nearby to a given law office may be relatively over-represented among that office's attorneys.

Further, firms of varying reputation may vary in their propensity to hire from schools of varying reputations (see Garicano and Hubbard, 2005a.) Specifically, suppose that the highest ranked law firms place the highest value on attorney ability — due, perhaps, to matching of the most challenging cases with the highest-skilled firms. Then these firms may hire disproportionately from the top-ranked law schools. Just as Silicon-Valley-type firm-to-firm spillovers must reflect the residual concentration after natural advantage due to state-level differences in factor prices have been accounted for, any evidence for hiring networks must be in the residual concentration after factors like distance and reputation match have been removed.

In this draft, we employ an overly simplified version of the method used by Ellison and Glaeser (1999) to remove the effects of natural advantage on firm-level concentration by law

school.[7] Specifically, we run linear regressions of $s_{jk} - x_k$ — that is, the deviation of office j's law-school k share from the full sample law-school k share — on a set of explanatory variables that reflect the sources of natural advantage outlined above. We then use the residual from this regression — which, by construction, is deviation of office share from sample share that is orthogonal to natural advantage — in place of $s_{jk} - x_k$ in our calculation of γ_j.

To do this, we handle distance first, and then add reputation match. In Column (2) of Table 8 Panel A, we report results from running a regression of $s_{jk} - x_k$ on indicator variables for the driving distance between the zip code of office k and that of law school j. Indicators are constructed for each ten mile increment up to 100 miles, and each 100 miles after that. Results show, not surprisingly, that proximity is related to office-level law-school shares. A law schools within ten miles of a law office is predicted to have an excess share that is nearly two percentage points higher than a law school that is ten to twenty miles from an office. Within-ten-miles schools are predicted to have shares that are three and five percentage points higher, respectively, compared to schools that are between and 20 and 30 miles distant, and between 100 and 200 miles away.

Taking residuals from these regressions, we compute new γ_k's and report summary statistics in Column (2), Panel B. For comparison purposes, we also list the unadjusted γ_k, taken from Table 3. Notably, the mean value for γ_k falls from 0.0652 to 0.0463, a drop of nearly 29%. The median γ_k falls from 0.0464 to 0.0302, a reduction of 35%. Thus, it appears that around one-third of observed office-level law-school concentration is explained by simple geographic proximity between offices and law schools. Figure 17 displays a histogram of the adjusted γ_k values — it is clearly shifted left relative to Figure 8.

In Column (3) of Table 8 Panel A, we add interactions between firm and school reputation ranks. Specifically, we create indicator variables for quartiles of law firm ranking (from Vault) and school ranking (from US News). We then add these indicators directly to our regression, along with interactions between each firm/school reputation rank quartile. These additions have only a modest effect on the predictive power of our regression, and also appear to mitigate the distance effects shown in Column (2).

Again, we take the residuals from this regression to compute new γ_k's. The mean value for γ_k falls from 0.0463 to 0.0404, a drop of more than 12%. The median γ_k falls from 0.0302 to 0.0258, a reduction of nearly 15%. Figure 18 again displays a histogram of the adjusted γ_k

[7] Ellison and Glaeser (1999) derive a non-linear relation between share and natural advantage, which they estimate with non-linear least squares. In this draft, we run a reduced form version of this equation with OLS.

Table 8: Decomposition of Office-Level School Shares

Panel A: Regression Results	(1)	(2)	(3)
<10 Miles		Excluded	Excluded
10-20 Miles		-0.0192	-0.0149
		(0.0011)	(0.0010)
20-30 Miles		-0.0312	-0.0273
		(0.0015)	(0.0015)
100-200 Miles		-0.0536	-0.0458
		(0.0012)	(0.0012)
Firm/School Quartile Interaction			Included
R^2		0.0226	0.0298
N (Office/School Pairs)		61,798	61,798

Panel B: Adjusted Office-Level γ

Controls	None	Distance	Distance + Firm/School Interactions
Mean	0.0652	0.0463	0.0404
Standard Deviation	0.0646	0.0532	0.0512
First Quartile	0.0255	0.0177	0.0156
Second Quartile	0.0464	0.0302	0.0258
Third Quartile	0.0776	0.0500	0.0422
N (Offices)	338	338	338

Panel A shows coefficients from a regression where an observation is an office/school. The dependent variable is the fraction of lawyers in the office that went to the school minus the fraction of the entire sample that went to that school. All regressions include indicators for each ten mile interval from the school to the office up to 100 miles and each 100 miles beyond that. The coefficients for three of these indicators are displayed. Firm prestige rankings are based on Vault and school rankings are based on US News and World Report. Panel B shows the results of recalculating the γ_k using residuals from the relevant regression. Column 1 shows the original gammas from Table 3 for comparison.

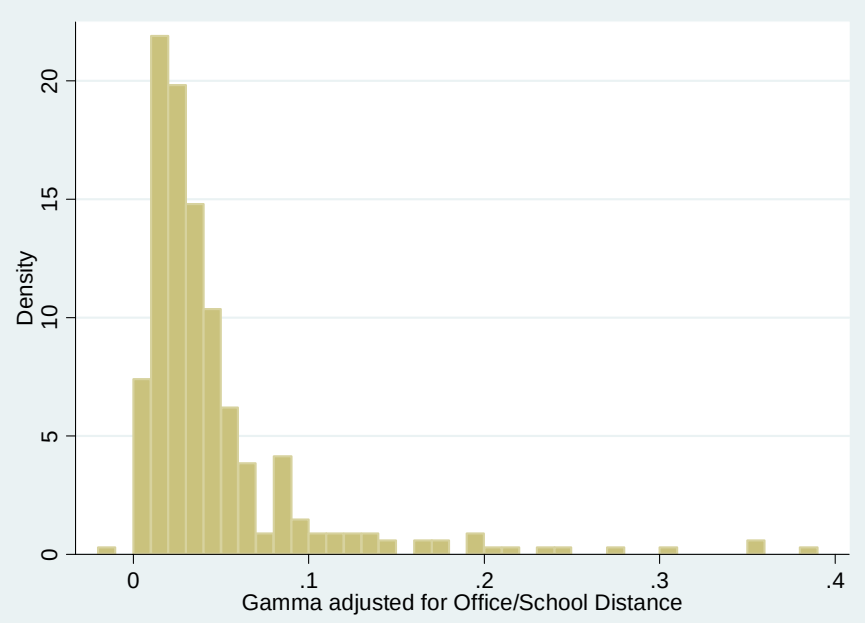

Figure 17: Histogram of Office-Level γ, adjusted for Office/School Distance

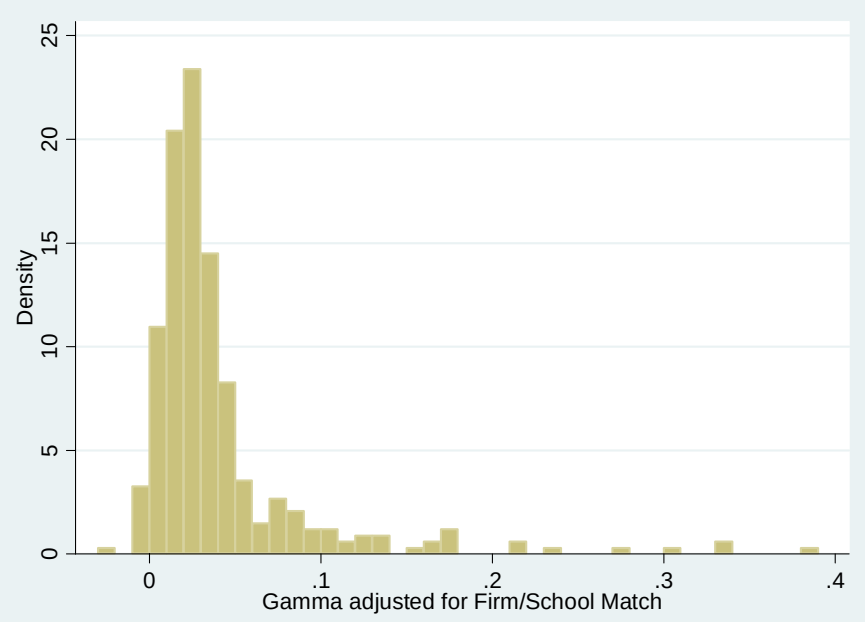

Figure 18: Histogram of Office-Level γ, adjusted for Office/School Distance, Firm Reputation, and Firm/School Reputation Match

values; again, a shift left is evident. An additional ten to fifteen percent of observed office-level law-school concentration is explained by rough matches on firm/school reputation.

Thus, it appears that just less than half of observed office-level law-school concentration can be explained by our simple proximity and firm/school match indicators. Remaining concentration may be evidence of hiring networks, or it may be attributable to sources of natural advantage not addressed by our two simple regressions.

3.5 Relation Between Partner Share and Associate Share

Finally, we examine the relation between partner office-level school shares and associate office-level school shares. In Panel A of Table 9, we estimate similar regression specifications to those in Table 8, but use the office's share of associates from a given school (net of the sample average) as the dependent variable. We also limit the sample to offices with at least twenty partners and twenty associates. As in Table 8, we begin by controlling for distances between the office and the law school, and for firm/school reputation match (see Columns 2 and 3). Then, in Columns 4 and 5, we use the office's share of partners from the relevant school (net of the sample average) as an independent variable.

We view this specification as the first step toward running our ideal experiment. Our ideal would be to study the hiring decisions of two identical law offices with respect to a single law school, where the offices' current number of attorneys from that school varies exogenously. If a high current concentration of attorneys from a given school predicts a high rate of hiring from that school, then this would be evidence in favor of hiring networks or co-worker complementarity.

By examining the partner share — which was likely determined at least in part before the current group of associates have been hired — we hope to provide at least some suggestive evidence on this point. We find that, even controlling for office-school distance and firm/school reputation match, an office's partner school share is very closely related to the office's associate school share. That is, offices with a high concentration of partners from a given school tend to also have a high concentration of associates from that school, even controlling for distance and reputation matching. In Column 5, our point estimate of the marginal effect of partner share on associate share is close to 0.6 (implying strong economic significance) and is statistically significant at much better than the 1% level.

In Panel B, we recompute the office-level associate γ using the residuals from the regressions in Panel A. Distance, reputation match, and partner share together explain a very large fraction

of total associate-level share. The unconditional median associate-level γ is 0.049, but the associate-level γ is only 0.01 after conditioning on distance, match, and partner share. Thus, it seems that nearly 80% of associate level concentration can be explained by these variables.

We view this evidence as our most suggestive finding to date regarding the importance of hiring networks. However, we are concerned about various forms of omitted variable bias, and we are currently enriching our data and analysis to address this.

4 Conclusion

In this draft, we have offered some basic results on the personnel-economic geography of large law firms. We have shown that large law firms tend to be concentrated with regards to the law schools they hire from. Office-level concentration is substantially greater then firm-level concentration. Office-level concentration is greater for associates than it is for partners, which may be consistent with various theories of employer learning. It seems that around two-fifths of observed office-level concentration can be explained by simple measures of office-school geographic proximity and firm-school reputation matches. Finally, there is a strong relation between partner office-level school shares and associate office-level school shares, even conditional on distance and firm-school match. This last point gives some suggestive evidence in favor of hiring networks or school-level co-worker complementarity, although our conclusions here clearly need to be refined. In future versions of this paper, we intend to explore these basic findings in greater detail.

Table 9: Decomposition of Office-Level School Shares — Associates Only

Panel A: Regression Results	(1)	(2)	(3)	(4)	(5)
< 10 Miles		Excluded	Excluded	Excluded	Excluded
10-20 Miles		-0.0041	-0.0001		0.0033
		(0.0015)	(0.0013)		(0.0011)
20-30 Miles		-0.0276	-0.0210		-0.0034
		(0.0022)	(0.0020)		(0.0017)
100-200 Miles		-0.0537	-0.0443		-0.0190
		(0.0014)	(0.0013)		(0.0011)
Bottom Quartile Firm			-0.0048		0.0003
			(0.0010)		(0.0008)
Partner/School Share				0.7373	0.5778
				(0.0042)	(0.0043)
Firm/School Quartile Interaction			Included		Included
R^2		0.265	0.3775	0.4689	0.5941
N (Office/School Pairs)		34,467	34,467	34,467	34,467

Panel B: Adjusted Office-Level γ

Controls	None	Distance	Distance + Firm/School Interactions	Partner Share	Distance, Firm/School Match, and Partner Share
Mean	0.0636	0.0411	0.0316	0.0243	0.0136
Standard Deviation	0.0558	0.0431	0.0401	0.0269	0.0218
Median	0.0490	0.0284	0.0221	0.0172	0.0100
75th percentile	0.0835	0.0528	0.0389	0.0314	0.0185
25th percentile	0.0269	0.0174	0.0102	0.0091	0.0033
N (Offices)	224	224	224	224	224

Panel A shows coefficients from a regression where an observation is an office/school. The sample is limited to offices with at least twenty partners and at least twenty associates. The dependent variable is the fraction of associates in the office that went to the school minus the fraction of the entire sample that went to that school. "Partner School Share" is the fraction of partners in the office that went to the school minus the fraction of all partners in the sample that went to that school. All regressions include indicators for each ten mile interval from the school to the office up to 100 miles and each 100 miles beyond that. The coefficients for three of these indicators are displayed. Firm prestige rankings are based on Vault and school rankings are based on US News and World Report. Panel B shows the results of recalculating γ using residuals from the relevant regression. Column 1 shows gammas analogous to those in Table 7 for the sample of offices with at least twenty partners and at least twenty associates.

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