Organizational Ability and Performance in U.S. Legal Services Firms

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Abstract

We quantify organizational ability for U.S. legal services firms using the two-stage data envelopment analysis (DEA) method of Demerjian et al. (2013). In the first stage, we estimate the DEA-based, technical efficiency of legal services firms following the production frontier approach. In the second stage, we measure organizational ability as the residual from the DEA+OLS model after controlling for efficiency determinants. We validate the measure by showing the persistence of organizational ability and the predictability of firms' future financial performance. Furthermore, we contribute to the literature examining professional service firms and organizational ability by identifying the determinants of ability through different classes of human resources and experience.

INTRODUCTION

Professional service firms account for nearly 15 percent of the U.S. gross domestic product (GDP) (Bureau of Economic Analysis [BEA] 2020). However, hyper-competition and human resource constraints have led the industry to make significant strategic changes in organizational structure in order to sustain growth, and the performance gap between firms is widening (Becker et al. 2001). This gap remains unexplained by current academic research (see, e.g., Greenwood et al. 2005; Hitt et al. 2001; Maister 2005). Following Lev et al. (2009), we posit that there is an unobservable quality of organizational ability which determines profitability and persistent superior performance for those professional service firms which possess it. To test this prediction, we obtain twenty years of data for the top U.S. law firms. Using data envelopment analysis (DEA), we create a law firm ability measure that is associated with law firm profitability and with persistent superior performance. We also use DEA to reveal the determinants of law firm ability. In doing so, we illuminate essential factors that lead to law firm profitability through the channel of organizational ability.

The services sector of the U.S. economy is the most significant contributor to GDP, accounting for nearly 60 percent in 2018 (BEA 2020; Deloitte 2019). Within the services sector, professional services such as law account for 13 percent of the total economy, making it the second-largest industry by contribution to GDP (BEA 2020; Deloitte 2019).[1] However, the sector faces pressure from globalization, fierce competition for employees, and rapid technological developments (Greenwood et al. 2005; Kor and Leblebici 2005). Generally, firms

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[1] Only the finance, insurance, and real estate sector contributes more to GDP than the professional services sector.

have responded to these challenges by radically changing their human resources strategies. However, these adjustments have not benefited all law firms equally.

As the gap between the best performing law firms and the others has widened, researchers have sought an explanation for the performance gap between law firms (Becker et al. 2001). Human resources are the most significant input utilized in generating revenue output for law firms. Thus, existing research attempts to explain the performance gap by appealing to the different human resources strategies that firms undertake by which they strive to leverage the knowledge and experience of the crown jewels of professional services firms: equity partners. But studies that attempt to identify the drivers of law firm profitability have found mixed results for the impact of human resources strategy on profitability (see, e.g., Greenwood et al. 2005; Hitt et al. 2001; Kor and Leblebici 2005; Maister 2005).

The success of organizational human resources structures seems to be impacted by unobservable firm characteristics that determine whether they create value for the firm. We suggest that this unobservable quality of successful law firms is an "organizational ability" that allows firms to effectively leverage equity partners' knowledge and experience. This organizational ability determines profitability and persistent superior performance for law firms that possess it. Further, it is a fundamental characteristic of excellent law firms and even predicts future firm performance. We define law firm organizational ability as the inherent collective characteristics of the individual partners and staff lawyers, administrative staff, and management that are allocated in such a way as to create stakeholder value. Proper allocation of resources may improve efficiency in generating revenues by increasing law firms' ability to learn, transfer knowledge, manage human resources, exploit scale and scope efficiencies, develop client relationships, and choose the most effective form of organization (Brock et al. 2006). We

suggest that organizational ability is a fundamental characteristic of superior law firms which explains the profitability gap, including channels of value creation.

Using DEA, we quantify law firm ability in two stages. Our measure captures unobservable characteristics (i.e., abilities) and explains performance differences between the very best law firms and others. Existing literature investigating the importance of ability on firm outcomes focuses primarily on quantifying managerial ability, as pioneered by Demerjian et al. (2013). While managerial ability is vital for understanding the impact of management on firm outcomes, this approach is not as salient for law firms, which typically operate in a partnership form of organization wherein managers are simultaneously owners and employees. Therefore, while we follow Demerjian et al. (2013) in measuring ability, we capture ability at the organizational level, rather than at the managerial level.

We first use data obtained from the American Lawyer 100 surveys to measure the relative efficiency of law firms using variable returns-to-scale DEA (Banker et al. 1984). This first-stage analysis considers how effectively lawyers and other firm-level resources combine to achieve firm efficiency. We use revenue as the firm's primary output and the number of full-time lawyers and operating expenses as inputs.

In the second stage, we regress the measure of efficiency calculated in the first stage on several firm characteristics that are likely to affect law firm efficiency. These characteristics include variables that capture the firms' human resources structure, diversification, prestige, and firm attributes such as age and size that partially explain firm efficiency. Consistent with prior research into ability (Demerjian et al. 2013; Banker and Park 2020), we use the residual from the second stage regression as our measure of law firm organizational ability.

We validate our measure of organizational ability showcasing its ability to predict revenues and other alternative measures of law firm profitability (Hitt et al. 2001; Greenwood et al. 2005). Our measure of organizational ability is associated both with law revenue generation and with persistent superior performance. Specifically, we find that revenues per lawyer are positively associated with our measure of organizational ability even several years in the future. Importantly, when we separate high ability law firms from low ability law firms, we find high ability firms are positively associated with future firm performance, whereas low ability firms are negatively associated. These results confirm our intuition that organizational ability is a significant driver of the performance gap observed between the highest performing law firms and all others in practice.

Following the intuition of Bui et al. (2018), we assume that a firm's persistently high (low) organizational ability score is more likely due to better (poorer) organizational ability than to chance. Therefore, we also investigate whether law firms' ability persists over time. Our findings indicate that our measure of organizational ability is useful in predicting future organizational ability. Further, our results suggest that low organizational ability firms persist in low organizational ability while high organizational ability firms are likely to remain in the high-organizational ability category. This finding provides evidence confirming our argument that the gap between the very best law firms and others is due in part to persistent organizational ability.

Finally, we use our measure of organizational ability to illuminate the determinants of organizational ability for law firms. Here we explain the characteristics of law firms that lead to organizational ability and, eventually, higher profitability. Because prior literature has suggested that the organizational structure of human resources affects profitability (but is unable to explain a wide gap even after considering human resource structure), we seek to determine whether

organizational ability is an omitted variable in the relationship between human resource allocation and performance. We investigate this question by establishing whether the organizational structure of human resources is a determinant of organizational ability. In particular, we investigate the role that the mix of partners to total lawyers has in creating organizational ability. We find that firms with a greater ratio of partners to total lawyers have positive associations with future revenue generation. On the other hand, firms with higher ratios of non-partners to total lawyers have negative associations with future revenue generation. Partners, as the crown jewels of the firms, have know-how and expertise to produce specialized services, manage knowledge transfer, develop client relationships, and choose the most productive form of organization (Brock et al. 2006; Kor and Leblebici 2005). When firms use equity partner resources effectively, efficiency in generating revenues is improved. In linking firms with a greater proportion of partnered attorneys with organizational ability, our findings suggest that organizational ability is the channel through which human resources strategies impact law firm performance.

Our study contributes to several streams of literature. First, we contribute to the growing body of research using DEA to identify and quantify firms' organizational abilities. Our findings support the validity of the organizational ability measure obtained using two-stage DEA (Banker and Natarajan, 2008; Demerjian et al., 2013; Banker and Park, 2020). Our three-stage analysis measures law firms' relative efficiency in using their labor and managerial resources, validates the first stage output by documenting expected relationships between law firm efficiency and legal industry variables, and documents significantly positive relationships between revenue generation and organizational ability.

Our analysis also introduces and validates a quantitative measure of law firm organizational ability that is applied to isolate and evaluate the contribution of organizational ability to individual law firm profitability and performance persistence. Thus, it contributes to the literature that uses DEA to measure and benchmark profitability by separating the effects of organizational ability from other factors.

We provide an explanation as to why existing empirical research fails to fully account for the performance differences between firms (Greenwood et al. 2005; Hitt et al. 2001; Maister 2005; Kor and Leblebici 2005). We provide evidence that law firms' organizational ability explains the perceived profitability gap between the best law firms and all others. We also add to the sparse literature that examines professional services firms (Greenwood et al. 2005).

The remainder of the paper is organized as follows. In the next section, we provide a background for our analysis and describe literature related to law firm characteristics and profitability. In the third section, we detail the methodology. In the fourth section, we describe the data and present the results of our analysis. A final section concludes and discusses the implications of this research.

BACKGROUND AND LITERATURE

Although professional services firms such as law firms are primary contributors to U.S. GDP (BEA 2020), these firms also face a constantly-changing market buffeted by technological, global, and workforce disruptions (Becker et al. 2001; Greenwood et al. 2005). The importance of professional service firms to the U.S. economy and the changes that they face suggest the importance of studying professional service firms. To illuminate the factors that affect profitability for professional services firms, we study law firms as a test case.

Law firms are a convincing test case for the professional services industry because they are representative of several important characteristics of professional services firms. Empson (2001) offers this definition of professional services firms: a firm that uses the specialist technical knowledge of its personnel to create customized solutions for clients. Professional services firms are embodied by three important characteristics: (1) they sell the services of individuals over the services of the firm, (2) they involve a high degree of client interaction and customization, and (3) they must attract and retain highly skilled employees (Empson 2001; Teece 2003). Further, professional services firms use a similar organizational structure for their human resources, and they generally use a partnership form rather than a corporate form. While some differences may exist, given that law firms typically embody these common characteristics of professional services firms, they are a useful industry group to use as a test case for professional services firms.

Because of its position in the professional services industry, the field of law provides insight regarding the determinants of performance for other professional services providers in the professional services industry. Despite the significance of professional service firms to the U.S. economy, little is known of the determinants of their performance (Greenwood et al. 2005). Existing law firm research focuses on law firms' organizational structures of human resources as determinants of profitability, in particular how firms organize their human resources so as to maximize utility from equity partners (Kor and Leblebici 2005; Greenwood et al. 2005.

Because specialist advice or consultation is the primary output of professional services firms, human capital represents the most significant form of input (Kor and Leblebici 2005), and organizational efficiency is determined by the effectiveness of the firm's lawyers to produce revenue for the firm (Hitt et al. 2007). In law firms, as in other professional services firms, the

organizational structure of human resources is generally arranged so that the lawyers with the most experience and knowledge are equity partners in the firm, and less-experienced lawyers are non-partner associates, non-equity partners, and non-partner track lawyers. Equity partners are the most important firm resource and the primary drivers of revenue outputs.

The organizational structure of the law firm is important because it determines how the firm's most precious capital resources, the equity partners, are used to create value for the firm. Law firms leverage the knowledge and experience of equity partners by assigning several partner and non-partner track associates to each equity partner. The degree to which firms leverage the knowledge and experience of their equity partners is a source of intra-industry firm heterogeneity. Some firms employ many associates per equity partner while others employ few. Benefits exist to both strategies. In general, firms that leverage their equity partners' knowledge and expertise are expected to have stronger firm performance. A partner assisted by several associates can take on more cases, delegate time consuming and less value-creating activities, and focus on projects that require expert high-level knowledge. On the other hand, too many associates assigned to one partner increases coordination time and lowers access to individual partner training for each associate.

A small number of law firms are very successful in leveraging equity partner knowledge and experience to increase profits (Becker et al. 2001); however a performance gap remains even after taking into account organization structure of human resources. That only a small number of firms find tremendous success suggests an omitted variable that affects the interaction between organizational structure of human resources and profitability. This mystery may be explained by virtue of unobserved organizational ability that is not measured by observable characteristics such as non-partner-to-partner ratios. Rather, firm-level factors seem to be impacted by some

unobservable characteristics that affect how organizational structure of human resources affect firm value. Kor and Leblebici (2005) admit that "often what makes a resource valuable is not its rarity or inherent characteristics but how the firm manages its resources to achieve efficiency and innovation." We suggest that it is this unobservable ability of law firms to efficiently manage their attorneys and deploy their assets across service offerings and geographies that determines profit maximization. Unobserved organizational ability is a fundamental characteristic of superior law firms and explains the profitability gap, including channels of value creation.

Organizational ability is defined as the collective ability of the various parts of the organization to achieve organizational goals (Anderson and Hyun 2020). Organizational ability is a core construct of firm performance. It includes each part's ability to perform its function and the ability of the parts to work together to create sustainable profits. Prior research examines various dimensions of organizational ability in creating firm value (see, e.g., Demerjian et al. 2013; Sørensen 2002; Chang et al. 2010; Darroch 2005). For law firms, organizational ability may be enhanced when firms properly leverage equity partners through their ability to transfer knowledge, develop firm reputation, manage human resources, cultivate client relationships, choose the most productive form of organization, and deploy human resources while managing trade-offs in service and geographical diversification (Brock et al. 2006; Greenwood et al. 2005; Kor and Leblebici 2005).

Although prior literature has measured ability using proxy variables, organizational ability is fundamentally unobservable. Banker and Park (2020) identify a recent development in the measurement of ability pioneered by Demerjian et al. (2013) as an alternative to previous proxy measures of organizational ability. Demerjian et al. (2013) quantify managerial ability using two-stage DEA. In the first stage, they use DEA to create an initial measure of the relative

efficiency of each firm within its industry by relating revenue as the primary output of the firm to various inputs to the revenue process. They then estimate a second-stage regression to purge the DEA-generated firm efficiency measure of firm-specific characteristics that aid management's efforts but are not due to managerial ability. The residuals from the second stage represent managerial ability. In the third stage, Demerjian et al. (2013) show that their ability measure is positively associated with firm performance. We follow this three-stage approach to quantify law firm organizational ability and relate it to profitability and persistence of firm performance.

RESEARCH DESIGN AND METHOD

Data

Because the largest professional services firms drive the professional services industry and comprise a significant portion of industry revenue, we focus on the largest law firms as our population of interest. To measure the organizational ability of the top 100 U.S. law firms, we gather data on U.S. law firms for the twenty-one year period between 1997 and 2017 from the American Lawyer 100 reports ("AM LAW 100"). The AM LAW 100 reports include data on revenue, operating income and expense, employees, location of headquarters and offices, and mergers and acquisitions. Data available through the AM LAW 100 is voluntarily provided or imputed by AM LAW's business of law journalists and researchers. Because law firms are private partnerships they are not required to report their financial statements in accordance with Generally Accepted Accounting Principles; however, many partnerships, particularly large firms with billions of dollars in annual revenue, choose to maintain records and accounts in accordance with GAAP. As the data is reviewed by AM LAW's researchers and AM LAW has a process for correcting any errors, we anticipate that our data is consistent and free from bias. The AM LAW 100 is publicly available for subscribers of LexisNexis.

We begin with 2,100 firm years and remove one firm-year with missing values to calculate employee-related variables. Our final sample is 2,099 firm years. The AM LAW 100 reports rank U.S. law firms annually by revenue per lawyer, compensation, profits per lawyer, profitability index, value per lawyer, profits per equity partner, and overall revenue. The AM LAW surveys are used extensively in prior research (see, e.g., Becker et al. 2001; Eckardt et al. 2018; Kor and Leblebici 2005; Malos and Campion 2000). The American Lawyer is the premier information and solutions company for U.S. law firms and primarily serves the legal industry. It is one of the most-cited U.S. law firm surveys and is widely used by practitioners as well as researchers in the law industry. Because we use AM LAW's ranking parameters in our tests, the implications of our findings are compatible with a practitioner-oriented approach.

Three-Stage Method

Measuring Law Firm Efficiency - Inputs

Following the approach of Demerjian et al. (2013), we estimate law firm efficiency using DEA in our first stage. The efficiency estimate we obtain from the DEA provides a measure of the relative organizational efficiency of the law firm relative to its peers (Banker et al. 1984). To assess unobservable organizational ability, we use DEA to measure how efficiently each firm in our sample uses its human resources and operating expenses to generate revenue. In particular, we estimate the labor inputs as the total number of full-time lawyers. We also include total operating expenses, which is the sum of direct costs of fixed compensation expenses to non-equity partner attorney and administrative staff as well as overhead costs such as occupancy, recruiting, and technology expenses. The total number of full-time lawyers represents the firm's ability to create value from efficient use of its most valuable asset, its professional workforce of attorneys (Greenwood et al. 2005). Total operating expenses represent the firm's efficient use of

its lawyers' knowledge base, facilities, marketing, administrative staff, and information technology. The inclusion of both total operating expenses and number of full-time lawyers is essential in order to capture the fixed and variable resource structure of the firm in its entirety. The operating expense component captures the fixed operating resources available to a law firm in a single period. Whereas total lawyers captures the mix of labor resources that a law firm can employ to create value.[2]

Measuring Law Firm Efficiency - Outputs

Revenue is the traditional measure of output used in Demerjian et al. (2013) and other studies (see, e.g., Banker et al. 1984; Bonsall et al. 2017; Krishnan and Wang 2015). The objective is to estimate the maximum revenue that a firm can generate for a given amount of input. We likewise use total revenue as our output measure. Total revenue represents fee-related income from legal work and excludes any revenues from non-legal work or business activities.

Organizational efficiency is determined by the effectiveness of the firm's lawyers and business operations to jointly produce revenue for the firm (Hitt et al. 2007). We apply input-oriented DEA to estimate an efficiency score (Banker et al. 1984), which we use as the dependent variable in our second stage regression.

Estimation of Law Firm Organizational Ability

Following Demerjian et al. (2013), we measure organizational ability as the residual obtained after regressing the DEA estimate of relative efficiency on variables that affect

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[2] In the second stage we control for both the ratio of partners to total employees and the total number of lawyers, so we effectively remove the influence of any correlation between operating expenses and total lawyers in the first stage. Although operating expense and total lawyers has a positive and significant correlation, our measure of managerial ability 1) has a correlation of -1.88% with operating expenses and is not statistically significant 2) has a correlation of 2.06% with total lawyers and is not statistically significant.

efficiency. We include firm-specific variables that aid in firm performance but which are not due to organizational ability. For law firms, the variables most likely to affect efficiency are the ratio of partners to total lawyers, size, prestige, diversification, age, and location. We include these variables as controls in our second stage regression. The residual from this regression captures unobservable organizational abilities that are not explained by the firm's observable traits that we include as controls.

Because industry-specific variables can improve the precision of firm-efficiency estimation, we include several variables specific to the legal industry (Banker and Park 2020). We expect more efficient firms to attract more and better talent, and that this talent will affect firm efficiency. Therefore, we select the number of lawyers as our measure of size. We also expect the ratio of partners to total lawyers to affect law firm efficiency. The ratio of partners to total lawyers impacts the profitability per partner, the firm's retention ratio, and the firm's repository of knowledge (Greenwood et al. 2005). We expect that firms with lower ratios will be more efficient than firms with higher ratios since more expert human resources (e.g., partners) are able to delegate less complicated work to less experienced employees (e.g., associates). Because more efficient firms are also likely to have strong reputations, we include the law firm's share of revenue per year as a control for prestige. Prestigious firms diversify more easily, charge fee premiums, and hire the best lawyers (Greenwood et al. 2005; Sherer and Lee 2002). Diversification may affect efficiency, so we include a control for the firm's geographical diversification (Hitt et al. 2001). Older firms are more established and may have more prestige, but they may also be more rigid and less likely to make changes needed to remain efficient (Sherer and Lee 2002).

The model for the second stage is as follows:

$$Ln(\hat{\theta}_{jt}) = \tag{1}$$
$$PARTtoLAW_{jt} + LAWYERS_{jt} + REVSHARE_{jt}$$
$$+ INTERN_{jt} + FIRMAGE_{jt} + REGION_k + YEAR_t + \hat{\varepsilon}_{jt}$$

where PARTtoLAW is the ratio of total partners to total lawyers. LAWYERS are the number of

average full-time employees, including partners and staff lawyers, but excluding temporary and

contract lawyers. REVSHARE is the firm's market revenue share per year based on other firms

in the sample. INTERN is an indicator variable equal to 1 if 40 percent or more of the firm's

lawyers are located outside the U.S., and zero otherwise. We also include FIRMAGE, which is

the number of years since the firm's first appearance on the AM LAW 100 and REGION, an

indicator variable equal to 1 if the firm is headquartered in the Northeast, South, Mideast, or

Western regions of the U.S., respectively. Finally, we include year indicator variables to capture

the influence of aggregate time trends. The regression estimation residual is our measure of law

firm organizational ability, which is used as the independent variable in the third stage regression

model described below.

The Impact of Law Firm Organizational Ability on Profitability and Persistence of Firm

Performance

In our third-stage analysis, we validate the organizational ability measure by showing

how our measure from the second stage affects law firm profitability. The model for the third

stage is as follows:

$$(REVperLAW_{j,t+n}) = \tag{2}$$
$$ABILITY_{jt} + LAWYERS_{jt} + REVENUE_{jt} +$$
$$INTERN_{jt} + FIRMAGE_{jt} + REGION_k + YEAR_t + \hat{\varepsilon}_{jt}$$
$$Where: n \in Z;\ 1 \cdots 3;\ ABILITY_{jt}\ partitioned\ into\ HiABILITY_{jt}\ and\ LoABILITY_{jt}$$

where the dependent variable is revenue per lawyer (REVperLAW). This measure gauges how profitable the firm is overall as measured by revenue per lawyer. By construction, this measure captures the impact of the firm's human resources strategy on revenue. We also measure the persistence of organizational ability by including the measure of future organizational ability as a dependent variable in Equation (2). Using future organizational ability as an outcome variable allows us to investigate whether organizational ability is persistent in certain law firms. Our variable of interest is ABILITY, the measure of organizational ability quantified by the residual from the second-stage regression. We include a lagged value of REVENUE to control for prior firm successes in generating revenues. All other independent variables are as defined in Equation (1). We expect that these variables may also impact firm profitability. By including them in the third stage, we control their effect on profitability and capture the impact of ABILITY in maximizing profit (Banker and Park 2020).

We take our analysis one step further by investigating how firms' organizational ability evolves as a result of the variation in the organizational structure of their human resources. Prior research suggests that the organizational structure of a firm's human resource inputs impacts firm performance through efficient utilization of equity partner knowledge and experience; however an unexplained performance gap remains (Hitt et al. 2007; Kor and Leblebici 2005; Sherer and Lee 2002). We have suggested that this performance gap relates to organizational ability. We now suggest that the organizational structure of a firm's human resource inputs is a determinant of ABILITY such that a firm that properly leverages equity partner knowledge may have higher organizational ability (Brock et al. 2006; Greenwood et al. 2005; Kor and Leblebici 2005). Therefore, the organizational structure that the firm employs may determine ABILITY and indirectly affect performance. We examine two possible determinants of ABILITY related

to human resources and experience: the ratio of partners to lawyers that a firm employs and the

age of the firm. To determine whether firms' unique mix of partners, non-partner lawyers, and

experience shift firms' future ability, we model future ability based on firms' partner ratios

interacted with firm age. We test the following model:

$$
\begin{aligned}
\left(ABILITY_{j,t+1}\right) = \\
\gamma_{jt} + \gamma_{jt} * FIRMAGE_{jt} + LAWYERS_{jt} + REVENUE_{jt} + \\
INTERN_{jt} + FIRMAGE_{jt} + REGION_k + YEAR_t + \hat{\varepsilon}_{jt} \\
Where: \gamma_{jt} \text{ is partners to lawyers} \mid non-partners \text{ to lawyers}
\end{aligned}
$$

(3)

where the dependent variable is our measure of future law firm ability calculated in the second

stage. Our variable of interest, γ, is the ratio of partners to lawyers (PARTtoLAW) and the ratio

of non-partners to lawyers (NPARTtoLAW). We also include the interaction of firm age

(FIRMAGE) with PARTtoLAW and NPARTtoLAW as variables of interest. All other variables

are as defined previously. Where partners and non-partners enhance firms' ability to learn,

transfer knowledge, strengthen reputation, develop client relationships, and manage human

resources (Brock et al. 2006; Greenwood et al. 2005; Kor and Leblebici 2005), we expect them

to have a positive influence on future ABILITY. We expect a null effect for FIRMAGE after

controlling for production inputs and outputs. The interaction of PARTtoLAW and

NPARTtoLAW with FIRMAGE tests whether experience affects the association of the firms'

human resources composition with future ability. This analysis indicates how firms might

change their human resources mix over time to maintain their organizational ability.

EMPIRICAL RESULTS

Descriptive Statistics

Table 1 presents descriptive statistics of the variables used in the analyses. The mean (median) of EFFICIENCY is 0.540 (0.502) and the mean (median) of ABILITY is 0.000 (-0.004). Figure 1 presents the histogram of the efficiency score from stage one and shows that ABILITY is normally distributed about the mean. The mean (median) of the number of lawyers (LAWYERS) for the sample is 742 (610) (table presents log-transformed numbers). The mean (median) of REVENUE is $567 million ($427 million) (table presents log-transformed numbers). The mean ratio of PARTtoLAW is 0.378, indicating that 38 percent of attorneys are either equity or non-equity partners for the average law firm. Non-partnered lawyers make up approximately 62 percent of the average law firm. Approximately 4 percent of the law firms in our sample have more than 40 percent of their partners overseas.

[INSERT TABLE 1 ABOUT HERE]

We report the correlation coefficients of our variables in Table 2. EFFICIENCY is positively correlated with ABILITY, REVENUE, FIRMAGE, and NPARTtoLAW. Positive univariate correlations suggest that these variables are organization characteristics that affect organizational efficiency, validating their use in the second stage. On the other hand, EFFICIENCY is negatively correlated with PARTtoLAW. This correlation suggests that the higher the ratio of equity and non-equity partners to total lawyers, the lower the firm efficiency. Likewise, ABILITY is positively correlated with REVENUE, FIRMAGE, and LAWYERS, and negatively correlated with PARTtoLAW. The lower the ratio of equity and non-equity partners to total lawyers, the higher the firm organizational ability. Further, the higher the ABILITY, the higher the REVENUE, OPINCOME and OPEXPENSE, and the higher the number of lawyers in the firm.

[INSERT TABLE 2 ABOUT HERE]

Main Results: Second-Stage Measurement of Organizational Ability

Table 3 presents the results of our second stage regression of EFFICIENCY on control variables that affect law firm efficiency. Here we regress the efficiency score estimated in the first stage of DEA on multiple organizational characteristics. As predicted, the ratio of partners to total lawyers and the size of the firm, as measured by the number of lawyers, is negatively associated with efficiency (-0.235, p-value < 0.01). A longer presence on the AM LAW100 is positively associated with efficiency (0.038, p-value < 0.01), as is having a higher market share of revenue than other law firms (0.402, p-value < 0.01). As predicted, international diversification has a negative impact on efficiency (-0.023, p-value < 0.05). We measure ABILITY as the residual from this regression and use it as our independent variable of interest in the third stage of our analysis. We draw particular attention to the R-squared, which indicates that the industry-specific variables we use to estimate law firm efficiency explain 75 percent of the variance in law firms' efficiency.

[INSERT TABLE 3 ABOUT HERE]

Main Results: Third-Stage Persistence of Organizational Ability

In the third stage of our analysis, we evaluate whether the ability measure is persistent over time. Following the intuition of Bui et al. (2018), we assume that a firm's persistently high (low) organizational ability score is more likely due to better (poorer) organizational ability. We regress the one, two, and three-year ahead residuals from our second stage regression on ABILITY at time t. Table 4 presents our findings. ABILITY is positively and significantly (p-value < 0.001) associated with all three future measures of ABILITY. This finding indicates that our organizational ability measure is useful in predicting future organizational ability and that

organizational ability is persistent in law firms rather than a fortunate coincidence. Further, our results suggest that low organizational ability firms persist in low organizational ability while high organizational ability firms are likely to remain in the high-organizational ability category. This finding provides evidence confirming our argument that the gap between the very best law firms and others is due in part to persistent unobservable organizational ability.

[INSERT TABLE 4 ABOUT HERE]

Main Results: Third-Stage Impact of Organizational Ability on Future Profitability

Having shown that ABILITY is persistent in law firms, we turn our attention to validating our measure against firm performance. We regress ABILITY, the residual from the second-stage regression, on REVperLAW. We investigate the impact of ABILITY on REVperLAW one, two, and three years in the future. Because we use lead measures of performance, our sample sizes decline in the lead analyses.

Table 5, columns (1) through (6) tabulate our estimation of the third-stage model with revenue per lawyer as the dependent variable. The coefficient of ABILITY is positive and significant (147.372, p-value < 0.01), indicating the positive association of ABILITY with revenues, and validating our measure of organizational ability. While the magnitude declines slightly over time (147.372 in $t+1$, 133.501 in $t+2$, and 128.300 in $t+3$), the positive association is persistent and statistically significant (all p-values < 0.01). Our analysis shows that ABILITY is vital in predicting revenue one, two, and three years in the future. In columns (2), (4), and (6), high ability firms are positively associated with future revenue, whereas low ability firms are not significantly associated with future revenue. Figure 2 provides a graphic representation of the distribution of revenue per lawyer for each level of organizational ability. Clearly apparent is the

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strong association between high organizational ability firms and high revenue per lawyer. These results confirm our intuition that organizational ability is a significant driver of the performance gap observed between the highest performing law firms and all others in practice.

The results tabulated in Table 5 are confirmed by untabulated analysis in which we find that profit margin per lawyer, operating income per lawyer, and operating income per partner also follow the pattern of revenue illuminated in Table 5, wherein ABILITY is positively and significantly associated with future revenue per lawyer. Further, when we disaggregate high and low ability law firms, we continue to show that the highest ability firms are persistently associated with higher profit and operating income. In comparison, the low ability firms are associated with lower profit and operating income.

Our findings are also economically significant. For example, a change in one standard deviation of ABILITY corresponds to a \$15,829 change in future REVperLAW at $t+1$. For high ability organizations, a one standard deviation change in ABILITY corresponds to a change of \$30,476 in REVperLAW. Given a mean \$7,600,000 REVperLAW, this equates to a change in REVperLAW of 40% for firms in the HIABILITY category, a significant economic impact.[3] The incremental effect of HIABILITY relative to LOABILITY is \$19, 273 (a factor 145 times greater than the mean REVperLAW for LOABILITY firms) for a one standard deviation change in the distribution of ABILITY.

[INSERT TABLE 5 ABOUT HERE]

Main Results: Law Firm Ability Determinants

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[3] AM LAW divides value per lawyer by \$10 million in their data set. Therefore, the calculation is performed as follows: 30,476/7,600,000 multiplied by 10,000 to account for lawyer values presented in the 10,000th place.

In our final analysis, we seek to understand what factors determine organizational ability. Prior research suggests that the organizational structure of a firm's human resource inputs (i.e., the relative number of equity partners and non-equity partners and the associates who are assigned to them) impacts firm performance through efficient utilization of equity partner knowledge and experience (Hitt et al. 2007; Kor and Leblebici 2005; Sherer and Lee 2002). Nevertheless, a performance gap is observed even when taking into account leveraging of equity partner knowledge and experience. Our results suggest that organizational ability is one reason for this performance gap and may be an omitted variable in the model of organizational structure on performance. We now test our hypothesis that the organizational structure of a firm's human resource inputs is a determinant of ABILITY such that a firm that properly leverages equity partner knowledge and experience may have higher ABILITY, which in turn leads to greater revenue generation (Brock et al. 2006; Greenwood et al. 2005; Kor and Leblebici 2005). Given that law firms' most valuable asset is the lawyers themselves, we investigate the impact of the unique mix of partners and non-partner lawyers on organizational ability. We regress the ratio of partners to lawyers (PARTtoLAW) and the ratio of non-partners to lawyers (NPARTtoLAW) on future ABILITY. Partners are presumably the most knowledgeable lawyers in the firm, maintain the most valuable relationships with clients, and serve as repositories for institutional memory. If partners enhance the ability of firms to learn, transfer knowledge, improve reputation, develop client relationships, and deploy human resources while managing strategic shifts (Brock et al. 2006; Greenwood et al. 2005; Kor and Leblebici 2005), we expect them to have a positive influence on ABILITY. Our findings in Table 6 confirm this intuition. Firms with a greater ratio of partners to total lawyers have positive associations with future profitability. On the other hand, firms with higher ratios of non-partners to total lawyers have negative associations with

future profitability. We have already shown that ABILITY is positively associated with future profitability. By showing that the organizational structure of human resources determines ABILITY, our findings suggest that ABILITY is the channel through which human resources strategies impact law firm performance.

In columns (3) and (4) of Table 6, we include an interaction between PARTtoLAW and NPARTtoLAW with FIRMAGE in order to predict how firms might adjust their human resources composition over time to maintain their organizational ability levels. Our results show the human resources composition and experience shift firms' future profitability. In particular, findings in columns (3) and (4) suggest that to maintain organizational ability, firms might employ larger numbers of non-partnered lawyers in the future because, over time, experience attenuates the negative relationship of NPARTtoLAW with future ability. As greater numbers of associates gain experience through tutoring from more knowledgeable partners, firms can lessen their reliance on partners. Aging firms with a significant proportion of partners to total lawyers can perform better in terms of value by migrating towards a balanced mix of both non-equity partners and non-partnered lawyers. The composition of human resources (the ratio of partners to total lawyers) that we examine here as a determinant of ability, in turn, affects the profitability outcomes we illustrated previously. Thus, the evolution in human resources strategies in which firms employ fewer partner-track lawyers impacts firm outcomes through organizational ability.

[INSERT TABLE 6 ABOUT HERE]

CONCLUSION

Professional services firms are experiencing tremendous challenges in the face of technological, global, and workforce disruptions to the industry, and the performance gap

between firms is widening (Becker et al. 2001). We provide a possible explanation for the performance gap in professional service firms using law firms as a test case. We suggest an unobservable quality of organizational ability that determines profitability and persistent superior performance for law firms that possess it. To test this prediction, we use DEA to create a law firm ability measure associated with law firm profitability and persistent superior performance. We use DEA to reveal the determinants of law firm ability, confirming prior research and illuminating factors that lead to law firm profitability.

We validate our measure of organizational ability with revenue generation and show that law firm organizational ability is associated both with law firm profitability and with persistent superior performance. When we disaggregate high ability law firms from low ability law firms, we find high ability firms are positively associated with future firm performance, whereas low ability firms are negatively associated. We also show that law firms' ability is persistent for high and low organizational ability firms. These results support our intuition that organizational ability is a significant driver of the performance gap observed between the highest performing law firms and all others in practice. Finally, we use our measure of organizational ability to illuminate the determinants of organizational ability for law firms. Here we explain the characteristics of law firms that lead to organizational ability and, eventually, higher profitability. Our findings that firms with a greater ratio of partners to total lawyers have positive associations with future profitability suggest that organizational ability is the channel through which human resources strategies impact law firm performance.

Our study contributes to several streams of literature. First, we add to the growing body of research using DEA to identify and quantify firms' abilities. Our findings support the validity of the organizational ability measure obtained using two-stage DEA (Banker and Natarajan,

2008; Demerjian et al., 2013; Banker and Park, 2020). Second, we provide an explanation as to why existing empirical research fails to fully account for the performance differences between firms (Greenwood et al. 2005; Hitt et al. 2001; Maister 2005; Kor and Leblebici 2005). We provide evidence that law firms' organizational ability explains the perceived profitability gap between the best law firms and all others. We also add to the sparse literature that examines professional services firms (Greenwood et al. 2005).

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Appendix I: Sample Procedure

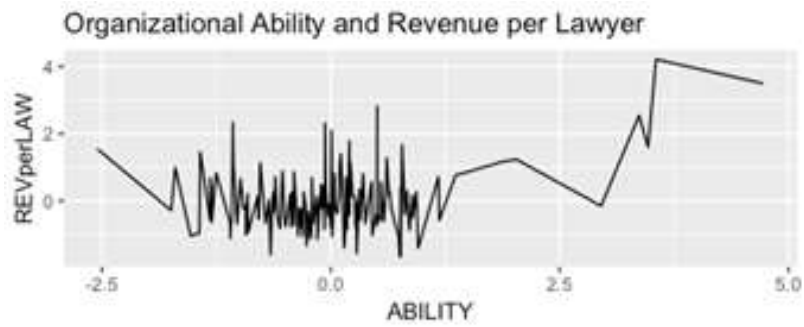| Observations	Data and Description
2,100 firm-year	The data obtained from AM LAW 100 on top law firms' financials (revenue and operating cost and income), employees, location, operational, and merger for the years 1997 to 2017.
(1)	Remove firm-year observation with a missing value for the employee-related variable.
2,099	Used in the final dataset for analysis.

Appendix II: Variable Definitions

Variable	Description
EFFICIENCY	Calculated using an output-oriented variable returns to scale, BCC, DEA-model (Banker et al. 1984). Total revenue as output and inputs as total operating expenses and total employees.
ABILITY	Residuals obtained by regressing the logarithm of DEA-based EFFICIENCY on contextual factors.
HIABILITY, LOABILITY	Indicator variable equal to 1 if firm-year ability is greater than (less than) 50th percentile, and 0 otherwise. Multiply LOABILITY with -1 to interpret greater score as lower ability.
REVENUE, REVSHARE	Total revenue of the firm and its market revenue share based on firm-year multiplied by 100, respectively. Total revenue represents fee-related income from legal work and excludes any disbursement of non-legal work or business activities. Raw continuous values are used in the first stage regression. Logarithmic values are used as controls in subsequent regressions.
OPINCOME	Net operating income for the firm-year.
OPEXPENSE	Difference between firm-year total revenue (REVENUE) and net operating income (OPINCOME).
LAWYERS	Average full-time lawyers, including partners and staff lawyers, but excluding temporary and contract lawyers. Raw continuous values are used in the first stage regression. Logarithmic values are used as controls in subsequent regressions.
PARTtoLAW, NPARTtoLAW	The ratio of total partners to total lawyers and non-partnered lawyers to total full-time lawyers.
PROFITMARGIN	The ratio of net operating income to total revenue.
INTERN	An indicator variable equal to 1 if 40% or more lawyers are located outside the U.S., and 0 otherwise.
FIRMAGE	A running logarithmic count of a firm's age based on its first appearance in the dataset.
NORTHEAST, MIDWEST, WEST, SOUTH	An indicator variable equal to 1 if the law firm is headquartered in the Northeast, Mideast, West, and South regions of the United States, respectively, and 0 otherwise.

Figure 1

Histogram of Organizational Ability

Figure 2

Organizational Ability and Revenue per Lawyer
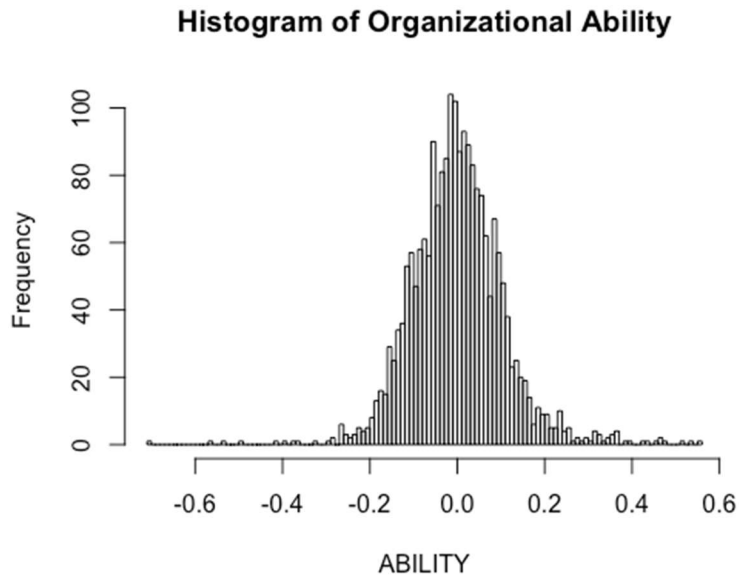
Table 1: Descriptive Statistics

Statistic	N	Mean	St. Dev.	Min	Pctl(25)	Median	Pctl(75)	Max
EFFICIENCY (1)	2,099	0.540	0.130	0.336	0.453	0.502	0.591	1.000
ABILITY (2)	2,099	0.000	0.107	-0.704	-0.064	-0.004	0.058	0.553
REVENUE (3)	2,099	13.025	0.660	11.608	12.591	12.963	13.473	14.654
OPINCOME (4)	2,099	11.991	0.744	10.435	11.482	11.922	12.516	13.826
OPEXPENSE (5)	2,099	12.556	0.646	11.151	12.140	12.510	12.994	14.100
LAWYERS (6)	2,099	6.455	0.528	5.421	6.089	6.415	6.743	8.116
PARTtoLAW (7)	2,099	0.378	0.106	0.123	0.292	0.380	0.460	0.711
NPARTtoLAW (8)	2,099	0.622	0.106	0.289	0.540	0.620	0.708	0.877
REVSHARE (9)	2,099	0.010	0.006	0.004	0.006	0.008	0.012	0.041
PROFITMARGIN (10)	2,099	36.663	8.873	18.243	30.682	35.635	42.189	64.891
OPINCperLAW (11)	2,099	5.542	0.513	4.149	5.174	5.492	5.892	7.662
OPINCperPART (12)	2,099	6.557	0.703	4.827	6.021	6.450	7.059	8.795
INTERN (13)	2,099	0.038	0.190	0	0	0	0	1
FIRMAGE (14)	2,099	2.177	0.696	0.693	1.609	2.303	2.773	3.091
REVperLAW (15)	2,099	760.7	289.7	298.6	565.7	702.8	919.6	3185.8

Winsorize continuous variables at 1st and 99th percentile

Variables in rows 3,4,5,6,11,12 are logarithmic transformed.

Table 2: Correlations

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
EFFICIENCY (1)		0.49	0.76	0.88	0.60	0.5	-0.41	0.41	0.66	0.68	0.76	0.73	0.16	0.46
ABILITY (2)	0.50		0.08	0.29	-0.09	0	0	0	0	0.68	0.42	0.31	0	0
REVENUE (3)	0.78	0.12		0.94	0.97	0.85	-0.29	0.29	0.73	0.20	0.49	0.49	0.24	0.70
OPINCOME (4)	0.94	0.33	0.94		0.85	0.72	-0.37	0.37	0.71	0.50	0.70	0.68	0.20	0.65
OPEXPENSE (5)	0.63	-0.03	0.97	0.84		0.89	-0.21	0.21	0.70	-0.03	0.03	0.32	0.25	0.69
LAWYERS (6)	0.51	0.12	0.85	0.71	0.89		-0.09	0.09	0.78	-0.10	0.01	0.06	0.31	0.47
PARTtoLAW (7)	-0.44	-0.04	-0.28	-0.38	-0.20	-0.06		-1	-0.38	-0.37	-0.44	-0.75	-0.24	-0.11
NPARTtoLAW (8)	0.44	0.04	0.28	0.38	0.20	0.06	-1		0.38	0.37	0.44	0.75	0.24	0.11
REVSHARE (9)	0.62	0.23	0.71	0.71	0.67	0.74	-0.42	0.42		0.20	0.23	0.33	0.26	0.16
PROFITMARGIN (10)	0.71	0.66	0.21	0.50	0	-0.05	-0.39	0.39	0.25		0.83	0.77	-0.05	0.09
OPINCperLAW (11)	0.83	0.35	0.52	0.72	0.36	0.09	-0.46	0.46	0.28	0.79		0.92	-0.03	0.46
OPINCperPART (12)	0.79	0.27	0.5	0.69	0.35	0.09	-0.76	0.76	0.39	0.73	0.92		0.10	0.38
INTERN (13)	0.16	0.01	0.22	0.19	0.23	0.23	-0.23	0.23	0.21	-0.05	-0.02	0.11		0.09
FIRMAGE (14)	0.54	0.04	0.71	0.66	0.70	0.48	-0.09	0.09	0.17	0.11	0.49	0.38	0.09	

Winsorize cont. vars at 1st and 99th percentile

Lower Triangle is Spearman Correlation

Upper Triangle is Pearson Correlation

Table 3: Determinants of Logarithm of Law Firm Efficiency

	EFFICIENCY
PARTtoLAW	-0.235***
	(0.048)
LAWYERS	-0.258***
	(0.013)
REVSHARE	0.402***
	(0.014)
INTERN	-0.023**
	(0.010)
FIRMAGE	0.038***
	(0.009)
NORTHEAST	-0.016***
	(0.005)
MIDWEST	0.012
	(0.010)
WEST	-0.033***
	(0.008)
SOUTH	0.037***
	(0.004)
N	2,099
R^2	0.752
Adjusted R^2	0.748

Notes: ***Significant at the 1 percent level.

**Significant at the 5 percent level.

*Significant at the 10 percent level.

Include year fixed effects and cluster standard errors by year.

Winsorize all continuous variables at the 1st and 99th percentile.

The dependent variable is logarithmically transformed.

Table 4: Persistence of Organizational Ability

	ABILITY (t+1)		ABILITY (t+2)		ABILITY (t+3)	
	(1)	(2)	(3)	(4)	(5)	(6)
ABILITY	0.924***		0.856***		0.786***	
	(0.010)		(0.018)		(0.026)	
HIABILITY		0.930***		0.883***		0.827***
		(0.014)		(0.019)		(0.028)
LOABILITY		-0.917***		-0.827***		-0.739***
		(0.022)		(0.030)		(0.038)
LAWYERS	-0.012**	-0.011**	-0.018***	-0.016***	-0.026***	-0.022***
	(0.005)	(0.005)	(0.005)	(0.005)	(0.007)	(0.007)
REVENUE	0.025***	0.024***	0.042***	0.039***	0.058***	0.054***
	(0.006)	(0.006)	(0.008)	(0.008)	(0.010)	(0.011)
INTERN	0.005	0.005	0.010*	0.010*	0.016**	0.016**
	(0.003)	(0.004)	(0.006)	(0.006)	(0.006)	(0.006)
FIRMAGE	0.003	0.003	0.007	0.008	0.013	0.014
	(0.005)	(0.005)	(0.007)	(0.007)	(0.009)	(0.009)
NORTHEAST	0.002	0.002	0.005*	0.005*	0.008**	0.008**
	(0.002)	(0.002)	(0.003)	(0.003)	(0.004)	(0.004)
MIDWEST	0.001	0.001	-0.0001	-0.0002	-0.0002	-0.0003
	(0.003)	(0.003)	(0.004)	(0.004)	(0.004)	(0.004)
WEST	-0.003	-0.003	-0.001	-0.001	0.001	0.002
	(0.004)	(0.004)	(0.006)	(0.006)	(0.008)	(0.008)
SOUTH	0.0003	0.0003	-0.001	-0.001	-0.005	-0.005
	(0.002)	(0.002)	(0.003)	(0.003)	(0.004)	(0.004)
N	1,953	1,953	1,811	1,811	1,673	1,673
R^2	0.870	0.870	0.783	0.783	0.694	0.695
Adjusted R^2	0.868	0.868	0.779	0.780	0.690	0.690

Notes: ***Significant at the 1 percent level.

**Significant at the 5 percent level.

*Significant at the 10 percent level.

Include year fixed effects and cluster standard errors by year.

Winsorize all continuous variables at 1st and 99th percentile.

Table 5: Predictability of Organizational Ability

	REVperLAW (t+1)		REVperLAW (t+2)		REVperLAW (t+3)	
	(1)	(2)	(3)	(4)	(5)	(6)
ABILITY	147.372***		133.501***		128.300***	
	(26.077)		(31.430)		(35.708)	
HIABILITY		283.735***		275.042***		293.139***
		(61.743)		(61.758)		(62.500)
LOABILITY		2.160		23.799		56.741
		(40.511)		(44.484)		(53.293)
LAWYERS	-783.226***	-772.958***	-784.436***	-773.522***	-785.597***	-772.737***
	(18.841)	(21.978)	(23.513)	(26.114)	(27.474)	(29.933)
REVENUE	772.696***	761.678***	771.291***	759.166***	773.083***	758.222***
	(22.916)	(27.107)	(27.957)	(31.566)	(32.745)	(36.207)
INTERN	-12.494	-11.360	-13.391	-12.051	-13.668	-11.537
	(13.067)	(13.613)	(12.448)	(13.004)	(13.495)	(14.015)
FIRMAGE	-9.422**	-5.258	-2.400	2.142	-3.606	2.097
	(4.573)	(5.817)	(5.671)	(6.715)	(7.210)	(8.043)
NORTHEAST	-5.357	-5.078	-4.000	-3.614	-1.581	-0.928
	(3.767)	(4.076)	(5.303)	(5.573)	(6.429)	(6.694)
MIDWEST	0.382	-0.399	0.912	0.384	2.950	2.703
	(5.902)	(5.595)	(5.347)	(5.204)	(4.430)	(4.342)
WEST	-8.970***	-6.396**	-3.824	-1.045	2.407	5.630
	(3.447)	(3.163)	(4.490)	(4.271)	(5.859)	(5.335)
SOUTH	-11.895***	-12.457***	-10.787*	-11.479*	-9.057	-9.993
	(4.544)	(4.782)	(5.640)	(6.013)	(6.024)	(6.404)
N	1,953	1,953	1,811	1,811	1,673	1,673
R^2	0.929	0.930	0.907	0.908	0.888	0.890
Adjusted R^2	0.928	0.929	0.905	0.907	0.886	0.888

Notes: ***Significant at the 1 percent level.

**Significant at the 5 percent level.

*Significant at the 10 percent level.

Include year fixed effects and cluster standard errors by year.

Table 6: Determinants of Ability through Channels of Human Capital

	ABILITY (t+1)			
	(1)	(2)	(3)	(4)
PARTtoLAW	0.159***		1.267***	
	(0.051)		(0.088)	
NPARTtoLAW		-0.159***		-1.267***
		(0.051)		(0.088)
PARTtoLAW*FIRMAGE			-0.476***	
			(0.037)	
NPARTtoLAW*FIRMAGE				0.476***
				(0.037)
LAWYERS	-0.123***	-0.123***	-0.127***	-0.127***
	(0.019)	(0.019)	(0.017)	(0.017)
REVENUE	0.147***	0.147***	0.144***	0.144***
	(0.013)	(0.013)	(0.013)	(0.013)
INTERN	0.033**	0.033**	0.027***	0.027***
	(0.014)	(0.014)	(0.009)	(0.009)
FIRMAGE	0.003	0.003	0.208***	-0.268***
	(0.016)	(0.016)	(0.018)	(0.027)
NORTHEAST	0.005	0.005	-0.002	-0.002
	(0.008)	(0.008)	(0.007)	(0.007)
MIDWEST	0.001	0.001	-0.017	-0.017
	(0.013)	(0.013)	(0.011)	(0.011)
WEST	0.003	0.003	-0.003	-0.003
	(0.010)	(0.010)	(0.010)	(0.010)
SOUTH	0.012**	0.012**	0.001	0.001
	(0.005)	(0.005)	(0.004)	(0.004)
N	1,811	1,811	1,811	1,811
R^2	0.088	0.088	0.156	0.156
Adjusted R^2	0.074	0.074	0.143	0.143

Notes: ***Significant at the 1 percent level.

**Significant at the 5 percent level.

*Significant at the 10 percent level.

Include year fixed effects and cluster standard errors by year.