

PROFITABILITY RATIO ANALYSIS FOR PROFESSIONAL SERVICE FIRMS

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## ABSTRACT

The DuPont analysis is one of the most commonly used financial analysis tools for traditional businesses. It disaggregates return on equity (ROE) into profit margin (PM), asset turnover (ATO), and leverage (LEV) thereby providing value-relevant information relative to aggregated profitability. In this paper, I extend the use of the DuPont model to the professional service industry. The professional service industry has recently become one of the fastest growing segments driving the U.S. economy (USITC 2009, U.S. Census Bureau of Economic Analysis 2009). Unlike traditional businesses whose key business assets are their physical assets, professional service firms rely on human capital assets that are not recognized in the balance sheet. I introduce a profitability ratio analysis model that focuses on human capital. I validate the model by examining whether the disaggregated profitability ratios for professional service firms add relevant information over aggregated ratio in the same way as they do for traditional businesses.

I use law firms as a representative segment of the professional service sector to empirically evaluate my model. I collect financial and human resource data for 81 of the 100 largest U.S. law firms from 2000 to 2007 then disaggregate profit per equity partner (PPP) into the three profitability ratios: profit margin (PM), revenue per lawyer (RPL), and leverage (LEV). I compare the absolute forecasting error (AFE) of the simple AR (1) model that uses only the current year profit per equity partner (PPP) to forecast one-year ahead profit per equity partner (PPP) and my model that uses the three profitability ratio model (PM, RPL, and LEV) of current year to forecast one-year ahead profit per equity partner (PPP). I find that using the disaggregated profitability ratios

significantly improves forecasting of future profitability relative to using only profit per equity partner (PPP), analogous to similar results documented for the DuPont model in Fairfield and Yohn (2001) and Soliman (2004).

I examine which firm characteristics are associated with the profitability ratios. I include four firm characteristics variables (STRUCTURE, SCOPE-INTL, SCOPE-RGNL, and SCALE) that are commonly used in economic analysis of industrial organizations. I find that the profitability ratios are systematically associated with firm characteristics that reveal information on the business models of individual firms. Leverage (LEV) is higher in law firms with non-equity partners (STRUCTURE), international focus (SCOPE-INTL), regional focus (SCOPE-RGNL), or large size (SCALE). Law firms that are large sized (SCALE) or regional focused (SCOPE-RGNL) command premium fee (high RPL) on average, but law firms with international focus or with non-equity partners do not.

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# CHAPTER 1: INTRODUCTION

## 1.1 Motivation

There has been a steady shift in the source of economic growth in the U.S. from production and consumption of manufacturing goods to provision and consumption of services and information (Bell 1974). In recent years, manufacturing firms have handed over the role of vanguard to the U.S. economy to professional service firms (e.g., legal services, computer systems design and related services, and miscellaneous professional, scientific and technical services).<sup>1</sup> According to the U.S. Bureau of Economic Analysis (2009), the contribution of professional service firms to the U.S. GDP has surpassed that of manufacturing firms since the new millennium.<sup>2</sup> In 2007, 79% of the U.S. private sector GDP was from the service sector and 17% of that was from the professional services industry (USITC 2009). The contribution of the professional service industry reached \$1.7 trillion in 2007. And it has been growing at an average annual rate of 7.05%, faster than the average 5.46% growth rate for the U.S. GDP and 3.10% growth rate for manufacturing industry (U.S. Bureau of Economic Analysis 2008). In 2008, professional service firms contributed 12.7 % of the U.S. GDP, compared to only 11.5 % contributed by manufacturing firms and continuing to lead over manufacturing firms.<sup>3</sup>

Given the economic importance of professional service firms, I extend the

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<sup>1</sup> The U.S. Bureau of Economic Analysis (2009) uses the North American Industry Classification System (NAICS) to classify industries. NAICS code for manufacturing firms is 3111-3399 and for professional service firms is 5411-5419.

<sup>2</sup> The contribution of professional service firms to the U.S. GDP has increased from 11.4 % in 2003 to 12.7 % in 2008. On the other hand, the contribution of manufacturing firms to the U.S. GDP has decreased from 15.9 % in 1995 to 11.5 % in 2008.

<sup>3</sup> In 2008, the major contributors to the U.S. GDP were finance and insurance (7.5%), real estate, rental and leasing (12.5%), professional and business services (12.7%), manufacturing (11.5%) and from government (12.9%); the service sector as a whole contributed 68.2% (U.S. Bureau of Economic Analysis 2009).

application of a commonly used method of financial analysis, the DuPont model, to professional service firms. The original DuPont model is used to analyze profitability as well as the strategic position of firms<sup>4</sup> and is based on balance sheet (e.g., assets, and equity) and income statement accounts (e.g., sales revenues, and operating income) (Figure 1). Due to a fundamental difference in defining the key business assets, professional service firms were not the target of the original DuPont model. Assets used in the original DuPont model are physical assets that are disclosed in a balance sheet (e.g., property, plants, equipment). However, professional service firms use their human capital (i.e., professionals)<sup>5</sup> as key assets and they are not included in a balance sheet. Therefore, profitability ratios based on physical assets such as return on assets (ROA), and asset turnover (ATO) are not as meaningful to professional service firms as they are to manufacturing firms. A modified profitability ratio model that focuses on human capital assets is required for financial and strategic analyses of professional service firms. In this research, I suggest such a profitability ratio model, and validate its usefulness in the context of forecasting the future profitability for a sample of the largest U.S. law firms over the period of 2000 to 2007. Profitability ratios such as leverage (LEV), profit margin (PM), revenue per lawyer (RPL), and profit per equity partner (PPP) have been commonly used in the legal industry to compare the performance of law firms (Gilson and Mnookin 1989, Henderson 2006, DiPietro 2008, Galanter and Henderson 2008, Feuer 2009) (Appendix 6). I extend the DuPont model to connect existing profitability ratios to make them more meaningful thereby providing information about the business

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<sup>4</sup> The DuPont model has been developed originally for manufacturing firms such as automobiles and chemicals. It is also applicable in retail and wholesales trade, agriculture, mining, utilities, construction, and transportation industries.

<sup>5</sup> Professional service firms also have physical assets (e.g., offices, computers) but they are supplementary assets which supports human capital.

model of law firms.

## 1.2 Manufacturing Firms vs. Professional Service Firms

Despite the growing importance of professional service firms in the U.S. economy, professional service firms have not benefited much from the profitability ratio analyses which are introduced in number of financial statement analysis textbooks (Penman 2001, Palepu et al. 2007, Smart and Megginson 2008, Hirschey 2009). The profitability ratio analysis is not as informative for the professional service firms as it is for the manufacturing firms because of the differences in defining their key business assets business process, and output. The professional service industry uses human capital assets to generate revenue, whereas manufacturing firms use physical assets (Sander and Williams 1992). For example, accounting firms (e.g., PricewaterhouseCoopers, Ernst & Young, Deloitte Touche, and KPMG) use accountants as key business assets to provide management advisory, audit, and tax services to their clients: law firms (e.g., Baker & McKenzie, Skadden, Jones Day, White & Case, Mayer Brown, and etc.) use their lawyers as key business assets to provide legal services to their clients. Through their professional judgment and expertise, the firms' employees provide highly customized services to their clients and, in return, they earn fee revenues (Zeithaml et al. 1985, Song et al. 1999, Nordenflycht 2009). The profitability of professional service firms is, therefore, determined by the ability and competence of each professional, whereas the profitability of manufacturing firms is determined by the accessibility of their physical assets. Unlike the physical assets of manufacturing firms which are disclosed in their financial statements, especially in the balance sheet, the ability, availability and

competence of the human capital assets of professional service firms are not disclosed in their financial statements and are, in fact, hard to measure.<sup>6</sup> In addition, the nature of manufacturing firms' and professional service firms' output is very different: manufacturing firms produce goods and professional service firms provide services.

The sources of assets of professional service firms are also different from manufacturing firms. The owners of manufacturing firms contribute financial capital, whereas the owners of professional service firms contribute human capital. To leverage the financial contribution of the owners, manufacturing firms borrow financial capital to extend their operations. To leverage expertise of partners, professional service firms employ professionals. Therefore, the sources of assets for manufacturing firms are liabilities and owners' equity while professional service firms' assets are from the human capital of professionals and equity partners.<sup>7</sup>

The way professional service firms develop a competitive advantage is slightly different from that of manufacturing firms. According to Porter (1996), manufacturing firms can gain a competitive advantage by differentiation or by achieving high operational efficiency. Firms that pursue the differentiation strategy can gain a competitive advantage by successfully differentiating themselves from their competitors.<sup>8</sup>

Firms that are not able to differentiate themselves can gain a competitive advantage by

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<sup>6</sup> A line of literature on valuing human capital assets in the organization exists but the value of human capital is not explicitly recognized in the balance sheet (Brummet et al. 1968, Flamholtz 1972, Ogan 1976). As a result, it is hard to know the value human capital assets of professional service firms. Hence in the paper, I am attempting to measure human capital simply using the number of human capital assets.

<sup>7</sup> Human capital is both assets and equity. If equity partners contribute, it becomes equity and if non-owners contribute (e.g., non-equity partners, professionals), it becomes assets.

<sup>8</sup> A classical example is General Motors. General Motors has Cadillac as a high-end auto line that pursues the differentiation strategy. Cadillac is able to command price premium compared to other automobile lines because it succeeded in differentiating itself as a superior brand.

efficient use of their assets.<sup>9</sup> Successful strategic positioning of the firms which is important to gain a competitive advantage is influenced by the key assets and business processes of the firm. Many professional service firms use the tacit knowledge of professionals to provide unique and very client-specific services (Maister 1997, Greenwood and Empson 2003, Lowendahl 2005). The competitive advantage of the professional service industry is determined by the firm's reputation and experience as an expert in certain service areas (e.g., Big 4 accounting firms in the accounting industry). Because of the differences in the nature of business operations and the assets they use to generate profit, the profitability decomposition framework is not very informative for professional firms in terms of identifying the source of profitability which defines the strategic position of a firm. In order to make the profitability ratios applicable and relevant to professional service firms, human capital, rather than the physical assets, must be considered as assets.

### 1.3 Outline

The original DuPont model disaggregates returns on the financial capital contribution of owners (ROE) into three parts: profit margin (PM), asset turnover (ATO), and leverage (LEV) (Palepu et al. 2007, Smart and Megginson 2008, Hirschey 2009) (Figure 1). Profit margin (PM) measures the operating performance of the firm and expressed by the operating income to the sales revenue (Livingstone and Grossman 2002). Asset turnover (ATO) measures the efficiency of a firm's use of its assets in generating sales revenue (Bodie et al. 2004). Leverage (LEV) measures how firm assets

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<sup>9</sup> From the example of General Motors, Chevrolet is a low-end auto line that pursues the operational efficiency strategy. Customers do not pay premium price for Chevrolet cars so it needs to achieve high operation efficiency to earn satisfactory return on assets (ROA).



are financed and is used as a financing multiplier to raise returns for owners' contributions (Livingstone and Grossman 2002).

In this study, I modify each component ratio and suggest a profitability ratio model for professional service firms (Figure 2)<sup>10</sup> which disaggregates profit per equity partner (PPP) into three ratios: profit margin (PM), human capital productivity (HCP), and leverage (LEV). The owners of professional service firms, the partners, contribute their human capital to the firm and in return they share in the firms' profits. I use the number of partners as a measure of owners' equity for professional service firms.<sup>11</sup> Hence, profit per partner (PPP) is a proxy for returns on human capital contributions of the partners, similar to return on equity (ROE) in the original DuPont model. For profit margin (PM), I use the same definition used for the manufacturing firms: the proportion of net income to the revenue. As a measure of total assets, I use the number of human capital assets, the professionals. Hence, as a measure of asset turnover for professional service firms, I use human capital productivity (HCP), which is the amount of revenue generated by each professional. Leverage (LEV) is measured by the proportion of total assets to the owners' equity. Hence, I use the proportion of the number of professionals to the number of partners.

To demonstrate the application and relevance of my profitability ratio model, I use the largest U.S. law firms, as a sample. Using U.S. law firms from 2000 to 2007, I validate the relevance of the profitability ratio model by forecasting one-year ahead profitability. Based on the profitability ratio model for professional service firms, I disaggregate the profit per equity partner (PPP) of law firms into profit margin (PM),

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<sup>10</sup> It applies to all firms that use assets that are not recognized in the balance sheet.

<sup>11</sup> See Chapter 3 for additional explanation on the measure of human capital assets.

revenue per lawyer (RPL), and leverage (LEV) (Figure 3). The professionals in law firms are lawyers, so I use the number of lawyers as assets in the profitability ratio model. I hypothesize that if the disaggregated profitability ratios add incremental information over the aggregated profitability ratios, forecasting of future profitability using the disaggregated profitability ratios will be more accurate than using the aggregated profitability ratio alone. To test my hypothesis, I compare the absolute forecasting error (AFE) between the simple AR (1) model, which only uses the prior year profit per equity partner (PPP) to forecast one-year ahead profit per equity partner (PPP), and the three profitability ratio model, which uses the prior year profit margin (PM), revenue per lawyer (RPL), and leverage (LEV) to forecast one-year ahead profit per equity partner (PPP). The results show that use of three profitability ratio model provides additional information about how firms generate their revenue (e.g., business strategy) hence improves forecasts of future profitability.

In order to examine the underlying firm characteristics that reflect business operations and the strategy of law firms, I consider three firm characteristics from the industrial organization studies (STRUCTURE, SCOPE, and SCALE) and construct four ratio equations (Model 3). The STRUCTURE is a measure of the partnership structure: whether or not a firm has non-equity partners. Law firms with non-equity partners tend to have low revenue per lawyer (RPL) but high leverage (LEV). Non-equity partners do not have ownership interest in the firm so they leverage the human capital contribution of the equity partners. In addition, they are less capable and less reputable than the equity partners in terms of “rainmaking”<sup>12</sup> and handling important clients, so they cannot

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<sup>12</sup> “The rain maker is someone who generates new business on a consistent basis and the real role of the rain maker is to develop a vision of growth and change for the firm.” (Roberts 1997)

command premium fee. Although non-equity partners are not as reputable as equity partners and therefore cannot command fee premium, more and more law firms are adding non-equity partners in their partnership structure hence I expect the STRUCTURE to reflect these business decisions. I include two variables as measures for the SCOPE of the law firm: international and regional law firms. The international law firms and regional law firms have developed different business models and strategies to meet the needs of their clients hence I expect two variables of SCOPE will provide incremental information on how the business strategies of law firms with different geographical and operational scope affects the four profitability ratios of the DuPont model. I also include the size of the law firms, an indicator of the SCALE of the law firm, because it reflects the market power of law firms which affects their pricing power: larger law firms have more power in pricing their services therefore, they can have a monopolistic power on attracting larger clients and can dominate the market. The SCALE of law firm is also one of the major factors that determine market position and target clientele hence, I expect SCALE is also one of the factors that explains the business strategy of law firms. From the four ratio equations, I find that the disaggregated earnings components reflect incremental information on the STRUCTURE, SCOPE, and SCALE of law firms. Consequently, such incremental information enhances the ability to predict future profitability.

The remainder of the paper is structured as follows: in Chapter 2, The DuPont Analysis, I review literature on decomposition framework, the DuPont model, strategic positioning information embedded in the DuPont model and how to validate the information gained from the DuPont Model. In Chapter 3, Human Capital Intensive

Firms, I introduce the human capital intensive firms and modify profitability ratio model for professional service firms. In Chapter 3, I also describe the implications about strategic positioning that can be made using a modified profitability ratio model for professional service firms. In Chapter 4, Law Firms, I explain the legal industry and demonstrate the modified profitability ratio model for law firms. I include a subsection in Chapter 4 which demonstrates how law practitioners and legal literature are using profitability ratios. I also link their modified profitability ratio model with the strategic positioning of law firms and support the link using law firm characteristics. In Chapter 5, I explain the data and construct variables, develop models to test my research questions and report results and include the robustness check of my results. In Chapter 6, Firm Characteristics and Profitability Ratios, I explain my variables and develop model to support my link between strategic positioning and firm characteristics and results. In Chapter 7, Conclusion, I summarize my findings and in Chapter 8, Future Research, I propose future research areas that are interesting to explore using my profitability ratio model.

## CHAPTER 2: THE DUPONT ANALYSIS

### 2.1 Decomposition Framework for Manufacturing Firms

Along with the DuPont model, the disaggregation of profitability into a number of components is a technique commonly used in the accounting literature as a way to improve the forecasting of profitability by uncovering value-relevant information (Kothari 2001). Ou and Penman (1989) use different accounting ratios and examine their contributions to predict future profitability. Ohlson and Penman (1992) disaggregate earnings into several line items and examine whether the disaggregation of earnings adds value-relevant information compared with using aggregated earnings. Kothari (2001) notes that using different levels of persistence of earnings components can improve the earnings forecast. Kormendi and Lipe (1987) find that forecasts based on more persistent earnings components provide a better earnings prediction than those based on less persistent earnings components. Banker and Chen (2006) build a forecasting model that incorporates cost variability as well as cost stickiness to measure the forecasting error. They compare their forecasting error with three other models that use different decomposition methods to forecast future earnings: 1) Sloan (1996) model that disaggregates earnings into cash flow and accrual components, 2) Fairfield et al. (1996) model that disaggregates earnings into operating income and non-operating income, and 3) simple AR (1) model using return on equity (ROE) only. They find that their forecasting model, which takes into account cost variability and cost stickiness, provides a more accurate prediction of future earnings than the other three models. To summarize, the accounting literature shows that the decomposition of earnings techniques

improves forecasting of future earnings by adding information about how earnings have been created.

## 2.2 The DuPont Analysis for Manufacturing Firms

The DuPont analysis has been introduced in the financial statement analysis textbooks as a valuation framework that reveals information about the strategic position of the industry sector companies (Bernstein and Wild 2000, Stickney and Brown 1999, Revsine et al. 1999). The DuPont model was originally developed in the early part of the twentieth century<sup>13</sup> for manufacturing firms such as automobiles and chemicals.<sup>14</sup> Using the relative importance of two profitability ratios, profit margin (PM) and asset turnover (ATO), the DuPont model has been used as an indicator for the strategic position of the firm (Stickney and Brown 1999, pp.563-564).

There are several studies that use information on strategic positioning of the firm to identify value-relevant profitability ratios and improve forecasting of future profitability. Soliman (2004) uses the industry-adjusted DuPont model to separate return on the net operating assets (RNOA) into asset turnover (ATO) and profit margin (PM). He finds that use of the disaggregated profitability ratios (ATO and PM) adds strategic positioning information over using the aggregated ratio, and improves the prediction of future profitability. According to Soliman (2004), the DuPont model makes a more accurate profitability forecast by identifying the specific profitability ratios that played influential roles in past performance.

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<sup>13</sup> The DuPont model was introduced to the DuPont Company when Donaldson Brown was its chief financial officer (CFO). The strategic importance of this analytical model was demonstrated in General Motors Corporation when Alfred P. Sloan, its chief executive officer (CEO), hired Brown as his CFO in the 1920s to help implement its multi-divisional strategy (Kaplan and Atkinson 1998, p.500).

<sup>14</sup> The DuPont model is also applicable in retail and wholesale trade, agriculture, mining, utilities, construction and transportation industries.

Fairfield and Yohn (2001) disaggregate changes in the return on assets (ROA) into changes in the asset turnover (ATO) and in the profit margin (PM) to forecast one-year ahead changes in return on assets (ROA). They use the first half of their sample period for the estimations and then use those estimations to forecast changes in return on assets (ROA) for the second half of their sample period. They measure the forecasting error by comparing how close forecasted changes in return on assets (ROA) are to actual changes in return on assets (ROA) for the second half of their sample period. Fairfield and Yohn (2001) found supporting results that decomposition of changes in the return on assets (ROA) into changes in the asset turnover (ATO) and changes in the profit margin (PM) improved the accuracy of forecasting the future changes in the return on assets (ROA) by adding value-relevant information.

The return on owner's equity (ROE) equation for typical manufacturing firms can be expressed as follows (Peterson and Fabozzi 1999, Livingstone and Grossman 2002, Palepu et al. 2007, Stowe et al. 2007, Smart and Megginson 2008, Hirschey 2009):

$$\begin{aligned} \text{Return on owners' equity (ROE)} &= \frac{\text{Net Income}}{\text{Sales}} \times \frac{\text{Sales}}{\text{Assets}} \times \frac{\text{Assets}}{\text{Equity}} \\ &= (\text{Profit Margin}) \times (\text{Asset Turnover}) \times (\text{Leverage}) \end{aligned}$$

The return on owner's equity (ROE) measures how successful the managers are in using the financial capital investment of shareholders, who are the owners of the firm. Higher return on owner's equity (ROE) means that owners get more returns for their financial capital investment and vice versa. With the DuPont model, return on owner's equity (ROE) can be disaggregated into three profitability ratios: profit margin (PM), asset turnover (ATO), and leverage (LEV). The profit margin (PM) measures how much net income was generated from each dollar of sales. The profit margin (PM) is an indicator

of price premium. In general, high profit margin (PM) means firms are enjoying high margin from the sales they are making and low profit margin (PM) indicates a low margin from sales. The asset turnover (ATO) measures the degree of asset utilization (i.e., the efficiency of using their assets to generate sales revenue). The assets for manufacturing firms usually mean net operating assets from the balance sheet. The asset turnover (ATO) tells how much of the sales revenue is generated from each dollar of assets. For typical manufacturing firms, leverage (LEV) which is the proportion of assets to equity measures the financial capital contributed by owners (e.g. shareholders) being leveraged by adding the financial capital borrowed from non-owners (e.g. creditors). The total operating assets needed in business can be fueled by the long-term financial capital contributed by owners and borrowed from non-owners. Therefore, the leverage (LEV) reveals information on the financing strategy of the firm and shows whether firms used the financial capital provided by creditors or by owners to finance their assets. High leverage (LEV) means that firms prefer financing their assets using the financial capital provided by creditors while low leverage (LEV) indicates that firms prefer financing by the owners (Livingstone and Grossman 2002).

### 2.3 Strategic Positioning of Manufacturing Firms

Asset turnover (ATO) and profit margin (PM) together determine the return on assets (ROA) of the company. The level of profit margin (PM) and asset turnover (ATO) varies across the industries and the relative importance of profit margin (PM) and asset turnover (ATO) is used to define the firms' strategic position: operational efficiency (cost leadership) and/or differentiation (Porter 1996). For example, firms that succeeded in



differentiating themselves as superior to competitors can command price premium, which is reflected in high profit margin (PM). Hence, the profit margin (PM) will be emphasized for firms with a differentiation strategy (Selling and Stickney 1989, Porter 1996). On the other hand, firms that cannot differentiate themselves from competitors need to achieve operational efficiency to gain competitive advantage. They need to achieve high asset turnover (ATO) to increase profits by generating more revenue from their existing assets. Therefore, the asset turnover (ATO) will play a more influential role for firms with an operational efficiency strategy (Selling and Stickney 1989, Porter 1996). One of the classic examples of differentiation and operational efficiency strategies is General Motors. General Motors has Cadillac as a high-end auto line that pursues the differentiation strategy and Chevrolet as a low-end that pursues an operational efficiency strategy. Cadillac is able to command a price premium compared to other automobile lines because it succeeded in differentiating itself as a superior brand. Its price premium is reflected in the profitability ratios of the DuPont model: relatively higher profit margin (PM) than asset turnover (ATO). On the other hand, Chevrolet fails to command price premium and as a result, it needs to achieve high operation efficiency in order to maintain adequate profitability. Chevrolet needs to keep its operating cycle short by quickly moving its cars from the production line to the customer. In addition, by lowering production costs, it can be more competitive in pricing which, in turn, helps it to gain sales volume.<sup>15</sup>

By analyzing 22 two-digit SIC industries from 1977 to 1986, Selling and Stickney (1989) find that the capital-intensive industries with high operating leverage have a low

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<sup>15</sup> The operational efficiency enables the cost leadership but Porter (1996) describes more in terms of the operational efficiency.

asset turnover (ATO) and high profit margin (PM) while the industries with low entry barriers and less product differentiation tend to have low profit margin (PM) and high asset turnover (ATO). They also find that, generally, firms that pursue the operational efficiency (cost leadership) strategy tend to rely on high asset turnover (ATO) and low profit margin (PM) and firms that pursue the differentiation strategy tend to rely on high profit margin (PM) and low asset turnover (ATO).

#### 2.4 Validation of Informativeness of the DuPont Model

To determine if the disaggregation of profitability into profitability ratios adds incremental information on the business operations of professional service firms, I follow what has been done in the prior accounting literature; I forecast their future profitability. I use the manufacturing firms' profitability decomposition framework, the DuPont model, and extend it to professional service firms to examine whether this decomposition adds incremental information about their business operations.

To extend it, I adjust for their differences in defining assets (i.e., manufacturing firms rely on physical assets, professional service firms on human capital as the business assets). Because of the common factor, assets are used to generate future economic benefits,<sup>16</sup> and goal, to maximize the return to the owner of the firm, I am able to apply the profitability assessment framework used in manufacturing firms to professional service firms. The sources of assets, however, are different between manufacturing firms and professional service firms. Manufacturing firms' assets are from borrowed funds (liabilities) and financial capital contributions (owners' equity) whereas professional service firms' assets are from employing professionals and human capital

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<sup>16</sup> This is the definition of assets provided by the International Accounting Standards Board (IASB).

contributions of partners.

Profitability analyses of manufacturing firms has commonly appeared in the financial statements and corporate finance textbooks (Palepu et al. 2004, Palepu et al. 2007, Stowe et al. 2007, Smart and Megginson 2008, Hirschey 2009). Many textbooks state that the DuPont analysis provides information on the effectiveness of using assets and of financing strategy (Hirschey 2009). Therefore, a number of studies evaluate value-relevance of the DuPont model by comparing the forecasting error in predicting future profitability. If the DuPont model adds additional information on the strategic position of the firm, it will predict future profitability of the firm with smaller forecasting error compared to the time series model that ignores component ratios (Fairfield and Yohn 2001, Soliman 2004, Banker and Chen 2006).

## CHAPTER 3:

### HUMAN CAPITAL INTENSIVE FIRMS

#### 3.1 Background on Human Capital Intensive Firms

Professional service firms are characterized as suppliers of knowledge intense services using a professional workforce (Nguyen-Hong 2000). Unlike manufacturing firms, professional service firms use the knowledge of their human capital resources to generate firm revenue. Professional service firms commonly include law firms, accounting firms, consultants (management, technology, and engineering), computer systems design firms, advertising and public relation service firms, investment bankers and insurance brokers (Lowendahl 2005).

Professional service firms use human capital as their key business assets. They rely heavily on human capital assets (input) to attract clients and to provide the professional services (output) to their clients (Chang and Birkett 2004). It has been well documented in the literature that human capital is the primary assets for professional service firms and it is predominantly important asset which determines firm profitability (Maister 1997, Middlebrook and Terril 2000, Hitt et al. 2001, Nordenflycht 2009). The services they provide require the judgment and expertise of professionals and the firms' success depends heavily on the intellectual capability of their human capital (Flamholtz et al. 2003). Their services are highly customized to client's needs and are often hard to standardize. The most valuable human capital assets in professional service firms are those who have the most tacit knowledge and the skills needed to maintain a good business relationship with the clients (Hitt et al 2001). In professional service firms, the partners are the most valuable asset because they improve long-term firm performance

(i.e., “rainmaker”). As the owners of the firm, partners contribute their human capital as an equity investment. They also handle important clients and manage professionals in the firm to maximize profit. As a return for contributing the most valuable human capital, the partners share the firm’s profits and losses.

There have been several studies in human resource accounting that acknowledge the growing importance of human capital in economic success of firms (Brummet et al. 1968, Flamholtz 1972, Ogan 2001, Flamholtz et al. 2003). Because human capital is not recognized in the balance sheet like physical assets, it is hard to value and quantify human capital. Flamholtz (1971) notes that the value of the service which individual professionals provide determines his/her value in the firm. Therefore, he develops a human resource valuation model that measures the value of human resource. Despite ongoing studies in this area, human capital has not been recognized as an asset in the balance sheet because it is very difficult to quantify the value of human capital. Therefore, in this paper I use the number of each types of human capital as an alternative measure to quantify them.

### 3.2 The DuPont Analysis for Human Capital Intensive Firms

I use profit per equity partner (PPP) as the analogy of the return on owners’ equity (ROE) for professional service firms: profit as a return on the contributed human capital resources of the partner (owner). To evaluate the profitability of professional service firms, I modified the return on owners’ equity (ROE) equation of the DuPont model as

follows:<sup>17</sup>

Return on the owners' human capital (ROE) = profit per equity partner (PPP)

$$\begin{aligned} &= \frac{\text{Net Income}}{\text{Sales}} \times \frac{\text{Sales}}{\text{Human capital}} \times \frac{\text{Human capital}}{\text{Equity partners}} \\ &= (\text{Profit Margin}) \times (\text{Human Capital Productivity}) \times (\text{Leverage}) \end{aligned}$$

The first component, the profit margin (PM) of professional service firms is similar to that of manufacturing firms: it measures how much profit the firm generates from each dollar of sales. For manufacturing firms, the profit margin (PM) is used as an indicator of price premium however, for professional service firms the human capital productivity (HCP) is better measure of premium fee. Although premium fee is reflected in the profit margin (PM) of professional service firms, it is affected by many other factors such as changes in price of inputs (e.g., compensation of professionals) and outputs (e.g., fee they charge for their services) and other operating expenses (e.g., space, information systems, support staffs costs and etc.) (Maister 1997). Especially, in professional service firms, the compensation of professionals takes large portion of their operating expense. If professional service firms hire highly competent professionals to provide high-end services, they may be able to get premium fee but competent professionals are expensive to have (need to compensate them more) which decreases the margin.

The second component is the human capital productivity (HCP): the total human capital of the company consists of the human capital contributed by owners (e.g. equity partners) as well as by non-owners (e.g. professionals). The human capital productivity (HCP) measures the productivity of professionals: the amount of sales revenue that each

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<sup>17</sup> Maister (1997) also suggests similar profitability formula framework for professional service firms. However, he fails to make implication of each profitability ratios of professional service firms with their business model. In addition, he fails to connect to the framework of Poter's (1996) generic strategies.

human capital resource is making (Hildebrandt International 2004). Unlike asset turnover (ATO) for manufacturing firms, the human capital productivity (HCP) is closely related premium fee: if professional service firms provide high-end service using more competent professionals, they will be able to command premium fee, which increases the human capital productivity (HCP).<sup>18</sup> Since professional service firms are using human capital resources to provide intangible services to their clients, it is hard to interpret the human capital productivity (HCP) in the same way as manufacturing firms' asset turnover (ATO). Explaining in terms of operational efficiency is not appropriate for professional service firms because their services cannot be mass-produced for all clients. I adopt the more pertinent interpretation of the human capital productivity (HCP): professionals increase human capital productivity (HCP) by taking high-end projects on which he/she can command premium fee.

The third component, the leverage (LEV) measures how much the human capital contribution of non-owners is used to leverage the contributed human capital of the partners in professional service firms (Samuelson and Jaffe 1990, Schmitt 2005). In general, a partner teams up with other professionals (non-owner human capital) to work on a project. Having more human capital per partners measures the strength of supervision that each partner has on his/her professionals. High leverage (LEV) indicates that partners cannot provide a close supervision on their professionals and low leverage (LEV) indicates that partners are providing a close supervision. Generally, high-end and complex projects rely heavily on partners' expertise and knowledge hence

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<sup>18</sup> Professional service firms can also increase human capital productivity (HCP) by increasing work hours of their professionals. Having their professionals to work more billable hours, they can also increase human capital productivity (HCP). But most professional service firms utilize their human capital resources to the maximum capacity. So increasing human capital productivity (HCP) by having professionals to work more hours is very restrictive.

those have to be handled by low leverage (LEV). On the other hand, low-end and less complex projects can be handled with high leverage (LEV): they do not rely heavily on partners' expertise hence, more projects can be handled using more number of professionals.

### 3.3 Strategic Position of Human Capital Intensive Firms

Although the profitability ratio model is analogous to the DuPont model, each profitability ratios have different implication. For professional service firms, the leverage (LEV) and human capital productivity (HCP) provide information on their business model like the asset turnover (ATO) and the profit margin (PM) of manufacturing firms. The ability to command premium fee is reflected in low human capital productivity (HCP) and the ability to provide a wide variety of services that require less supervision of equity partners is reflected in (LEV).

For example, the accounting industry, which is one of the leading sectors of professional service firms, uses the term human capital productivity (HCP), and leverage (LEV). The accounting industry use revenue per accountant (RPA) as human capital productivity (HCP): the amount of revenue generated per accountant. Leverage (LEV) is calculated as the ratio of number of accounting professionals to number of partners. Revenue per accountant (RPA) is an indicator of fee premium: high revenue per accountant (RPA) indicates the accountants are providing services that command fee premium. Leverage (LEV) is an indicator of the complexity of service they provide: high leverage (LEV) indicates that the firm provides services that require less supervision by and expertise of the equity partners. One of the distinguishing characteristics of the



accounting industry is the existence of Big4 firms. According to *Accounting Today* (2001-2008), Big4 accounting firms have been outperforming non-Big4 by excelling both revenue per accountant (RPA) and leverage (LEV) (Graph 1).<sup>19</sup>

- Insert Graph 1 here -

Big 4 firms are positioned at the top right hand side of the graph: Big4 firms (marked with firm identification) have both high revenue per accountant (RPA) and high leverage (LEV) compared to non-Big4 firms (marked without firm identification). That is, Big4 firms provide high-end audit services that enable them to command fee premium. The existence of fee premium of Big4 firms has been well documented in accounting literature: Big4 firms command fee premium because they succeeded in differentiating themselves as high quality audit service providers (Simunic 1980, Moizer 1997, DeFond et al. 2000, Ferguson et al. 2003). In addition, taking advantage of their large size, Big4 firms provide general audit services that can be handled with less supervision by equity partners. Big4 firms are able to generate fee revenue with high revenue per accountant (RPA) and leverage (LEV) because they are international accounting firms. Because of their international scope of operations, they are able to provide high-end services that enable them to command fee premium and low-end services that can be handled with high leverage (LEV). Despite the uniqueness of Big4 firms, using profitability ratios helps explain how accounting firms create their revenue. That is, two profitability ratios, revenue per accountant (RPA) and leverage (LEV) provide information on their business model.

However, implementing a new overall firm level strategy or changing the firm

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<sup>19</sup> Graph 1 is descriptive statistics of profitability ratios of 64 firms out of top 100 U.S. accounting firms from year 2000 to 2007. See Appendix 3 for the detailed list of 64 firms. Annually, *Accounting Today* publishes top 100 U.S. accounting firms.

level strategy in professional service firms can be challenging (Maister 1997, Lowendahl 2005). Most professional service firms are partnerships and different partners have their own ways to manage their business units. For example, law firm partners in the product liability area tend to rely on high leverage (LEV) because of class action suits which are template based and do not require the creativity of the partners. Whereas, law firm partners in business transaction areas, such as merger and acquisition, tend to rely heavily on the expertise of the partners. Normally, within a law firm, there are a number of practice areas and each practice area is managed by partners.<sup>20</sup> Partners have their own ways of attracting and dealing with clients, and managing associates hence, it may be hard change their ways of doing the business by implementing a new overall firm strategy. However, law firms can implement a new overall firm level strategy by gradually adding partners in the legal service areas they want to move in or dismissing partners in the service areas they want to move out from (Maister 1997). Law firms also use mergers and acquisitions to move into new legal service areas. For example, Bingham McCutchen has been acquiring many other law firms. During the last 12 years, Bingham McCutchen has made 10 major acquisitions and as a result, was able to increase the number of lawyers and able to represent every area of law that affects their clients worldwide. To conclude, for professional service firms such as law firms and accounting firms, using a bottom-up approach is better than a top down approach to implement an overall firm strategy.

Three profitability ratios, profit margin (PM), human capital productivity (HCP), and leverage (LEV) in the profit per equity partner (PPP) model are commonly used by

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<sup>20</sup> In the website, most of law firms in my sample list all areas of legal services and advertise themselves as an expert.

professional service firm consultants and practitioners as indicators to measure professional service firm profitability (Cotterman 2001, DiPietro 2008). Maister (1997) has introduced the concept of profitability ratios model for the professional service firms by connecting with the DuPont model. He emphasized the role of profit per equity partner (PPP) as an ultimate measure of profitability of professional service firms however, he failed to emphasize the role of three profitability ratios to increase profit per equity partner (PPP).<sup>21</sup> Lowendahl (2005) explained that professional service firms develop human capital resources as a byproduct of daily operation. He linked the allocation of human capital resource of the professional service firms with firms' leverage (LEV) and profit margin (PM). However, each of them is used independently to explain different aspects of firm profitability. The new profitability ratio model will help consultants and practitioners see the big picture of firm profitability by showing how all three ratios (PM, HCP, and LEV) are linked together into one profitability ratio (PPP). To demonstrate the relevance of the profitability ratio model, I forecast future profitability. I use the legal industry as a representative of professional service firms in order to validate and demonstrate the application of my profitability ratio model.

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<sup>21</sup> He notes that "profitability of partnership structured organizations, the ultimate measure of profitability is PPP which is driven by three main factors, margin, productivity and leverage." (Maister 1997, p. 31)

## CHAPTER 4:

### LAW FIRMS

#### 4.1 Background on Legal Industry

As the leading legal service providers in the international legal service market, U.S. law firms are one of the growth sectors in the U.S. economy (U.S. Census Bureau of Economic Analysis 2009). According to *AmLaw 100* (2008), 75% of the world's 100 most profitable law firms were U.S. firms in 2007. With the globalization of institutional and corporate clients, the demand for legal professionals with the ability to handle international disputes has and will continue to increase. Considering its contribution to the U.S. economy, the legal industry is an appropriate sample to represent professional service firms.

Lawyers, the human capital assets, are the major important inputs used to generate revenue (outputs) of law firms (Lowendahl 2005, Sander & Williams 1992).<sup>22</sup> The equity partners, as owners of the law firm, also contribute their human capital and, in return, share firm profits and losses. The human capital contributions of the equity partners are the most critical and valuable asset in law firms since they determine the long-term profitability of the firm. In general, the equity partners are the “rainmakers”<sup>23</sup> who attract and handle important clients (e.g., corporate, institutions, government, individuals, etc.). They represent the law firm using the reputations they have built over the years, and are the source of the law firm's premium fee. They are also business managers who manage the law firm to maximize return on the human capital investment

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<sup>22</sup> In the website of Blank Rome, LLP, it clearly states that firm's “true capital is human capital”. (www.BlankRome.com)

<sup>23</sup> “The rain maker is someone who generates new business on a consistent basis and the real role of the rain maker is to develop a vision of growth and change for the firm.” (Roberts 1997)

of the firm. The equity partners' human capital investment is leveraged by the non-owner human capital resources (e.g., non-equity partners and associates).

Recently, the changes in demand of clients for legal services have caused many U.S. law firms to redefine their business strategies. With globalization and increases in the number of international transactions, more and more institutional as well as corporate clients are demanding a wide variety of legal services in their business locations. Consequently, law firms need to make decisions about whether to remain in service areas they currently are known for and/or to expand their market by opening international branches or diversifying into new lines of services. If a law firm decides to remain focused on specific service areas, it is able to charge premium fee using the reputations of its equity partners' expertise. If a law firm chooses to expand the line of services it provides and/or the market, it can increase its clientele. However, it can be hard to command premium fee for services because the firm's lawyers are spread out both geographically and in areas of legal services. Clients do not necessarily attribute the reputations of the firm's equity partners to other locations or types of service.

In addition, changes in the demand for legal services since the 1990's have caused U.S. law firms to make organizational structure changes. Compared with traditional boutique law firms which were organized around a few equity partners and several lawyers, today's law firms have become much larger.<sup>24</sup> A number of U.S. law firms realized that maintaining the traditional one-tier partnership is not sufficient to handle large number of lawyers. They needed to provide more promotion opportunities to their lawyers without diluting the "rainmaking" intensity of the equity partners. Therefore, the law firms began to expand the partnership structure by adding non-equity partners.

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<sup>24</sup> In 2007, 20% of the largest U.S. law firms have more than 1,000 lawyers (*AmLaw 100* 2008).

Non-equity partner is an intermediate step to becoming an equity partner; he/she does not have ownership in the firm. Non-equity partners do not have as much “rainmaking” ability as equity partners but they do supervise a number of associates. They usually receive fixed salaries and benefits and do not share in the profits and losses of the firm. Most law firms have a two-tier partnership structure<sup>25</sup> as a way to retain and motivate talented partners.<sup>26</sup> By providing more promotion opportunities, law firms with two-tier partnerships can keep talented lawyers from being wooed by their competitors. These changes in the organizational structure affect the composition of the human capital assets, which in turn influences the revenue per lawyer (RPL) and leverage (LEV) of the law firms. The average proportion of each type of professional in law firms is shown in Figure 4.

#### 4.2 The DuPont Analysis for Law Firms

I use the disaggregated profitability ratios to explain how the law firms operate their businesses. By using the profitability ratio model for professional service firms, I disaggregate profit per equity partner (PPP) into the profitability analysis ratios for law firms: profit margin (PM), revenue per lawyer (RPL) and leverage (LEV).

$$\begin{aligned}
 & \text{Profit per equity partner (PPP)} \\
 = & \frac{\text{Net Income}}{\text{Sales}} \times \frac{\text{Sales}}{\text{Lawyer}} \times \frac{\text{Lawyer}}{\text{Equity partners}} \\
 = & (\text{Profit Margin}) \times (\text{Revenue per Lawyer}) \times (\text{Leverage})
 \end{aligned}$$

Both law practitioners and law literature use these profitability ratios, profit per equity

<sup>25</sup> The *AmLaw 100* (2008) reports that 80 % of the top 100 U.S. law firms have two-tier partnership.

<sup>26</sup> In 2008, 80% of the *AmLaw 100* firms has a two-tier partnership. Some law firms use the non-equity partner tier to de-equalize their poor performing equity partners or retain the senior equity partners who are close to retirement (Henderson 2006).

partner (PPP), leverage (LEV), and revenue per lawyer (RPL) to compare law firm profitability and business models (Gilson and Mnookin 1989, *AmLaw100*, Henderson 2006, Galanter and Henderson 2008, Mystal 2009) (Appendix 6). Practitioner's journals in the legal industry use profitability ratios such as profit per partner (PPP), leverage (LEV), revenue per lawyer (RPL) and profit margin (PM) to compare the profitability of law firms and to make outlooks for upcoming years (DiPietro 2008, Blumenthal 2009, Feuer 2009). In addition, researchers use profitability ratios to explain recent changes in the organizational structure of law firms (Gilson and Mnookin 1989, Samuelson and Jaffe 1990, Henderson 2006, Galanter and Henderson 2008).

However, they use each profitability ratio independently, never linking the three ratios together into one profitability ratio model. I use the three profitability ratios of the profitability ratio model to infer how law firms operate their businesses in the same way the DuPont model uses the strategic position of manufacturing firms. The profit margin (PM), the proportion of net income to revenue of law firms, tells how much margin law firms have on the revenue they generate. As can be seen in the profitability ratio model for professional service firms, a good indicator of premium fee for law firm is revenue per lawyer (RPL) rather than profit margin (PM).<sup>27</sup> The revenue per lawyer (RPL) is the amount of revenue that each human capital resource brings in, which indicates whether the law firm is getting premium fee or not: if a firm is commanding premium fee for their service, it will have high revenue per lawyer (RPL); if not, it will have low revenue per lawyer (RPL). Leverage (LEV) measures the degree that the

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<sup>27</sup> Although premium fee is reflected in the profit margin (PM) of law firms, it is affected by many other factors such as changes in price of inputs (e.g., compensation of lawyers) and outputs (e.g., fee they charge for their services) and other operating expenses (e.g., space, computers, support staffs costs and etc.) (Maister 1997).

human capital resource contribution of owners is leveraged by the human capital of non-owner lawyers. Higher leverage (LEV) means equity partners' contributions are leveraged by using more of the human capital resources in the law firm while low leverage (LEV) means that they are leveraged by using fewer of their resources.

#### 4.3 Use of Profitability Ratios in Legal Industry and Literature

The profitability ratios have been commonly used by law practitioners and researchers but they mechanically interpret those ratios without connecting them to the business model of the firm. In addition, they fail to link them with profitability ratio analysis. In legal research, profit per partner (PPP) is commonly used as a measure of law firm performance. However, they fail to enrich their explanation of law firm performance using the three component ratios of profit per partner (PPP). For example, Gilson and Mnookin (1989) recognize that a law firm's leverage (LEV) is directly related to firm profit (in terms of profit per partner (PPP)). They interpret a law firm's leverage (LEV) as having more human capital resources available to handle clients. Henderson (2006), Galanter and Henderson (2008) and Samuelson and Jaffe (1990) examine the relation between the organizational structure of a law firm and firm performance. All three papers only use profit per partner (PPP) as a measure of law firm profitability.

A number of practitioners' law journals commonly use profit margin (PM), leverage (LEV) and revenue per lawyer (RPL) but they fail to see them as component ratios of profit per partner (PPP). Feuer (2009) uses revenue per lawyer (RPL) and profit per partner (PPP) to explain downsizing phenomenon in the legal industry. He uses both ratios to support his claim that a decrease in profitability of law firms causes



law firms to downsize. DiPietro (2008) makes a prediction for the 2008 legal market using leverage (LEV), profit margin (PM), profit per partner (PPP) and changes in billable hours. He use leverage (LEV) to support his predictions for labor market growth, use profit margin (PM) and profit per partner (PPP) for firm profitability. Blumenthal (2009) note that recent trends toward two-tier partnership structure in the legal industry affect profit per partner (PPP): profit per partner (PPP) is a vulnerable measure that can be influenced by organizational structure changes. Hence he suggests considering revenue per lawyer (RPL) rather than profit per partner (PPP) to compare the performance of law firms. He is using revenue per lawyer (RPL) as a profitability measure that is similar to profit per partner (PPP) not as its component ratio. Both law practitioners and researchers fail to connect three profitability ratios as component ratios of profit per partner (PPP).

#### 4.4 Strategic Position of Law Firms

As with the profitability ratios of manufacturing firms, the relationship among leverage (LEV), profit margin (PM), and revenue per lawyer (RPL) tells how law firms operate their business to earn revenue. Law firms can command premium fee (high RPL) if they are able to handle complex services which require expertise and supervision of reputable equity partners (high-end services). Normally, high-end services require closer supervision by the equity partners who have more experience and expertise, resulting in low leverage (LEV) (Maister 1997). Law firms that provide a general level of legal services requiring less supervision by and expertise of equity partners cannot command premium fee (low RPL) hence they need to emphasize leverage (LEV). The

relative importance of leverage (LEV) and revenue per lawyer (RPL) can provide information about the business model of law firms in the same way as profit margin (PM) and ATO for manufacturing firms. To visualize the relative importance of the two ratios, I plot each firm by their leverage (LEV) and revenue per lawyer (RPL). I calculate the standardized rank (LEVRANK and RPLRANK) of each firm by average leverage (LEV) rank and average revenue per lawyer (RPL) rank.<sup>28</sup> Graph 2 shows the relative importance of leverage (LEV) and revenue per lawyer (RPL) of each sample firm. The names and ID numbers (Firmid) of the 81 sample firms are listed in Appendix 1. Firmid is assigned based on the average size of law firms which is measured in terms of number of lawyers. Firms that have the most number of lawyers will have Firmid of 1 and firms that have the least number of lawyers will have Firmid of 81.

- Insert Graph 2 here -

The firms in the solid circles are the law firms that emphasize only one of the profitability ratios. For example, one firm in the upper left side of the graph is Wachtell, Lipton, Rosen & Katz (Firmid: 81).<sup>29</sup> Wachtell, Lipton, Rosen & Katz is ranked the lowest in terms of leverage (LEV) (low LEVRANK) but the highest in terms of revenue per lawyer (RPL) (high RPLRANK) because it differentiated itself from the other firms by positioning itself as a high-end law firm specializing in mergers & acquisitions.<sup>30</sup>

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<sup>28</sup> The standardized rank is calculated as following:

- 1) I rank average leverage (LEV) and average revenue per lawyer (RPL) for each firm for the 81 firm samples in descending order: firm with highest leverage (LEV) or revenue per lawyer (RPL) will have the rank of 81 and with the lowest will have the rank of 1 for each ratio.
- 2) I divide the rank in 1) by 81 which are the number of firm sample to calculate standard rank of leverage (LEVRANK) and revenue per lawyer (RPLRANK): firm with the highest rank in leverage (LEV) or revenue per lawyer (RPL) will have the standardized rank of 1 and with the lowest will have the standardized rank of 1/81 for each ratio.

<sup>29</sup> Wachtell, Lipton, Rosen & Katz (Firmid: 81) is headquartered in New York, NY.

<sup>30</sup> See Appendix 4 for example of 4 law firms with high revenue per lawyer (RPL) and low leverage (LEV) (in top left hand side circle of Graph 2) and quotes from their websites how they describe themselves to the

Three firms in the solid circle at the bottom right corner, White & Case LLP (Firmid: 4), Baker McKenzie (Firmid: 1), and Shook, Hardy & Bacon LLP (Firmid: 60), emphasize leverage (LEV) (high LEVRANK) more than revenue per lawyer (RPL) (low RPLRANK).<sup>31</sup> Shook, Hardy & Bacon LLP is regional law firms<sup>32</sup> which handles many product liability class action lawsuits, which are more template based work and require less supervision and expertise of equity partners. These cases can be handled by increasing the leverage (LEV) but result in low revenue per lawyer (RPL). The other two firms, White & Case LLP and Baker McKenzie, are international law firms. They provide legal services from their offices around the world which restricts them from commanding premium fee: since their lawyers are spread out all over the world, it is impossible to accept a project that requires the close supervision and expertise of the reputable equity partners. In addition, the international market is more competitive than the U.S. market in terms of pricing because they need to compete with local law firms which provide legal services at a relatively lower price than U.S. international law firms. Most of the international law firm clients are large corporate and institutional firms with clients who demand a wide variety of legal services in their business locale. These services require only a modest degree of expertise and experience of equity partners so each partner can handle a number of lawyers which results in increased leverage (LEV).

Three firms in the dotted circle on the upper right side of Graph 2 are ranked high in terms of both leverage (LEV) and revenue per lawyer (RPL): Cadwalader, Wickersham

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public. They emphasize their accomplishment and reputation as an expert in a certain area of legal practice.

<sup>31</sup> See Appendix 5 for example of 4 law firms with high leverage (LEV) and low revenue per lawyer (RPL) (in bottom right hand side circle of Graph 2) and quotes from their websites. They describe themselves as a law firm with ability to cover wide geographical locations and ability to handle various areas of legal practice.

<sup>32</sup> Shook, Hardy & Bacon LLP is headquartered in Kansas City, MO (See Appendix 1).

& Taft LLP (Firmid: 66), Weil, Gotshal & Manges LLP (Firmid: 12), and Kirkland & Ellis LLP (Firmid: 16). All three firms are regional law firms: Cadwalader, Wickersham & Taft LLP and Weil, Gotshal & Manges LLP are headquartered in New York, NY, and Kirkland & Ellis LLP in Chicago, IL. These firms provide specialized service (which is reflected in high revenue per lawyer (RPL)) as well as the general types of legal services using their high leverage (LEV) to maintain their presence in their regional market. Cadwalader, Wickersham & Taft LLP promotes itself as a financial service law firm, Weil, Gotshal & Manges LLP as an expert in corporate practice, and Kirkland & Ellis LLP as an expert in litigation and corporate practices.<sup>33</sup> Six firms in the dotted circle in the bottom left corner of Graph 2 are ranked very low in terms of leverage (LEV) and revenue per lawyers (RPL). Out of six firms, two are national law firms (Nixon Peabody LLP (Firmid: 49), Seyfarth Shaw LLP (Firmid: 50)) and the rest are regional law firms.<sup>34</sup> They are also the lowest performing firms in terms of profit per partner (PPP). Out of the 81 firms studied, Fulbright & Jaworski LLP ranks 64<sup>th</sup> in terms of profit per partner (PPP), Nixon Peabody LLP ranks 77<sup>th</sup>, Blank Rome LLP ranks 76<sup>th</sup>, Dorsey & Whitney LLP ranks 81<sup>th</sup>, Seyfarth Shaw LLP ranks 73<sup>th</sup>, and Womble Carlyle Sandridge & Rice, PLLC ranks 79<sup>th</sup> in terms of profit per partner (PPP). To summarize, the relative importance of profitability ratios informs the business model and business operation of law firms.

#### 4.5 Firm Characteristics and Profitability Ratios of Law Firms

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<sup>33</sup> More information on their practice areas can be found in their websites: Cadwalader, Wickersham & Taft LLP (<http://www.cadwalader.com>), Weil, Gotshal & Manges LLP (<http://www.weil.com>), and Kirkland & Ellis LLP (<http://www.kirkland.com>).

<sup>34</sup> Fulbright & Jaworski LLP (Firmid: 23) locates in Houston, TX., Blank Rome LLP (Firmid: 73) in Philadelphia, PA., Dorsey & Whitney LLP (Firmid: 44) in Minneapolis, MN., Womble Carlyle Sandridge & Rice, PLLC (Firmid: 70) in Winston Salem, NC (See Appendix 1).

The differences in the business model of law firms are reflected in different profitability ratios hence, I examine the relationship between firm characteristics and profitability ratios. I identify three firm characteristics: STRUCTURE, SCOPE, and SCALE. There is much research that examines the link between firm performance and firm structure in industrial organizations (Tirole 1988, Sah and Stiglitz 1986, Rajan and Zingales 2001). In addition, due to the recent trend toward two-tier partnership in the legal industry, there has been growing interest in the relation between firm performance and firm structure (Henderson 2006). Hence I include STRUCTURE as a variable to examine how a firm affects the business operation of the firm and influences different parts of the profitability ratios. It has been well documented in economics literature that there are two types of production economies that a firm in any industry can achieve: economies of scope and economies of scale (Clark 1923, Panzar and Willig 1981). I believe that economies of scope and economies of scale are also applicable to law firms therefore, I include two SCOPE variables, SCOPE-INTL for international law firms and SCOPE-RGNL for regional law firms, to measure economies of scope for law firms and one SCALE variable for economies of scale.

#### 4.5.1. Structure Variable

Sah and Stiglitz (1986) use the quality of decision making to measure firm performance and examine the relation between firm structure (e.g., hierarchy and polyarchy) and firm performance. They define hierarchy as a firm structure which allows a few individuals to perform projects and polyarchy as a structure that allows several individuals to undertake projects. They find that hierarchy is commonly adopted

for firms that demand centralized economies. Rajan and Wulf (2003) find that more and more firms choose to have flatter organizational hierarchy by eliminating the middle positions. They note that firms formed as partnerships tend to have flatter organizational structure. However, this is somewhat contrary to some of the recent phenomenon in legal industry.<sup>35</sup>

Traditionally, law firms have a one-tier partnership structure with only equity partners but more and more law firms are switching their partnership structure to a two-tier partnership structure that in 2008, 80% of the *AmLaw 100* firms have a two-tier partnership. However, Henderson (2006) found that firms with two-tier partnership are less profitable than firms with one-tier partnership in terms of profit per partner (PPP)leverage (LEV). He also found that firms with two-tier partners are positively related to leverage (LEV). Therefore, I consider partnership structure (STRUCTURE) in my model to examine the relation between law firms' partnership structure and their profitability ratios.<sup>36</sup> STRUCTURE is a proxy of the partnership structure of the law firms. The STRUCTURE of a firm affects the business operation of the firm and influences different parts of profitability ratios. If the firms have both equity and non-equity partners then STRUCTURE will be 1: if they have only equity partners then STRUCTURE will be 0.

The reputations of equity partners are closely related to premium fee of law firms. Equity partners' human capital contribution as the "rainmakers," which is to attract new clients and maintain relationships with existing clients, is the most valuable human

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<sup>35</sup> More and more accounting firms both national and non-national level are adopting two-tier partnership structure (Weinstein 2003, *INSIDE Public Accounting* 2005, *WebCPA* 2009).

<sup>36</sup> Based on a number of literatures in industrial organization and in legal industry, law firms' choice of their firm structure is related to law firm performance hence I consider STRUCTURE variable in my model.

capital resource which affects the long-term profitability of the firm. Non-equity partners are less competent and less experienced in terms of “rainmaking” and handling important clients. Hence, non-equity partners supervise the work of associates. In terms of compensation, non-equity partners are compensated more than associates so leveraging using non-equity partners will increase compensation expense for the law firms (negative impact on profit margin (PM)) than using associates.<sup>37</sup> However, if a law firm cannot command premium fee using the reputation of equity partners, it will leverage using non-equity partners and/or associates. Therefore, I expect STRUCTURE to have a negative relation with revenue per lawyer (RPL) but a positive relation with leverage (LEV).

#### 4.5.2. Scope Variables

Scope of operation indicates the breadth of operation: degree of diversification. Large scope of operation is associated with diversification (diffused) and small scope is associated with specialization (focused). Economies of scope can be gained by increasing return on investment as a result of adding different lines of products, adding operations in geographical regions or adding different economic functions (Chandler 1990). Garicano and Hubbard (2007) find law firms’ organizational structure affects degree of their service specialization. They also find that as market size increases, law firms tend to be more specialized.

Economies of scope for law firms can be achieved by synergy of providing a menu of legal services. Being a one-stop legal service provider with a menu of legal

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<sup>37</sup> According to *AmLaw 100* (2000-2008), the average compensation of equity partners was \$1,086,000, and of non-equity partners was \$300,000. Associates get salary of \$90,000 if they have at least 3 years of experience and get \$150,000 if they have at least 10 to 15 years of experience (Krivitzky 2009).

services can help a firm achieve economies of scope: the synergy of providing multiple legal services to their clients (Garicano and Hubbard 2008). However, detailed information on the areas of service of law firms, which is a proxy to measure the scope of law firms is not publicly available.<sup>38</sup> Therefore, I use geographical region as a SCOPE variable, I include international (SCOPE-INTL) and regional (SCOPE-RGNL).<sup>39</sup> International firms have a relatively large number of lawyers (assets) and generate more total revenue than regional firms.<sup>40</sup> International law firms have their lawyers spread out worldwide, so it is hard for them to take high-end projects that require equity partners' expertise and supervision. In addition, international law firms face intense competition in the international market which restricts them from commanding premium fee for their services. Therefore, they capitalize on their leverage (LEV) to increase firm profit. That is, they provide relatively low-end legal services by hiring less competent but relatively low cost lawyers in their international offices. They can provide a broad menu of legal services to attract clientele globally and achieve economies of scope. On the other hand, regional law firms face less competition than international or national firms. Their lawyers are located relatively close to each other, so they can use equity partners' reputations to command premium fee for their service.<sup>41</sup> As a result, they are able to attract more complex service projects from high-end clients (high RPL). Most of

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<sup>38</sup> *AmLaw 100* does not disclose data on law firms' area of their legal service. I search the website of law firms to identify their areas of service to measure the scope of law firms. However, most of law firms advertise themselves as a service provider of all areas of legal service.

<sup>39</sup> *AmLaw 100* does disclose whether law firms are international, national, or regional firm.

<sup>40</sup> However, this does not mean they are more profitable than the regional firms. For example, Baker & McKenzie, one of the largest international law firms, is ranked in first place for number of lawyers but is ranked 98 out of 100 firms in terms of revenue per lawyer (RPL) and 56 out of 100 in return on the equity partners (PPP) (*AmLaw 100* 2008).

<sup>41</sup> Wachtell, Lipton, Rosen & Katz one of the well-known mergers & acquisitions expert regional law firm in New York, is ranked last in terms of the number of lawyers but first in terms of revenue per lawyer (RPL). Their experiences and reputations enable them to earn price premium (RPL) which leads to higher returns for their equity partners (PPP).



the regional firms in the *AmLaw 100* have relatively high profit per equity partners (PPP) firms: 9 out of the top 10 in terms of return on the equity partners (PPP) are regional law firms (*AmLaw 100* 2008).

#### 4.5.3. Scale Variables

Scale measure the depth of operation. Economies of scale are an advantage of having large firm size. Manufacturing firms achieve economies of scale by increasing the size of production volume of a product. Consequently, they are able to reduce average costs of the product (Carton and Perloff 2005 p. 36-40).<sup>42</sup> Law firms as well as other professional service firms tend to benefit by increasing their scale. However, by increasing their scale, law firms benefit more by gaining pricing power rather than by reducing average costs of their service. Unlike manufacturing firms, law firms provide heterogeneous and client specific services to their clients hence there is not much room for cost advantage for becoming a large law firm. However, large law firms are able to command premium fee for their legal services therefore, economies of scale for law firms should be interpreted as monopolistic pricing power.

SCALE is the firm size variable measured in terms of number of lawyers. Large law firms have more pricing power because their size allows them to dominate the smaller firms in handling large-size clients. Hence large law firms enjoy less competition and they are more monopolistic in commanding fees for their services, analogous to the fee premium for Big4 in the auditing literature (Palmrose 1986, Simon and Francis 1988, Ireland and Lennox 2002).

To summarize, I expect that the firm characteristics, STRUCTURE,

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<sup>42</sup> Economies of scale are related to increasing return to scale.

SCOPE-INTL, SCOPE-RGNL, and SCALE to imply the revenue creating strategy of law firms hence they should be reflected differently in three profitability ratios (LEV, PM, and RPL).

## CHAPTER 5:

### DATA, ESTIMATION MODELS, AND FORECASTING ERRORS

#### 5.1 Data

I use the *AmLaw 100* to collect the human capital resources and financial data of the law firms that are needed to estimate the models. I use a paired sample to test the forecasting models, so I include 81 firms from the 100 largest U.S. law firms listed in the *AmLaw 100* that survived from 2000 to 2007 as a sample.<sup>43</sup> The sample size is 648 firm-year observations.<sup>44</sup> The *AmLaw 100* reports statistics of one year prior; hence I use the *AmLaw 100* from the year 2001 to 2008 to get data from the years 2000 to 2007.

I adopt the definition of the variables from the *AmLaw 100*. The variables that are listed in the *AmLaw 100* are common measures and ratios used in law literature (Gibson and Mnookin 1985, Samuelson and Jaffe 1990, Cotterman 2001, Schmitt 2005, DiPietro 2008, USITC 2009, Blumenthal 2009, Feuer 2009). The total number of lawyers (LAWYER) is defined as the headcount of lawyers at the end of the fiscal year. The total number of lawyers excludes the first year associates because usually they are not capable of generating revenue in their first year (they spend the first several months in training programs). Equity partners (EQPARTNER) are defined as those who file Schedule K-1 tax forms and get less than half of their compensation on a fixed income basis. Non-equity partners (NEQPARTNER) are defined as those who receive more than half of their compensation on a fixed basis. If the firms have a one-tier partnership structure, the total number of the equity partners will equal the total number of partners.

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<sup>43</sup> To do paired sample test, I need to have identical firms for entire sample period so I include firms that survived from 2000 to 2007

<sup>44</sup> I have 81 firms each year from 2000 to 2007 (8 years). But for estimating the absolute forecasting error, I drop three firms which are outliers. The estimation of the absolute forecasting errors is based on 78 firms.

In firms with a two-tier partnership structure, the total number of partners includes both the equity and non-equity partners. The gross revenue (REV) of a firm is fee income from legal work only, and does not include disbursements or income from non-legal ancillary businesses. Profit per partner (PPP) is calculated by dividing the net operating income by the number of equity partners. Revenue per lawyer (RPL) is calculated by dividing the gross revenue (REV) by the number of lawyers. The leverage (LEV) is defined as the ratio of the number of lawyers to the number of equity partners. Profit margin (PM) is the ratio of net operating income to gross revenue multiplied by 100. To help comparison across sample periods, all monetary values are inflation adjusted to 2007 dollars.

To define the structure, scope, and scale of law firms, I adopt the *AmLaw 100* definition. STRUCTURE indicates whether the law firm has a one-tier or two-tier partnership structure. STRUCTURE equals 1 if law firms have a two-tier partnership structure: law firms have both equity and non-equity partners. STRUCTURE equals 0 if law firms have a one-tier partnership structure: law firms have only equity partners. SCOPE-INTL indicates whether or not law firms are international. *AmLaw 100* defines law firms as international if they have more than 40% of their lawyers located outside the U.S. I denote law firms as international firms (SCOPE-INTL = 1) with more than 40% of lawyers located outside the U.S. and non-international firms (SCOPE-INTL = 0) if less than 40% of the lawyers are located outside the U.S. SCOPE-RGNL indicates the geographical concentration of law firms. *AmLaw 100* classifies geographical locations into 8 regions (New England, NY city, Mid-Atlantic, Washington DC, South & Southeast, Midwest, West & Southwest, and West Coast/Pacific Rim). If a firm has at least 45% of

its attorneys located in only one of 8 regions, it is classified as a regional firm. Therefore, all law firms that are neither national nor international law firms are denoted as regional law firms (SCOPE-RGNL = 1). *AmLaw 100* publishes number of lawyers for each listed law firms hence to define SCALE of law firms I use number lawyers. Detailed definitions of the variables that are used in the models are defined in Table 1. In Table 2, I report the descriptive statistics of the variables. Table 3 reports the Spearman and Pearson correlations of the variables.

- Insert Table 2 here -

- Insert Table 3 here -

Based on the correlation matrix of Table 3, profit margin (PM), revenue per lawyer (RPL) and leverage (LEV) have a positive relationship with profit per partner (PPP) in both Pearson and Spearman correlations. STRUCTURE is negatively related to profit margin (PM), revenue per lawyer (RPL), and profit per partner (PPP) but positively related to leverage (LEV). International law firms (SCOPE-INTL) are negatively related to revenue per lawyer (RPL), and profit per partner (PPP) but positively related to leverage (LEV). Regional law firms (SCOPE-RGNL) are positively related to profit margin (PM), revenue per lawyer (RPL), and profit per partner (PPP) but negatively related to leverage (LEV).

## 5.2 Estimation Models

The profitability decomposition has been commonly used in accounting literature as a technique to improve future profitability predictions since each profitability ratio provides additional information on how a firm creates its value (Kormendi and Lipe 1987,

Kothari 2001, Fairfield and Yohn 2001, Soliman 2004, Banker and Chen 2006). I apply the DuPont model and disaggregate profitability to examine the relevant information from each profitability ratio of the law firms. In addition, I validate the relevance of each profitability ratio using accuracy of the profitability forecasts. Based on the profitability ratio model for professional service firms, the forecasting models that I construct to test the research question are as follows:

$$\text{Model 1: } \text{LogPPP}_{t+1} = \alpha + \beta_{\text{PPP}} \text{LogPPP}_t + \varepsilon_t \quad (1)$$

$$\text{Model 2: } \text{LogPPP}_{t+1} = \alpha + \beta_{\text{LEV}} \text{LogLEV}_t + \beta_{\text{PM}} \text{LogPM}_t + \beta_{\text{RPL}} \text{LogRPL}_t + \varepsilon_t (2)$$

where,

$\text{LogPPP}$  = Log(Net operating income / Number of equity partners) scaled by \$1,000

$\text{LogLEV}$  = Log(Number of lawyers/Number of equity partners)

$\text{LogPM}$  = Log{(Net income/Gross revenue)x100}

$\text{LogRPL}$  = Log(Gross revenue/Number of lawyers) scaled by \$1,000

Model 1 is the base AR (1), which uses prior year profit per equity partner (PPP) to forecast one-year ahead profit per equity partner (PPP). In Model 2, I construct using the three profitability ratios that I disaggregated based on the profitability ratio model, profit margin (PM), revenue per lawyer (RPL), and leverage (LEV). Since these three profitability ratios are in multiplicative terms in the profitability ratio model, I log-transform to make them additive terms.

When estimating the forecasting errors of Model 1 and Model 2, I follow Fairfield and Yohn (2001). For Model 1 and Model 2, I use paired samples to calculate forecasting error. I use identical sample firms to estimate coefficients of Model 1 and Model 2 and estimate coefficients to forecast one-year ahead profit per equity partner

(PPP) in the forecasting period. I then compare actual profit per equity partner (PPP) with forecasted profit per equity partner (PPP) to calculate forecasting error for each of my models.<sup>45</sup> First, I divide my sample period into two periods: the estimation period, from the year 2000 to 2003, and the forecasting period, from 2004 to 2007. I use the estimation period to estimate Model 1 and Model 2 coefficients to forecast profit per equity partner (PPP) in the forecasting period. I then compare the forecasted profit per equity partner (PPP) and actual profit per equity partner (PPP) of Model 1 and Model 2 to test their forecasting errors in the forecasting period for each firm year observation (Figure 5). If the profitability ratios provide incremental information, they will enhance prediction of one-year ahead profitability: Model 2 will result in smaller absolute forecasting errors than Model 1. I expect the profitability ratios to provide information on how a firm creates its profit which will then lead to a more accurate prediction of future profitability.

### 5.3 Forecasting Errors and Results

In order to test whether the decomposed profitability ratios add incremental information over the aggregated profitability, I employ prediction of future profitability following Fairfield and Yohn's (2001) methodology. They use the previous nine years of the sample period to estimate the coefficients of the forecasting model and the estimated forecasting model to forecast one-year ahead profitability for the next ten years (out of sample). I divide my sample period into two subsamples: the estimation period (from 2000 to 2003) and the forecasting period (from 2004 to 2007) (see Figure 5). I

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<sup>45</sup> I eliminate one firm that has the greatest sum of absolute forecast error in the estimation period and the forecasting period. Even before I eliminate one firm, the results are consistent with those reported in Table 4.

use the estimation period (from 2000 to 2003) to estimate the coefficients for the forecasting models (Model 1 and Model 2) and use the Prais-Winsten regression (Park and Mitchell 1980) to estimate the coefficients.<sup>46</sup> I use the Durbin-Watson test for the estimation period (2000-2003) to check for the autocorrelation problem that is common in time series data, and find autocorrelation is not a problem.<sup>47</sup> In estimating forecasting errors, I delete three firms as outliers, so in the estimation and forecasting, 624 firm-year observations are used. In Table 4, I report the estimation of the coefficient for Model 1 and Model 2. To reduce the correlation problem in residuals which is common in time-series data, I report the Prais-Winsten regression results.<sup>48</sup> Panel A shows the Model 1 results of the AR (1) model which forecasted one-year ahead profit per equity partner (PPP) based on the prior year profit per equity partner (PPP). The coefficients of all three profitability ratios are positive and very significant.  $\beta_{PPP}$  is positive (0.956) and very significant (at significance  $Pr > |t| < .0001$ ). Panel B shows the Model 2 results of the three profitability ratio model: I deconstruct profit per equity partner (PPP) into the profitability analysis ratios leverage (LEV), profit margin (PM), and revenue per lawyer (RPL), and use the profitability ratio analysis to predict one-year ahead profit per equity partner (PPP). The coefficients for all three profitability ratios are positive ( $\beta_{PM} = 0.779$ ,  $\beta_{RPL} = 0.881$ ,  $\beta_{LEV} = 0.885$ ) and very significant (all three coefficients at significance  $Pr > |t| < .0001$ ). I compare the coefficients of each profitability ratio to examine whether they add incremental information about the business model of law firms over aggregated profitability ratio profit per equity partner (PPP). That is, if profitability ratios add

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<sup>46</sup> Fairfield and Yohn (2001) also use pooled regression to estimate.

<sup>47</sup> I do a Durbin Watson test for the estimation period (2000-2003) and  $D-W = 1.9786$  at significance  $Pr < DW 0.3892$  and  $Pr > DW 0.6108$ , which show autocorrelation is not a problem.

<sup>48</sup> Park and Mitchell (1980) propose using the Prais-Winsten regression which is used to address the correlation problem in the error terms which is common in panel data. It is the generalization of the change model which does not force the coefficient of AR (1) to be 1.



incremental information over aggregated ratio, their coefficients will be different from each other. If the coefficients of profitability ratios are not different from each other, disaggregation of profit per equity partner (PPP) into leverage (LEV), profit margin (PM), and revenue per lawyer (RPL) do not add incremental information about the business model. I find that two of the profitability ratio coefficients are not equal to each other ( $\beta_{PM} - \beta_{LEV} = 0$  is rejected at significance  $Pr > F$  0.0286 level) which supports the separation of profitability into the three components: in determining one-year ahead profit per equity partner (PPP), one profitability ratio play a more influential role than the others.

- Insert Table 4 here -

Based on the estimated coefficients, I forecast profit per equity partner (PPP) using the forecasting period (2004 to 2007). I define forecasting error (FE) as the difference between the actual and the forecasted profit per equity partner (PPP). The absolute forecasting error (AFE) is defined as the absolute value of the forecasted error (FE). In evaluating the accuracy of forecasts, Banker and Chen (2006) and Fairfield and Yohn (2001) use the mean and median differences of the AFE. I follow their approaches to evaluate forecasting accuracy by using the absolute forecasting error (AFE) of Model 1 and Model 2 which are reported in Table 5.

- Insert Table 5 here -

In Table 5, Panel A, I report the descriptive statistics of the absolute forecasting error (AFE) of Model 1 and Model 2. I find that the absolute forecasting error (AFE) of Model 2 is smaller than Model 1 in terms of the median (Model 1 = 0.054, Model 2 = 0.050) and mean (Model 1 = 0.074, Model 2 = 0.072). Panel A results show Model 2

that using the disaggregated ratios of profit per equity partner (PPP) (PM, RPL, and LEV) to forecast one-year ahead profit per equity partner (PPP) outperforms Model 1 which used the prior year profit per equity partner (PPP) to forecast one-year ahead profit per equity partner (PPP).<sup>49</sup> In order to statistically test whether the median and mean of Model 1 and Model 2's absolute forecasting errors (AFE) are different, I compare the median and mean differences of absolute forecasting error (AFE) (reported in Panel B). I use a t-test<sup>50</sup> to compare the mean difference of Model 1 and Model 2 absolute forecasting errors (AFE). Wilcoxon signed rank test<sup>51</sup> results following Banker and Chen's work (2006) to compare the median difference of Model 1 and Model 2 absolute forecasting error (AFE). I do a pair-wise comparison of absolute forecasting error (AFE) between Model 1 and Model 2. I set Model 1 as a base model therefore, a positive mean or median difference in absolute forecasting error (AFE) implies comparison model (Model 2) provides more accurate forecast of one-year ahead profit per equity partner (PPP) compared to the base model (Model 1): Model 2 generates a lower level of mean or median absolute forecasting errors (AFE) compared to Model 1. I use a one-tailed test for the t-test and Wilcoxon signed rank test. The median difference of the absolute forecasting errors (AFE) is positive (0.001) and significant (at significance  $Pr \geq S$

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<sup>49</sup> As a robustness check, Fairfield and Yohn (2001) use individual regression by year and find results consistent with pooled regression. Hence I also use Fama-Macbeth regression for estimation period and estimated coefficients to forecast PPP. The results are not reported here but I find consistent results that are reported in Table 4.

<sup>50</sup> I use dependent t-test for paired sample.

<sup>51</sup> Wilcoxon signed rank test is used to compare the two models in non-parametric way (Sheskin 1997). Wilcoxon signed rank test are found by following procedures: 1) take the absolute difference between absolute forecasting error (AFE) of Model 1 and absolute forecasting error (AFE) of Model 2 for each law firm, 2) omit law firm samples if absolute forecasting error (AFE) of Model 1 is equal to absolute forecasting error (AFE) of Model 2 (that is, if AFE of Model 1 = AFE of Model 2), 3) rank the remaining absolute differences, from smallest to largest, 4) if absolute forecasting error (AFE) of Model 1 > absolute forecasting error (AFE) of Model 2, then rank will have a positive sign and if absolute forecasting error (AFE) of Model 1 < absolute forecasting error (AFE) of Model 2, then rank will have a negative sign, 5) calculate Wilcoxon signed test by summing all the signed ranks.

0.0296). The mean difference of the absolute forecasting errors (AFE) is positive (0.002) and significant (at significance  $Pr > t$  0.0161): the comparison model (Model 2) generates lower absolute forecasting errors (AFE) than the base model (Model 1). The results in Table 5 confirm that the forecasting model with the profitability ratios (Model 2) provides a better forecast of one-year ahead profitability than the base AR (1) model (Model 1).

#### 5.4. Robustness of Forecasting Errors Results

As a robustness check, I evaluate the absolute forecasting error (AFE) of Model 1 and Model 2 by using the changes model.

$$\text{Model 1-1: } \Delta \text{LogPPP}_{t+1} = \alpha + \beta_{\Delta \text{PPP}} \Delta \text{LogPPP}_t + \varepsilon_t \quad (1-1)$$

$$\text{Model 2-1: } \Delta \text{LogPPP}_{t+1} = \alpha + \beta_{\Delta \text{LEV}} \Delta \text{LogLEV}_t + \beta_{\Delta \text{PM}} \Delta \text{LogPM}_t + \beta_{\Delta \text{RPL}} \Delta \text{LogRPL}_t + \varepsilon_t \quad (2-1)$$

where,

$\Delta \text{LogPPP}$  =  $\Delta \text{Log}(\text{Net operating income} / \text{Number of equity partners})$  scaled by \$1,000

$\Delta \text{LogLEV}$  =  $\Delta \text{Log}(\text{Number of lawyers} / \text{Number of equity partners})$

$\Delta \text{LogPM}$  =  $\Delta \text{Log}\{(\text{Net income} / \text{Gross revenue}) \times 100\}$

$\Delta \text{LogRPL}$  =  $\Delta \text{Log}(\text{Gross revenue} / \text{Number of lawyers})$  scaled by \$1,000

The Prais-Winsten regression is the generalization of the change model. However, I considered the change model for two reasons. First, using the change model reduces omitted variables problems. The effect of omitted variables in the residual will be canceled out if I take the difference between two periods. Second, I wish to follow the research methodology of Fairfield and Yohn (2001). Fairfield and Yohn (2001) used the change in profit margin (PM) and the change in asset turnover (ATO) to predict the change in return on assets (ROA). The level of profit margin (PM) and the level of asset

turnover (ATO) imply the operation strategy of the firms hence they do not provide the necessary information to predict the one-year ahead change in return on assets (ROA). I follow Fairfield and Yohn (2001) to test whether using the changes in profit margin (PM), in revenue per lawyer (RPL) and leverage (LEV) improve forecasting of the change in one-year ahead profit per equity partner (PPP) compared to using the change in profit per equity partner (PPP) alone to forecast one-year ahead the change in profit per equity partner (PPP). I follow the same procedures in the levels models. I use the estimation period (from 2000 to 2003) to estimate the coefficients for the changes models (Model 1-1 and Model 2-1) and use the Prais-Winsten regression (Park and Mitchell 1980) to estimate the coefficients. I use the Durbin-Watson test for the estimation period (2000-2003) to check for the autocorrelation problem, and find no autocorrelation problem.<sup>52</sup>

- Insert Table 6 here -

In Table 6, I report the Prais-Winsten regression estimation of the coefficient for Model 1-1 and Model 2-1. Panel A shows the Model 1-1 results of the AR (1) model which forecasted one-year ahead changes in profit per equity partner (PPP) based on the prior year changes in profit per equity partner (PPP). Panel B shows the Model 2-1 results of the changes in three profitability ratio model. I compare the coefficients of each of the changes in the profitability ratio to examine whether they are different from each other. If the changes in the three profitability ratios add incremental information over changes in profit per equity partner (PPP), I expect their coefficients to be different from each other. I find that two pairs of the profitability ratios coefficients are not equal

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<sup>52</sup> I do a Durbin Watson test for the estimation period (2000-2003) and  $D-W = 2.166$  at significance  $Pr < DW 0.8518$  and  $Pr > DW 0.1482$ , which show autocorrelation is not a problem.

to each other ( $\beta_{\Delta PM} - \beta_{\Delta RPL} = 0$  is rejected at significance  $Pr > F$  0.0194 level and  $\beta_{\Delta PM} - \beta_{\Delta LEV} = 0$  is rejected at significance  $Pr > F$  0.0039 level) which supports the usefulness of my profitability ratio model. That is, in determining one-year ahead changes in profit per equity partner (PPP), some profitability ratios play more influential role than the others: changes in profit margin (PM) compared to changes in leverage (LEV) and changes in revenue per lawyer (RPL).

- Insert Table 7 here -

Based on the estimated coefficients in Table 6, I evaluate forecasting accuracy by using the absolute forecasting error (AFE) of Model 1-1 and Model 2-1 in Table 7. In Panel B of Table 7, I do a pair-wise comparison of absolute forecasting error (AFE) between Model 1-1 and Model 2-1. I set Model 1 as a base model. Therefore, a positive mean or median difference in absolute forecasting error (AFE) implies that the comparison model (Model 2-1) provides a more accurate forecast of one-year ahead profit per equity partner (PPP) than the base model (Model 1-1): Model 2-1 generates a lower level of mean or median absolute forecasting error (AFE) compared to Model 1-1. I use one-tailed test for the t-test and Wilcoxon signed rank test.

Consistent with the results in Table 5, I find that the absolute forecasting error (AFE) of Model 2-1 is smaller than Model 1-1 in terms of the median (Model 1-1 = 0.045, Model 2-1 = 0.044) and mean (Model 1-1 = 0.069, Model 2-1 = 0.066) shown in Panel A. In order to statistically test whether the median and mean of the absolute forecasting error (AFE) are different between Model 1-1 and Model 2-1, I compare their median and mean which are reported in Panel B. I use a t-test to compare the mean difference of Model 1-1 and Model 2-1's absolute forecasting error (AFE) and the Wilcoxon signed rank test

to compare their median difference. The mean difference of the absolute forecasting error (AFE) is positive (0.003) and very significant (at significance  $Pr > t$  0.0302). The median difference of the absolute forecasting error (AFE) is positive (0.004) and significant (at significance  $Pr \geq S$  0.0023). The results in Table 7 confirm that the forecasting model with the profitability ratios (Model 2-1) provides a better forecast of one-year ahead profitability than the base AR (1) model (Model 1-1), which is consistent with Fairfield and Yohn (2001).

## CHAPTER 6:

### FIRM CHARACTERISTICS AND PROFITABILITY RATIOS

#### 6.1 Variable Measurement and Estimation Models

To measure the SCOPE-INTL and SCOPE-RGNL variables, I use the definition from the *AmLaw 100*. I code SCOPE-INTL as 1 if firms have more than 40 percent of their lawyers located outside the U.S. and 0 if they have 40 percent or less. I code SCOPE-RGNL as 1 if the firm is located in only one of the 8 regions defined by the *AmLaw 100* (New England, NY city, Mid-Atlantic, Washington DC, South & Southeast, Midwest, West & Southwest, and West Coast/Pacific Rim) and as 0 if the firm is either national<sup>53</sup> or SCOPE-INTL. I expect the SCOPE-INTL variable will have a negative impact on revenue per lawyer (RPL) and a positive effect on leverage (LEV): legal service they provide can be handled using relatively less competent lawyers in their overseas offices because they provide low-end services which do not require a close supervision of reputable equity partners. Since they cannot command premium fee for their services, they need to increase leverage (LEV) to serve more clients. The SCOPE-RGNL firms may provide high-end service which requires their lawyers to work closely with equity partners who have reputations and expertise and command premium fee. In this case, the SCOPE-RGNL variable will have a positive effect on revenue per lawyer (RPL). To dominate the regional market, they also need to provide general types of legal service to low-end regional clients which will have a positive effect on leverage (LEV).

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<sup>53</sup> The *AmLaw 100* defines law firms as national if they have more than 45percent of their attorneys located in any one region of the country.<sup>54</sup> In 2007, international law firms have 2,215 lawyers on average, national law firms have 965 lawyers on average, and regional law firms have 607 lawyers on average (*AmLaw 100* 2008). Therefore, large law firms tend to be the ones that have international and/or national presence.

The third firm characteristic variable I include is SCALE, the size of the firm (e.g., the number of lawyers in the firm). SCALE measures the available human capital resources of the law firms, hence I expect to have a positive effect on leverage (LEV). It is difficult to increase the number of equity partners without diluting their “rainmaking” ability, I expect larger law firms to have high leverage (LEV) compared with smaller law firms. Large law firms have more pricing power than small law firms using their brand name.<sup>54</sup> In addition, they have enough human capital resources to handle large clients and projects. Their size allows them to dominate markets for large clients and to be more monopolistic in commanding premium fee. Consequently, it will be reflected positively in revenue per lawyer (RPL). The reputation of large law firms is based on size and not on reputations of equity partners or on intimacy between partners and clients so they are able to have high leverage (LEV).

To examine the relationship between the firm characteristics and their influence on each of the profitability ratios (PM, RPL, and LEV) and the aggregated profitability (PPP), I construct four performance equations (Model 3). In Model 3, I have four different equations for each of the profitability ratios (LogPM, LogRPL, and LogLEV) and the aggregated profitability (LogPPP) respectively in place of Log (RATIO).

$$\text{Log (RATIO)} = f(\text{STRUCTURE, SCOPE-INTL, SCOPE-RGNL, SCALE}) \quad (3)$$

where, RATIO is PM, RPL, LEV and PPP

$$\text{LogPPP} = \text{Log}(\text{Net operating income} / \text{Number of equity partners}) \text{ scaled by } \$1,000$$

$$\text{LogLEV} = \text{Log}(\text{Number of lawyers}/\text{Number of equity partners})$$

$$\text{LogPM} = \text{Log}\{(\text{Net income}/\text{Gross revenue}) \times 100\}$$

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<sup>54</sup> In 2007, international law firms have 2,215 lawyers on average, national law firms have 965 lawyers on average, and regional law firms have 607 lawyers on average (*AmLaw 100* 2008). Therefore, large law firms tend to be the ones that have international and/or national presence.



LogRPL = Log(Gross revenue/Number of lawyers) scaled by \$1,000  
 STRUCTURE = 1 if 2-tier partnership structure, =0 if 1-tier partnership structure  
 SCOPE-INTL = 1 if more than 40% of lawyers located outside U.S., =0 otherwise  
 SCOPE-RGNL = 1 if firms has at least 45% of firm's attorneys located in only one of the 8 regions of the country (New England, NY city, Mid-Atlantic, Washington DC, South & Southeast, Midwest, West & Southwest, and West Coast/Pacific Rim), =0 if national or international  
 SCALE = Log(Number of lawyers)

## 6.2 Results

I examine the four profitability equations to determine which characteristics are embedded in each profitability ratio and which ones improved the profitability forecasts. Table 8 shows the results of the four equations, Model 3, which I construct to examine the relationship between the firm characteristics and their influence on the aggregated profitability (PPP) and on each of the profitability ratios (PM, RPL, and LEV). Seemingly unrelated regression (SUR) is commonly used to handle the multiple equations model because OLS provides a consistent coefficient estimate but does not provide an efficient estimate if the error terms are correlated across equations (Zellner 1962 p. 349-352, Zellner, Kmenta and Dreze 1966).<sup>55</sup> However, when all equations have identical regressors, such as in Model 3, the OLS provides unbiased and efficient estimators (Dwivedi & Srivastava 1978, Greene 2005 p. 343-344).<sup>56</sup> Since the

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<sup>55</sup> In this case, SUR provides more efficient estimate by using the cross equation covariance matrix from OLS estimate (Zellner 1962, Zellner, Kmenta and Dreze 1966).

<sup>56</sup> I do not report in the paper but as a robustness check, I also run Model 3 using SUR. I got the same results as with the OLS.

Prais-Winsten regression addresses serial correlation problems that are common in time-series data (Park and Mitchell 1980) hence I use Prais-Winsten regression.<sup>57</sup>

-Insert Table 8 here -

STRUCTURE variable shows consistent results across equations: STRUCTURE has a negative coefficient in the profit margin (PM) equation ( $\beta = -0.245$  at significance  $\text{Pr}|t| < .0001$ ), revenue per lawyer (RPL) equation ( $\beta = -0.215$  at significance  $\text{Pr}|t| < .0001$ ) and profit per equity partner (PPP) equation ( $\beta = -0.357$  at significance  $\text{Pr}|t| < .0001$ ) but a positive coefficient in leverage (LEV) equation ( $\beta = 0.115$  at significance  $\text{Pr}|t| < .0001$ ). The coefficient of STRUCTURE in the revenue per lawyer (RPL) equation shows that non-equity partners are less competent than equity partners in terms of “rainmaking” and handling important clients, therefore, their reputations cannot command premium fee which is reflected negatively in revenue per lawyer (RPL). Having non-equity partners rather than associates to leverage equity partners’ “rainmaking” ability increases compensation expense because the compensation for non-equity partners is higher than that for associates<sup>58</sup>. This results in a negative reflection on profit margin (PM) equations. As expected, STRUCTURE has a positive relationship with leverage (LEV) because non-equity partners are used to leverage the human capital contribution of the equity partners.

I find that the international (SCOPE-INTL) firms create and enhance their profits differently from regional firms. International law firms face more competition in terms of fees because they need to compete with local law firms. Therefore, for their

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<sup>57</sup> To address heteroskedasticity problem, I report robust standard error (Eicker-White standard error). In addition, I check for collinearity problem but I find collinearity is not a problem (Variance Inflation Factors (VIF) < 1.55). Also I check for outliers using Cook’s D but I do not find any influential outliers (Cook’s D < 1).

<sup>58</sup> See footnote 17.

international offices, the international law firms hire relatively less competent (in terms of education and training) local lawyers and offer lower compensation than they do for U.S. lawyers. Hiring local lawyers results in increased leverage (LEV) of the international law firm allowing them to have more business. Since local lawyers are not as qualified and competent as the U.S. lawyers they attract low-end legal clients and projects which do not rely heavily on the close supervision and expertise of the equity partners. Therefore, the international firms cannot command premium fee. To offset the lack of premium fee, international law firms use high leverage (LEV) to increase profit per equity partner (PPP). The SCOPE-INTL variable is negatively reflected in revenue per lawyer (RPL) equation ( $\beta = -0.662$  at significance  $\Pr|t| < .0001$ ) and profit per equity partner (PPP) equation ( $\beta = -0.397$  at significance  $\Pr|t| = 0.0097$ ) but positively reflected in leverage (LEV) equation ( $\beta = 0.250$  at significance  $\Pr|t| < .0001$ ).

According to the results, regional law firms (SCOPE-RGNL) have a positive relationship to revenue per lawyer (RPL) ( $\beta = 0.390$  at significance  $\Pr|t| < .0001$ ), leverage (LEV) ( $\beta = 0.051$  at significance  $\Pr|t| = 0.0580$ ), and profit per equity partner (PPP) ( $\beta = 0.370$  at significance  $\Pr|t| < .0001$ ). There is generally less competition for regional firms than international firms therefore, they do not have as much fee competition. In addition, lawyers in regional firms are located close to each other, compared to international or national law firms, which allows them to accept projects that require close supervision by equity partners and to use the reputations of their equity partners to command premium fee. Premium fee is reflected in high revenue per lawyer (RPL) and eventually affects profit per equity partner (PPP). The regional law firms have positive relation with leverage (LEV) because they also take low-end projects from regional

clients to dominate regional market.

I find that large law firms (SCALE) tend to have low profit margin (PM), and high revenue per lawyer (RPL), and high profit per equity partner (PPP) than small firms. Large firms have pricing power to dominate small firms because they have the capacity to handle large clients and projects. Therefore, large firms are able to command premium fee for their services: SCALE is positive in the revenue per lawyer (RPL) equation ( $\beta = 0.561$  at significance  $\Pr|t| < .0001$ ). However, more lawyers can increase operating expenses, such as compensation expenses, which reflects negatively on the profit margin (PM) equation ( $\beta = -0.093$  at significance  $\Pr|t| = 0.0003$ ). Since their reputations are based on size and not just intimacy between partners and clients they are able to have high leverage (LEV) with more lawyers per partner ( $\beta = 0.138$  at significance  $\Pr|t| < .0001$ ). By using premium fee from their pricing power and high leverage, large law firms are able have higher profit per equity partner (PPP) ( $\beta = 0.506$  at significance  $\Pr|t| < .0001$ ). From the Model 3 results, I find that the different profitability ratios contain different information about how law firms operate their business. Incremental information that is embedded in each of the disaggregated profitability ratios in the Model 2 plays an important role in predicting future profit per equity partner (PPP) when compared with the Model 1.

## CHAPTER 7:

### CONCLUSION

With globalization and an increase in international transactions, the professional service industry has become one of the major and fastest growing industries driving the U.S. economy (USITC 2009). Although the role of professional service firms in the U.S. economy has increased, they have largely been ignored in terms of applying the financial analysis models and techniques which are commonly used in accounting literature. The main contribution of this paper is to modify the financial analysis framework of traditional businesses, the DuPont model, for professional service firms and to examine whether it provides additional information about their business operations.

The original DuPont model for traditional businesses disaggregates return on equity (ROE) into three profitability ratios, profit margin (PM), asset turnover (ATO), and leverage (LEV). Due to the unique characteristics of professional service firms' business assets, which are human capital assets, I modify the DuPont model to make it more meaningful to this industry. To validate the use of my profitability ratio model, I apply it to the legal industry which is one of the typical and representative segments of professional service firms. I disaggregate profit per equity partner (PPP) of law firms, which measures return on the human capital contributions of the equity partners, into the three profitability ratios: profit margin (PM), revenue per lawyer (RPL), and leverage (LEV). To validate whether the decomposition of the profitability ratios adds incremental information, I forecast future profitability.

Consistent with studies that use traditional businesses (Fairfield and Yohn 2001, Soliman 2004), I validate that separating the profitability ratio provides more accurate

forecasting of future profitability than using the aggregated profitability. I compare the absolute forecasting error (AFE) between the forecasting model which uses only the prior year profit per equity partner (PPP) to forecast one-year ahead profit per equity partner (PPP) and the forecasting model which uses profit margin (PM), revenue per lawyer (RPL) and leverage (LEV) to forecast one-year ahead profit per equity partner (PPP). I find the disaggregated profitability ratios provide additional information on how the law firms operate their businesses which also improves forecasting of future profitability. To investigate what additional information of firm characteristics enhances forecasting of future profitability, I construct four equations. Firms with two-tier partnership structure tend to have lower profitability because the non-equity partners are less competent than the equity partners in terms of “rainmaking” and handling important clients. Hence the law firms with non-equity partners cannot command premium fee for their services. I find that since the international firms cannot command premium fee for their services, they have to maintain high leverage (LEV) to keep their firm profitability. Regional firms have most of their lawyers located in one region which enables them to work closely with their equity partners. Therefore, they can use the reputations of equity partners to command premium fee for their services. Consequently, regional firms have high profit per equity partner (PPP). I find that large firms use their size to dominate small firms since they are able to command premium fee. Large law firms establish their reputation based on their size not from the relationship between partners and clients, therefore they have high leverage (LEV). The results of the four profitability equations support the hypothesis that the disaggregated profitability ratios provide additional information which increases the predictability of future profitability.

With a simple modification for the differences in defining the business assets, I found that applying the profitability ratio model adds incremental information on the business model of professional service firms, especially law firms, just as the DuPont model does for manufacturing firms.

## CHAPTER 8:

### FUTURE RESEARCH

#### 8.1 The Relation between Profitability and Organizational Structure of Law Firms

I have found that the separation of profitability of law firms into different components reveals value-relevant information on how they operate their business. The four profitability ratio equations show that the different profitability ratios are influenced by the organizational structure of the law firm. Therefore, it would be interesting to examine the link between the organizational structure of the law firms and their profitability ratios, and how they affect each other. For example, more and more law firms are adding another layer to their partnership structure by adding non-equity partners (*AmLaw 100* 2004). This will affect each profitability ratio differently (obviously, it will increase leverage). It would be interesting to examine the relationship between organizational structure of law firms and their profitability ratios. In fact, accounting firms are also adding non-equity partners (Weinstein 2003, Sinkin and Putney 2007, Rosenberg 2009). Therefore, examining the relationship between the organizational structure of law firms and their profitability ratios can provide a framework that can be applied to other professional service firms. While I use simple counts of the number of partners and professionals, the model I employ can accommodate alternative measures of human capital that may be developed. This, in fact, suggests a direction for future research on improved measures of human capital that recognizes the heterogeneity in the productivity of different personnel.

#### 8.2 The Impact of Sarbanes-Oxley Act in Accounting Industry



I have found that separating profitability into different components improves forecasting of future profitability in law firms. It would be valuable to examine whether applying the framework that I use for the professional service firms works in accounting firms as well by uncovering the relevant information that is mingled in the aggregated profitability. One of the interesting aspects of the accounting industry is the enactment of the Sarbanes-Oxley Act (SOX) in 2002. There have been a number of studies that examine the effect of SOX on accounting firms and their clients, but there is no study that looks at how SOX changes the way accounting firms create their firm revenue. By examining the profitability ratios of the accounting firms, I expect to observe the changes in the business model of accounting firms after the enactment of SOX.

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## Appendix A: List of Sample Law Firms

<b>Firmid<sup>59</sup></b>	<b>Firm name</b>	<b>Location</b>
1	Baker & McKenzie LLP	International
2	Jones Day	National
3	Skadden, Arps, Slate, Meagher & Flom LLP	New York, NY
4	White & Case LLP	International
5	Latham & Watkins LLP	National
6	Sidley Austin LLP	National
7	Mayer, Brown, Rowe & Maw LLP	National
8	Morgan Lewis & Bockius LLP	National
9	Greenberg Traurig, LLP	National
10	Holland & Knight LLP	National
11	DLA Piper US LLP	National
12	Weil, Gotshal & Manges LLP	New York, NY
13	McDermott Will & Emery LLP	National
14	Shearman & Sterling LLP	New York, NY
15	Morrison & Foerster LLP	San Francisco, CA
16	Kirkland & Ellis LLP	Chicago, IL
17	O`Melveny & Myers LLP	Los Angeles, CA
18	Hogan & Hartson LLP	Washington D.C.
19	Foley & Lardner LLP	Milwaukee, WI
20	Akin Gump Strauss Hauer & Feld LLP	National
21	Reed Smith LLP	Pittsburgh, PA
22	Paul, Hastings, Janofsky & Walker LLP	National
23	Fulbright & Jaworski LLP	Houston, TX
24	Hunton & Williams LLP	Richmond, VA
25	Winston & Strawn LLP	Chicago, IL
26	Cleary Gottlieb Steen & Hamilton LLP	New York, NY
27	Dechert LLP	National
28	Kirkpatrick & Lockhart Preston Gates Ellis LLP	National
29	Gibson, Dunn & Crutcher LLP	Los Angeles, CA
30	Squire, Sanders & Dempsey LLP	National
31	Bryan Cave LLP	National
32	Vinson & Elkins LLP	Houston, TX
33	Wilmer Cutler Pickering Hale and Dorr LLP	Washington D.C.
34	Pillsbury Winthrop Shaw Pittman LLP	San Francisco, CA
35	King & Spalding LLP	Atlanta, GA
36	Bingham McCutchen LLP	National
37	Orrick, Herrington & Sutcliffe LLP	San Francisco, CA
38	LeBoeuf, Lamb, Greene & MacRae LLP	National
39	Simpson Thacher & Bartlett LLP	New York, NY
40	McGuireWoods LLP	Richmond, VA

<sup>59</sup> Firmid is assigned to law firms in the order of size (number of lawyers) from largest to smallest.

41	Wilson Sonsini Goodrich & Rosati	Palo Alto, CA
42	Alston & Bird LLP	Atlanta, GA
43	Baker Botts, LLP	Houston, TX
44	Dorsey & Whitney LLP	Minneapolis, MN
45	Sullivan & Cromwell LLP	New York, NY
46	Arnold & Porter LLP	Washington D.C.
47	Proskauer Rose LLP	New York, NY
48	Sonnenschein Nath & Rosenthal LLP	Chicago, IL
49	Nixon Peabody LLP	National
50	Seyfarth Shaw LLP	National
51	Baker Hostetler LLP	Cleveland, OH
52	Davis Polk & Wardwell	New York, NY
53	Heller Ehrman LLP	San Francisco, CA
54	Perkins Coie LLP	Seattle, WA
55	Paul, Weiss, Rifkind, Wharton & Garrison, LLP	New York, NY
56	Ropes & Gary LLP	Boston, MA
57	Katten Muchin Rosenman LLP	Chicago, IL
58	Howrey LLP	Washington D.C.
59	Debevoise & Plimpton LLP	New York, NY
60	Shook, Hardy & Bacon, LLP	Kansas City, MO
61	Goodwin Procter LLP	Boston, MA
62	Dewey Ballantine LLP	New York, NY
63	Cooley Godward Kronish LLP	Palo Alto, CA
64	Fried, Frank, Harris, Shriver & Jacobson LLP	New York, NY
65	Willkie Farr & Gallagher LLP	New York, NY
66	Cadwalader, Wickersham & Taft LLP	New York, NY
67	Covington & Burling LLP	Washington D.C.
68	Milbank, Tweed, Hadley & McCloy LLP	New York, NY
69	Duane Morris LLP	Philadelphia, PA
70	Womble Carlyle Sandridge & Rice, PLLC	Winston Salem, NC
71	Kilpatrick Stockton LLP	Atlanta, GA
72	Kaye Scholer LLP	New York, NY
73	Blank Rome LLP	Philadelphia, PA
74	Cravath, Swaine & Moore LLP	New York, NY
75	Mintz Levin Cohn Ferris Glovsky and Popeo, P.C.	Boston, MA
76	Jenner & Block LLP	Chicago, IL
77	Schulte Roth & Zabel LLP	New York, NY
78	Chadbourne & Parke LLP	New York, NY
79	Stroock & Stroock & Lavan, LLP	New York, NY
80	Cahill Gordon & Reindel LLP	New York, NY
81	Wachtell, Lipton, Rosen & Katz	New York, NY

## Appendix B: Firm by Scope of Operation

### Panel A. Classification by Scope of Operation

	<b>N</b>	<b>Firms (Firmid)</b>
<b>International Firms</b>	<b>2</b>	Baker & McKenzie LLP (1) White & Case LLP (4)
<b>National Firms</b>	<b>19</b>	Jones Day (2) Latham & Watkins LLP (5) Sidley Austin LLP (6) Mayer, Brown, Rowe & Maw LLP (7) Morgan Lewis & Bockius LLP (8) Greenberg Traurig, LLP (9) Holland & Knight LLP (10) DLA Piper US LLP (11) McDermott Will & Emery LLP (13) Akin Gump Strauss Hauer & Feld LLP (20) Paul, Hastings, Janofsky & Walker LLP (22) Dechert LLP (27) Kirkpatrick & Lockhart Preston Gates Ellis LLP (28) Squire, Sanders & Dempsey LLP (30) Bryan Cave LLP (31) <sup>60</sup> Bingham McCutchen LLP (36) LeBoeuf, Lamb, Greene & MacRae LLP (38) Nixon Peabody LLP (49) Seyfarth Shaw LLP (50)
<b>Regional Firms</b>	<b>60</b>	Skadden, Arps, Slate, Meagher & Flom LLP (3) Weil, Gotshal & Manges LLP (12) Shearman & Sterling LLP (14) <sup>61</sup> Morrison & Foerster LLP (15) Kirkland & Ellis LLP (16) O'Melveny & Myers LLP (17) Hogan & Hartson LLP (18) Foley & Lardner LLP (19) Reed Smith LLP (21) Paul, Weiss, Rifkind, Wharton & Garrison, LLP (22) Fulbright & Jaworski LLP (23) Hunton & Williams LLP (24) Winston & Strawn LLP (25) Cleary Gottlieb Steen & Hamilton LLP (26) Gibson, Dunn & Crutcher LLP (29) Vinson & Elkins LLP (32) Wilmer Cutler Pickering Hale and Dorr LLP (33)

<sup>60</sup> Bryan Cave LLP (31) become regional law firm (St. Louis, MO) from 2006.

<sup>61</sup> Shearman & Sterling LLP (14) become national law firm in 2006 and become international law firm in 2007.

	<p> Pillsbury Winthrop Shaw Pittman LLP (34)  King &amp; Spalding LLP (35)  Orrick, Herrington &amp; Sutcliffe LLP (37)  Simpson Thacher &amp; Bartlett LLP (39)  McGuireWoods LLP (40)  Wilson Sonsini Goodrich &amp; Rosati (41)  Alston &amp; Bird LLP (42)  Baker Botts LLP (43)  Dorsey &amp; Whitney LLP (44)  Sullivan &amp; Cromwell LLP (45)  Arnold &amp; Porter LLP (46)  Proskauer Rose LLP (47)  Sonnenschein Nath &amp; Rosenthal LLP (48)  Baker &amp; Hostetler LLP (51)  Davis Polk &amp; Wardwell (52)  Heller Ehrman LLP (53)  Perkins Coie LLP (54)  Ropes &amp; Gary LLP (56)  Katten Muchin Rosenman LLP (57)  Howrey LLP (58)  Debevoise &amp; Plimpton LLP (59)  Shook, Hardy &amp; Bacon, LLP (60)  Goodwin Procter LLP (61)  Dewey Ballantine LLP (62)  Cooley Godward Kronish LLP (63)  Fried, Frank, Harris, Shriver and Jacobson LLP (64)  Willkie Farr &amp; Gallagher LLP (65)  Cadwalader, Wickersham &amp; Taft LLP (66)  Covington &amp; Burling LLP (67)  Milbank, Tweed, Hadley &amp; McCloy LLP (68)  Duane Morris LLP (69)  Womble Carlyle Sandridge &amp; Rice, PLLC (70)  Kilpatrick Stockton LLP (71)  Kaye Scholer LLP (72)  Blank Rome LLP (73)  Cravath, Swaine &amp; Moore LLP (74)  Mintz Levin Cohn Ferris Glovsk and Popeo, P.C. (75)  Jenner &amp; Block LLP (76)  Schulte Roth &amp; Zabel LLP (77)  Chadbourne &amp; Parke LLP (78)  Stroock &amp; Stroock &amp; Lavan, LLP (79)  Cahill Gordon &amp; Reindel LLP (80)  Wachtell, Lipton, Rosen &amp; Katz (81) </p>
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**Panel B. Descriptive Statistics by Scope of Operation (2000-2005)<sup>62</sup>**

	<b>N</b>	<b>Average number of lawyers</b>	<b>Average PPP (in \$1,000)</b>
<b>International Firms</b>	2	2,215	\$985
<b>National Firms</b>	19	965	\$909
<b>Regional Firms</b>	60	607	\$1,146

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<sup>62</sup> There are two firms (Bryan Cave LLP (31) and Shearman & Sterling LLP (14)) that had changed their scope of operation in year 2006 and 2007. Therefore, numbers in Appendix 2 Panel B are for year 2000 to 2005.

### Appendix C: List of 64 Accounting Firms from *Accounting Today*

Firm Name	Headquarter City	Headquarter State
Deloitte & Touche	New York	NY
Ernst & Young	New York	NY
Pricewaterhouse Coopers	New York	NY
KPMG	New York	NY
RSM McGladrey Inc.	Bloomington	MN
Grant Thornton	New York	NY
BDO Seidman	Chicago	IL
Crowe, Chizek and Co.	Indianapolis	IN
Baird Kurtz & Dobson	Springfield	MO
Moss Adams	Seattle	WA
Centerprise Advisors In	Chicago	IL
Plante&Moran	Southfield	MI
Clifton Gunderson	Peoria	IL
J.H. Cohn	Roseland	NJ
Virchow, Kranse & Co.	Madison	WI
Reznick Fedder & Silver	Bethesda	MD
Dixon Odom	High Point	NC
Larson, Allen, Weishair	Minneapolis	MN
Rothstein, Kass & Co.	Roseland	NJ
M.R. Weiser & Co.	New York	NY
Marcum & Kliegman	Woodbury	NY
Eisner	New York	NY
Eide Bailly	Fargo	ND
Wipfli Ullrich Bertelso	Wausau	WI
Anchin, Block & Anchin	New York	NY
David Berdon & Co.	New York	NY
Marks Peneth & Shron	New York	NY
Cherry, Bekaert & Holla	Richmond	VA
Citrin Cooperman & Co.	New York	NY
Amper, Politziner & Mat	Edison	NJ
Goodman & Co.	Norfolk	VA
Parente Randolph	Wilkes-Barre	PA
Carr Riggs & Ingram	Enterprise	AL
Rehmann Robson	Saginaw	MI
Vitale, Caturano & Co.	Boston	MA
WithumSmith + Brown	Princeton	NJ
Schenck & Association	Appleton	WI
Aronson, Fetridge & Wei	Rockville	MD
Hein + Associates	Denver	CO
Suby, Von Haden & Assoc	Madison	WI

Firm Name	Headquarter City	Headquarter State
SS&G Financial Service	Cleveland	OH
Lattimore Black Morgan	Nashville	TN
Rubin, Brown, Gornstein	St. Louis	MO
Schneider Downs & Co.	Pittsburgh	PA
Habif, Arogeti & Wynne	Atlanta	GA
Blackman Kallick Bartel	Chicago	IL
Frank, Rimerman & Co.	San Jose	CA
Margolin, Winer & Evans	Garden City	NY
Hill, Barth & King	Boardman	OH
Clark, Schaefer, Hacket	Middletown	OH
Kaufman Rossin & Co.	Miami	FL
Singer Lewak Greenbaum	Los Angeles	CA
Doeren Mayhew	Troy	MI
Watkins, Meegan, Drury	Bethesda	MD
Rachlin Cohen & Holtz	Miami	FL
Elliott, Davis & Co.	Greenville	SC
Stonefield Josephson In	Santa Monica	CA
Lurie Besikof Lapidus &	Minneapolis	MN
Blum Shapiro & Co.	West Hartford	CT
Decosimo and Co.	Chattanooga	TN
Rosen Seymour Shapss Ma	New York	NY
Blue & Co.	Carmel	IN
Carlin Charron & Rosen	Worcester	MA
LeMaster & Daniels	Spokane	WA

## Appendix D: Examples of Law Firms Commending Premium Prices

- 1) Wachtell, Lipton, Rosen & Katz (Firmid 81): (<http://www.wlrk.com>)

About the firm>Who we are>

“Wachtell, Lipton, Rosen & Katz enjoys a global reputations as one of world’s leading business law firms. Our deep experience in the fields of merger and acquisitions, strategic investments, takeovers and takeover defense, corporate and securities law, and corporate governance means that we are regularly handle some of the largest, most complex and demanding transactions in the United States and around the world. We counsel both public and private acquirers and targets. We also have extensive experience handling sensitive investigations and litigation matters and corporate restructurings, and in counseling boards of directors and senior management in the most sensitive situations. In addition, our attorneys are thought leaders, speaking and writing frequently in our various areas of expertise.”

- 2) Gibson, Dunn & Crutcher LLP (Firmid 29): (<http://www.gibsondunn.com>)

Home>Firm News>

“Gibson, Dunn & Crutcher LLP is pleased to announce its selection as the best litigation firm in the nation by *The American Lawyer* magazine in its fifth biennial "[Litigation Department of the Year](#)" competition. In awarding this honor, *The American Lawyer* dubbed Gibson Dunn's litigators the "Game Changers," adding, "when other firms and conventional strategies come up short, clients in deep trouble turn to Gibson Dunn for fresh, aggressive thinking and innovative rescues." The magazine also honored Gibson Dunn's Labor and Employment group as a finalist in its labor and employment



competition. The winners were just announced in the magazine's January 2010 issue.”

3) Rope & Gray LLP (Firmid 56): <http://www.ropesgray.com>

About Rope & Gray LLP>Firm Overview>

“Built on a foundation of over 140 years of dedication to forging strong client relationships, we represent interests across a broad spectrum of industries in corporate law and litigation matters. In addition, we offer counsel on labor and employment issues, tax and benefits, creditors' rights, and private client services. Our clients range in size from large to small companies and include financial institutions, government agencies, hospitals and health care organizations, colleges and universities, and families and individuals.”

4) Arnold & Porter LLP (Firmid 46): (<http://www.arnoldporter.com>)

Who We Are>

“Arnold & Porter attorneys, practicing in more than 25 distinct areas of the law, conduct business on six continents. Our global reach, experience, and deep knowledge allow us to work across geographic, cultural, technological, and ideological borders, serving clients whose business needs require US, EU, or cross-border regulatory, litigation, and transactional services.”

“Arnold & Porter is recognized throughout the US, EU, and the world for excellence in the practice of law. In 2009, *Chambers Global* named 14 Arnold & Porter attorneys as "Leaders in their Field" in the areas of life sciences (global); competition/antitrust (Belgium, Europe-wide, US, and global); international arbitration (Latin America); intellectual property; international trade, and outsourcing (US). *PLC Which lawyer?*

*Yearbook* 2009 ranked 46 Arnold & Porter lawyers in 20 areas. The firm was ranked by PLC as “Leading” in competition/anti-trust, life sciences, corporate real estate, corporate/M&A, and environment. Arnold & Porter received Honorable Mention recognition in *The American Lawyer*’s “Litigation Department of the Year” 2008 feature. *The American Lawyer* also ranked the firm No. 6 on its “A-List” of top 20 firms in the country, the sixth time the firm has made the list since its inception in 2003.”

## Appendix E: Examples of Law Firms Leveraging Human Capital

1) White & Case LLP (Firmid: 4): (<http://www.whitecase.com>)

Home>

“A leading global law firm with lawyers in 36 offices in 25 countries, White & Case provides counsel and representation in virtually every area of law that affects cross-border business, including transactions, arbitration and litigation. Whether in established or emerging markets, the hallmark of White & Case is our complete dedication to meeting the business priorities and legal needs of our clients.”

Home>About the Firm>

“International practice is the foundation of our firm, and we have been involved in transactions in virtually every corner of the world. Our commitment to each region of the world is substantial. We have a critical mass of U.S., English, and domestic lawyers throughout the world who are either native to or fully integrated in the regions where they are based.”

2) Baker McKenzie (Firmid: 1): (<http://www.bakermckenzie.com>)

About Us>

“**We Are Baker & McKenzie:** Baker & McKenzie defined the global law firm in the 20th century, and we are redefining it to meet the challenges of the global economy in the 21st.

We bring to matters the instinctively global perspective and deep market knowledge and insights of 3,900 locally admitted lawyers in 67 offices worldwide. We have a distinctive global way of thinking, working and behaving – "fluency" – across borders,

issues and practices.

We understand the challenges of the global economy because we have been at the forefront of its evolution. Since 1949, we have advised leading corporations on the issues of today's integrated world market. We have cultivated the culture, commercial pragmatism and technical and interpersonal skills required to deliver world-class service tailored to the preferences of world-class clients worldwide.

Ours is a passionately collaborative community of 60 nationalities. We have the deep roots and knowledge of the language and culture of business required to address the nuances of local markets worldwide. And our culture of friendship and broad scope of practice enable us to navigate complexity across issues, practices and borders with ease.”

3) Shook, Hardy & Bacon LLP (Firmid: 60): (<http://www.shb.com>)

Our Firm>

“Shook, Hardy & Bacon L.L.P. is an international law firm with a legacy spanning more than a century. Established in Kansas City in 1889, today the firm has grown to approximately 1,500 employees worldwide, with more than 500 attorneys and 226 research analysts and paraprofessionals. The firm has [nine offices](#) strategically located in Geneva, Houston, Kansas City, London, Miami, Orange County, San Francisco, Tampa, Florida, and Washington, D.C.

Shook, Hardy & Bacon L.L.P. is committed to being the best in the world at providing creative and practical solutions at unsurpassed value. We are deeply passionate about achieving the best results for our clients from the boardroom to the courtroom and sustaining a diverse environment where everyone is respected, feels appreciated, and experiences fulfillment and enjoyment through meaningful personal

contributions.”

4) Mintz Levin Cohn Ferris Glovsky and Popeo, P.C.(Firmid 75):

<http://www.mintz.com>)

Introducing Mintz Levin>

“Founded in 1933, Mintz Levin has grown into a versatile law firm of 500 highly qualified and dedicated attorneys representing diverse international clients in many industries who turn to us for a wide range of legal services and resources. Our offices are located in Boston, Washington, D.C., New York, San Diego, Los Angeles, Palo Alto, Stamford (CT), and London.”

## Appendix F: Literature Review on Use of Profitability Ratios in Legal Industry

### Panel A. Practitioners' Journal

Blumenthal (2009)	DiPietro (2008)	Feuer (2009)
<p>During the downturn of economies, law firms also suffered the downturn. profit per equity partner (PPP), which is the common measure that is used to compare the profit of law firm seems to be a sensitive measure because it can be influenced by changed in organizational structure, Hence, he is suggesting whether revenue per lawyer (RPL) is better measure to compare the profitability of law firms.</p>	<p>Outlook legal industry for 2008 and he used profit margin (PM), leverage (LEV), profit per equity partner (PPP) and changes in billable hour to support his prediction.</p>	<p>He explained downsizing phenomenon in legal industry using profitability measures such as revenue per lawyer (RPL) and profit per equity partner (PPP).</p>

### Panel B. Research Papers

Gilson & Mnookin (1989)	Henderson (2006)	Galanter & Henderson (2008)	Samuelson & Jaffe (1990)
<p>They examined the efficiency of up-or out system in law firms from firm's perspective and from the associate's perspective and link it with risk-sharing and incentives. They reported law firm's leverage (LEV) is directly related to firm profit: higher the firm's leverage (LEV), the higher the firm's per partner profit (PPP).</p>	<p>He examined the relation between organizational structure of law firms and performance of law firms. He found that two-tier partnership is negatively related to profit per equity partner (PPP) and explained law firms choose two-tier because it is largely a function of firms' relative standing in market for high-end corporate law service.</p>	<p>They examined the changes in the role of equity partners, non-equity partners and associates in the law firms as they get larger sized.</p>	<p>They found that two-tier partnership is negatively associated with profit per equity partner (PPP). They also proposed determinants of profit per equity partner (PPP) which include number of associates, and number of partners (negative effect).</p>

### Panel C. Books

Lowendahl (2005)	Maister (1997)
He explained that professional service firms develop firm resources (human capital) as a byproduct of daily operation. In explaining the human capital resources allocation, he linked with leverage (LEV) and profit margin (PM) of professional service firm.	“Profitability of partnership structured organizations, the ultimate measure of profitability is profit per equity partner (PPP), which is driven by three main factors, margin, productivity and leverage.” (p.31)

**Table 1: Variables Definition**

LogPM	$\text{Log}\{(\text{Net income}/\text{Gross revenue}) * 100\} = \text{Log}(\text{PPP}/\text{RPL})$
LogRPL	$\text{Log}(\text{Gross revenue}/\text{Number of lawyers})$ scaled by \$1,000
LogLEV	$\text{Log}(\text{Number of lawyers}/\text{Number of equity partners})$
LogPPP	$\text{Log}(\text{Net operating income}/\text{Number of equity partners})$ scaled by \$1,000
STRUCTURE	=1 if 2-tier partnership structure, =0 if 1-tier partnership structure
SCOPE-INTL	=1 if more than 40% of lawyers located outside U.S., =0 otherwise
SCOPE-RGNL	=1 if firm has at least 45% of firm's attorneys located in only one of the 8 regions of the country (New England, NY city, Mid-Atlantic, Washington DC, South & Southeast, Midwest, West & Southwest, and West Coast/Pacific Rim), =0 if national or international
SCALE	$\text{Log}(\text{Number of lawyers})$



**Table 2: Descriptive Statistics**

	<b>N</b>	<b>Mean</b>	<b>Q1</b>	<b>Median</b>	<b>Q3</b>
<b>LogPM*</b>	648	3.574	3.434	3.584	3.738
<b>LogRPL*</b>	648	6.617	6.439	6.602	6.751
<b>LogLEV</b>	648	1.373	1.194	1.402	1.545
<b>LogPPP*</b>	648	6.958	6.623	6.916	7.250
<b>LogREV*</b>	648	13.101	12.760	13.069	13.392
<b>STRUCTURE</b>	648	0.742	0	1	1
<b>SCOPE-INTL</b>	648	0.026	0	0	0
<b>SCOPE-RGNL</b>	648	0.738	0	1	1
<b>SCALE</b>	648	6.484	6.198	6.450	6.733

\*To facilitate comparison across years, all monetary values are inflation adjusted to 2007 dollars.

LogPM	$\text{Log}\{(\text{Net income}/\text{Gross revenue}) * 100\} = \text{Log}(\text{PPP}/\text{RPL})$
LogRPL	$\text{Log}(\text{Gross revenue}/\text{Number of lawyers})$ scaled by \$1,000
LogLEV	$\text{Log}(\text{Number of lawyers}/\text{Number of equity partners})$
LogPPP	$\text{Log}(\text{Net operating income}/\text{Number of equity partners})$ scaled by \$1,000
STRUCTURE	=1 if 2-tier partnership structure, =0 if 1-tier partnership structure
SCOPE-INTL	=1 if more than 40% of lawyers located outside U.S., =0 otherwise
SCOPE-RGNL	=1 if firm has at least 45% of firm's attorneys located in only one of the 8 regions of the country (New England, NY city, Mid-Atlantic, Washington DC, South & Southeast, Midwest, West & Southwest, and West Coast/Pacific Rim), =0 if national or international
SCALE	$\text{Log}(\text{Number of lawyers})$

**Table 3: Correlation Matrix (p-values in parentheses)**

Pearson correlations are above the diagonal, and Spearman correlations are below the diagonal.

	LogPM	LogRPL	LogLEV	LogPPP	LogREV	STRUC -TURE	SCALE	SCOPE -RGNL	SCOPE -INTL
LogPM		0.57609 (<.0001)	-0.41939 (<.0001)	0.59202 (<.0001)	0.14866 (0.0001)	-0.46875 (<.0001)	-0.20768 (<.0001)	0.17613 (<.0001)	-0.04351 (0.2687)
LogRPL	0.56175 (<.0001)		0.09294 (0.0180)	0.90820 (<.0001)	0.42771 (<.0001)	-0.40166 (<.0001)	-0.17542 (<.0001)	0.23427 (<.0001)	-0.17304 (<.0001)
LogLEV	-0.36366 (<.0001)	0.19029 (<.0001)		0.36725 (<.0001)	0.32901 (<.0001)	0.19102 (<.0001)	0.29878 (<.0001)	-0.13810 (0.0004)	0.22026 (<.0001)
LogPPP	0.56916 (<.0001)	0.91433 (<.0001)	0.40963 (<.0001)		0.48975 (<.0001)	-0.35698 (<.0001)	-0.04907 (0.2122)	0.14957 (0.0001)	-0.01229 (0.7549)
LogREV	0.17262 (<.0001)	0.51110 (<.0001)	0.33986 (<.0001)	0.52372 (<.0001)		-0.13762 (0.0004)	0.81486 (<.0001)	-0.34037 (<.0001)	0.27048 (<.0001)
STRUCTURE	-0.49732 (<.0001)	-0.37086 (<.0001)	0.17742 (<.0001)	-0.32690 (<.0001)	-0.13281 (0.0007)		0.10763 (0.0061)	-0.26317 (<.0001)	-0.07989 (0.0421)
SCALE	-0.15123 (0.0001)	-0.00978 (0.8038)	0.26116 (<.0001)	0.04235 (0.2817)	0.81910 (<.0001)	0.15286 (<.0001)		-0.52116 (<.0001)	0.40544 (<.0001)
SCOPE-RGNL	0.18333 (<.0001)	0.22778 (<.0001)	-0.14240 (0.0003)	0.13662 (0.0005)	-0.32307 (<.0001)	-0.26484 (<.0001)	-0.52483 (<.0001)		-0.27523 (<.0001)
SCOPE-INTL	-0.06023 (0.1256)	-0.16394 (<.0001)	0.22280 (<.0001)	-0.01048 (0.7901)	0.23201 (<.0001)	-0.07989 (0.0421)	0.26050 (<.0001)	-0.27523 (<.0001)	

**Table 4: Prais-Winsten Estimation Results for the Levels Regression Models**  
**Estimation Period: (2000 ~ 2003)**

**Panel A. Model 1: AR(1) Model**

$$\text{Model 1: } \text{LogPPP}_{t+1} = \alpha + \beta_{\text{PPP}} \text{LogPPP}_t + \varepsilon_t$$

Variables	Coefficients	Model 1
Intercept		0.345*** (0.0003)
LogPPP <sub>t</sub>	$\beta_{\text{PPP}}$	0.956*** (<.0001)
Adj. R-sq		0.9516

Numbers in the parenthesis is Pr>|t| value, the estimated probability that the regression coefficient is equal to zero.

\*, \*\*, \*\*\* indicate significantly different from zero at the 10%, 5%, and 1% levels, respectively.

**Panel B. Model 2: Three Profitability Ratios Model**

$$\text{Model 2: } \text{LogPPP}_{t+1} = \alpha + \beta_{\text{PM}} \text{LogPM}_t + \beta_{\text{RPL}} \text{LogRPL}_t + \beta_{\text{LEV}} \text{LogLEV}_t + \varepsilon_t$$

Variables	Coefficients	Model 2
Intercept		-2.731*** (<.0001)
LogPM <sub>t</sub>	$\beta_{\text{PM}}$	0.779*** (<.0001)
LogRPL <sub>t</sub>	$\beta_{\text{RPL}}$	0.881*** (<.0001)
LogLEV <sub>t</sub>	$\beta_{\text{LEV}}$	0.885*** (<.0001)
Adj. R-sq		0.9016

**Panel C. Comparison of Coefficients**

Pr>F	
H0: $\beta_{\text{PM}} = \beta_{\text{RPL}}$	0.3029
H0: $\beta_{\text{PM}} = \beta_{\text{LEV}}$	0.0286**
H0: $\beta_{\text{RPL}} = \beta_{\text{LEV}}$	0.9587

Numbers in the parenthesis is Pr>|t| value, the estimated probability that the regression coefficient is equal to zero.

\*, \*\*, \*\*\* indicate significantly different from zero at the 10%, 5%, and 1% levels, respectively.

LogPM	$\text{Log}\{(\text{Net income}/\text{Gross revenue}) * 100\} = \text{Log}(\text{PPP}/\text{RPL})$
LogRPL	$\text{Log}(\text{Gross revenue}/\text{Number of lawyers})$ scaled by \$1,000
LogLEV	$\text{Log}(\text{Number of lawyers}/\text{Number of equity partners})$
LogPPP	$\text{Log}(\text{Net operating income}/\text{Number of equity partners})$ scaled by \$1,000

**Table 5: Absolute Forecasting Errors Using the Levels Models**

$$\text{Model 1: } \text{LogPPP}_{t+1} = \alpha + \beta_{\text{PPP}} \text{LogPPP}_t + \varepsilon_t$$

$$\text{Model 2: } \text{LogPPP}_{t+1} = \alpha + \beta_{\text{PM}} \text{LogPM}_t + \beta_{\text{RPL}} \text{LogRPL}_t + \beta_{\text{LEV}} \text{LogLEV}_t + \varepsilon_t$$

**Panel A. Descriptive Statistics of Absolute Forecasting Error (AFE)**

	<b>Median</b>	<b>Mean</b>	<b>Std Dev</b>	<b>Q1</b>	<b>Q3</b>
<b>Model 1</b>	0.054	0.074	0.075	0.027	0.100
<b>Model 2</b>	0.050	0.073	0.070	0.024	0.103

**Panel B. Tests of Pair-Wise Difference in Absolute Forecasting Error (AFE)**

<b>Base Model</b>	<b>Comparison Model</b>	<b>Median Difference</b>	<b>Mean Difference</b>
Model 1	Model 2	0.001** (0.0296)	0.002** (0.0161)

\*, \*\*, \*\*\* indicate significantly different from zero at the 10%, 5%, and 1% levels, respectively using one-tailed t-test for mean difference, and one-tailed Wilcoxon signed rank test for median difference.

LogPM	$\text{Log}\{(\text{Net income}/\text{Gross revenue}) * 100\} = \text{Log}(\text{PPP}/\text{RPL})$
LogRPL	$\text{Log}(\text{Gross revenue}/\text{Number of lawyers})$ scaled by \$1,000
LogLEV	$\text{Log}(\text{Number of lawyers}/\text{Number of equity partners})$
LogPPP	$\text{Log}(\text{Net operating income}/\text{Number of equity partners})$ scaled by \$1,000

**Table 6: Prais-Winsten Estimation Results for the Changes Regression Models**  
**Estimation Period: (2000 ~ 2003)**

**Panel A. Model 1-1: AR(1) Model**

$$\text{Model 1-1: } \Delta \text{LogPPP}_{t+1} = \alpha + \beta_{\Delta \text{PPP}} \Delta \text{LogPPP}_t + \varepsilon_t$$

Variables	Coefficients	Model 1-1
Intercept		0.075*** (<.0001)
$\Delta \text{LogPPP}_t$	$\beta_{\Delta \text{PPP}}$	-0.139** (0.0367)
Adj. R-sq		0.0142

Numbers in the parenthesis is  $\text{Pr}>|t|$  value, the estimated probability that the regression coefficient is equal to zero.

\*, \*\*, \*\*\* indicate significantly different from zero at the 10%, 5%, and 1% levels, respectively.

**Panel B. Model 2-1: Three Profitability Ratios Model**

$$\text{Model 2-1: } \Delta \text{LogPPP}_{t+1} = \alpha + \beta_{\Delta \text{PM}} \Delta \text{LogPM}_t + \beta_{\Delta \text{RPL}} \Delta \text{LogRPL}_t + \beta_{\Delta \text{LEV}} \Delta \text{LogLEV}_t + \varepsilon_t$$

Variables	Coefficients	Model 2-1
Intercept		0.064*** (<.0001)
$\Delta \text{LogPM}_t$	$\beta_{\Delta \text{PM}}$	-0.129 (0.1387)
$\Delta \text{LogRPL}_t$	$\beta_{\Delta \text{RPL}}$	0.195* (0.0855)
$\Delta \text{LogLEV}_t$	$\beta_{\Delta \text{LEV}}$	0.846 (0.1499)
Adj. R-sq		0.0165

**Panel C. Comparison of Coefficients**

Pr>F	
$H_0: \beta_{\Delta \text{PM}} = \beta_{\Delta \text{RPL}}$	0.0194**
$H_0: \beta_{\Delta \text{PM}} = \beta_{\Delta \text{LEV}}$	0.0039***
$H_0: \beta_{\Delta \text{RPL}} = \beta_{\Delta \text{LEV}}$	0.7132

Numbers in the parenthesis is  $\text{Pr}>|t|$  value, the estimated probability that the regression coefficient is equal to zero.

\*, \*\*, \*\*\* indicate significantly different from zero at the 10%, 5%, and 1% levels, respectively.

LogPM	$\text{Log}\{(\text{Net income}/\text{Gross revenue}) * 100\} = \text{Log}(\text{PPP}/\text{RPL})$
LogRPL	$\text{Log}(\text{Gross revenue}/\text{Number of lawyers})$ scaled by \$1,000
LogLEV	$\text{Log}(\text{Number of lawyers}/\text{Number of equity partners})$
LogPPP	$\text{Log}(\text{Net operating income}/\text{Number of equity partners})$ scaled by \$1,000

**Table 7: Absolute Forecasting Errors Using the Changes Models**

$$\text{Model 1-1: } \Delta \text{LogPPP}_{t+1} = \alpha + \beta_{\Delta \text{PPP}} \Delta \text{LogPPP}_t + \varepsilon_t$$

$$\text{Model 2-1: } \Delta \text{LogPPP}_{t+1} = \alpha + \beta_{\Delta \text{PM}} \Delta \text{LogPM}_t + \beta_{\Delta \text{RPL}} \Delta \text{LogRPL}_t + \beta_{\Delta \text{LEV}} \Delta \text{LogLEV}_t + \varepsilon_t$$

**Panel A. Descriptive Statistics of Absolute Forecasting Error (AFE)**

	<b>Median</b>	<b>Mean</b>	<b>Std Dev</b>	<b>Q1</b>	<b>Q3</b>
<b>Model 1-1</b>	0.045	0.069	0.072	0.024	0.091
<b>Model 2-1</b>	0.044	0.066	0.075	0.021	0.083

**Panel B. Tests of Pair-Wise Difference in Absolute Forecasting Error (AFE)**

<b>Base Model</b>	<b>Comparison Model</b>	<b>Median Difference</b>	<b>Mean Difference</b>
Model 1-1	Model 2-1	0.004*** (0.0023)	0.003** (0.0302)

\*, \*\*, \*\*\* indicate significantly different from zero at the 10%, 5%, and 1% levels, respectively using one-tailed t-test for mean difference, and one-tailed Wilcoxon signed rank test for median difference.

LogPM	Log{(Net income/Gross revenue)*100} = Log(PPP/RPL)
LogRPL	Log(Gross revenue/Number of lawyers) scaled by \$1,000
LogLEV	Log(Number of lawyers/Number of equity partners)
LogPPP	Log(Net operating income/Number of equity partners) scaled by \$1,000

**Table 8: Prais-Winsten Estimation Results for Performance Equations**

**Panel A. Expected Signs**

Model 3:  $\text{Log}(\text{RATIO}) = f\{\text{STRUCTURE}, \text{SCOPE-INTL}, \text{SCOPE-RGNL}, \text{SCALE}\}$

Variables	LogPM	LogRPL	LogLEV
<b>STRUCTURE</b>	-	-	+
<b>SCOPE-INTL</b>	?	-	+
<b>SCOPE-RGNL</b>	?	+	+
<b>SCALE</b>	?	+	+

**Panel B. Coefficients Estimation**

Model 3:  $\text{Log}(\text{RATIO}) = f\{\text{STRUCTURE}, \text{SCOPE-INTL}, \text{SCOPE-RGNL}, \text{SCALE}\}$

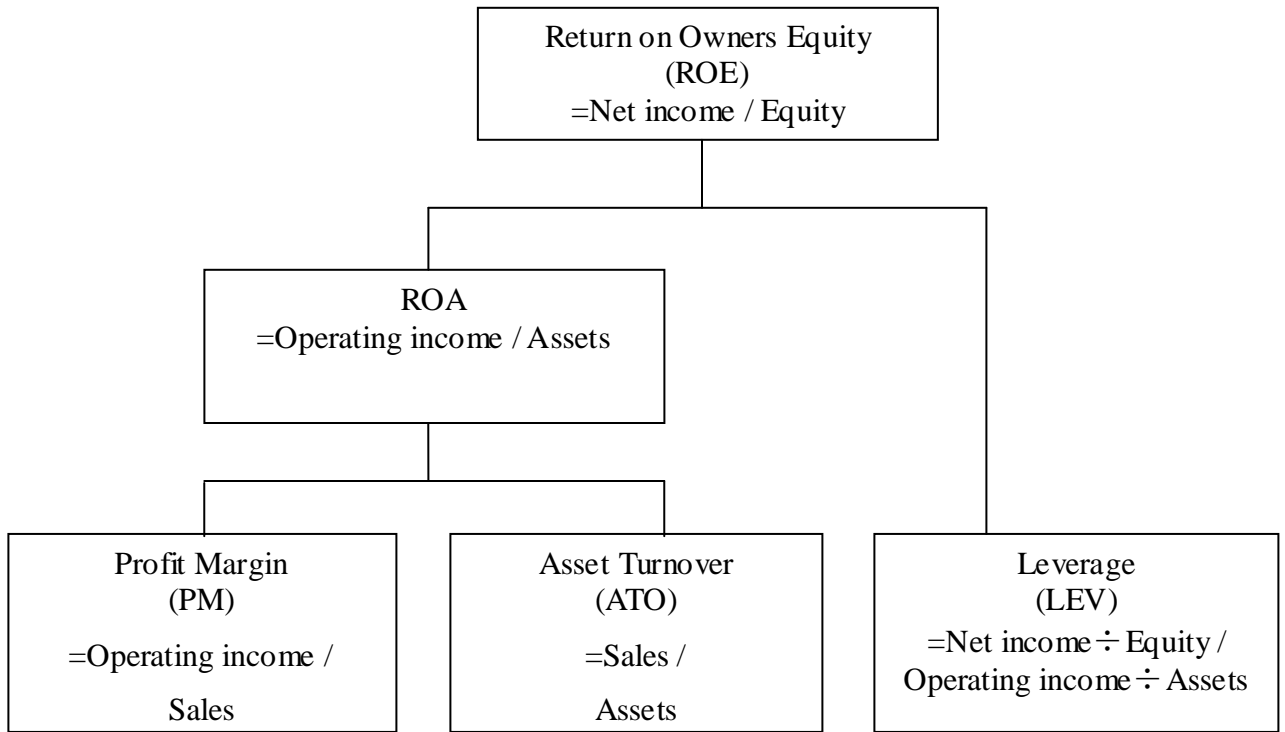
Variables	LogPM	LogRPL	LogLEV	LogPPP
<b>Intercept</b>	4.279*** (<.0001)	2.066*** (<.0001)	0.340** (0.0457)	2.819*** (<.0001)
<b>STRUCTURE</b>	-0.245*** (<.0001)	-0.215*** (<.0001)	0.115*** (<.0001)	-0.357*** (<.0001)
<b>SCOPE-INTL</b>	-0.029 (0.4217)	-0.662*** (<.0001)	0.250*** (<.0001)	-0.397*** (0.0097)
<b>SCOPE-RGNL</b>	-0.023 (0.2953)	0.390*** (<.0001)	0.051* (0.0580)	0.370*** (<.0001)
<b>SCALE</b>	-0.093*** (0.0003)	0.561*** (<.0001)	0.138*** (<.0001)	0.506*** (<.0001)
<b>R-Square</b>	0.2468	0.4633	0.1326	0.2879

Numbers in the parenthesis is  $\text{Pr}\{>|t|\}$  value using robust standard error, the estimated probability that the regression coefficient is equal to zero.

\*, \*\*, \*\*\* indicate significantly different from zero at the 10%, 5%, and 1% levels, respectively.

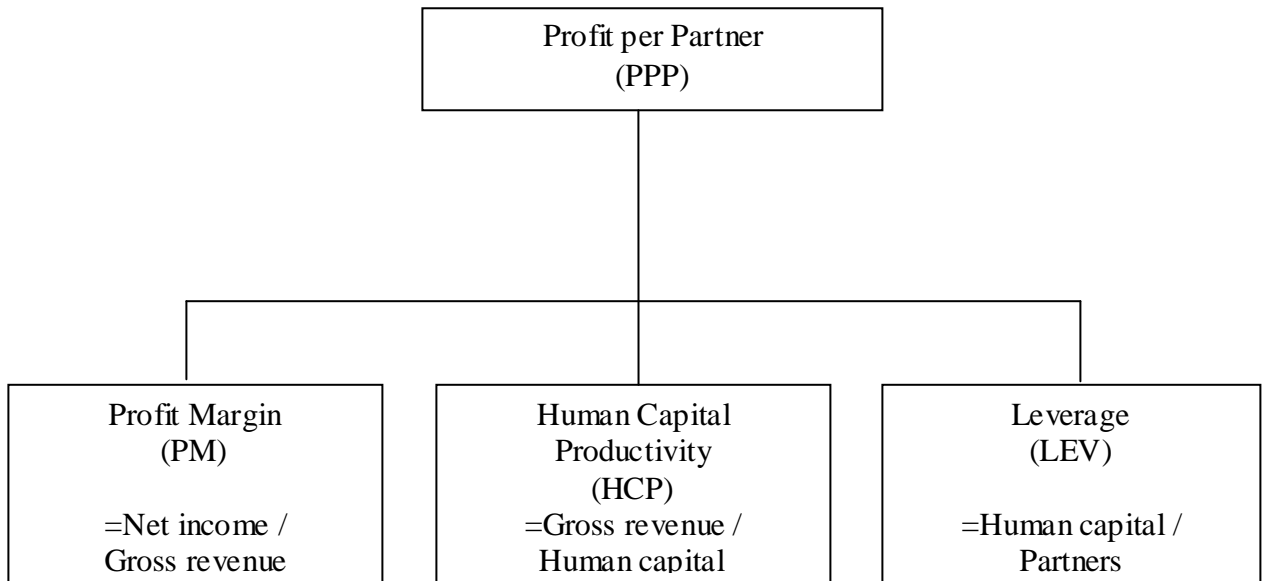
- LogPM                     $\text{Log}\{(\text{Net income}/\text{Gross revenue}) * 100\} = \text{Log}(\text{PPP}/\text{RPL})$
- LogRPL                  $\text{Log}(\text{Gross revenue}/\text{Number of lawyers})$  scaled by \$1,000
- LogLEV                  $\text{Log}(\text{Number of lawyers}/\text{Number of equity partners})$
- LogPPP                  $\text{Log}(\text{Net operating income}/\text{Number of equity partners})$  scaled by \$1,000
- STRUCTURE            =1 if 2-tier partnership structure, =0 if 1-tier partnership structure
- SCOPE-INTL            =1 if more than 40% of lawyers located outside U.S., =0 otherwise
- SCOPE-RGNL           =1 if firm has at least 45% of firm's attorneys located in only one of the 8 regions of the country (New England, NY city, Mid-Atlantic, Washington DC, South & Southeast, Midwest, West & Southwest, and West Coast/Pacific Rim), =0 if national or international
- SCALE                    $\text{Log}(\text{Number of lawyers})$

**Figure 1: DuPont Model**

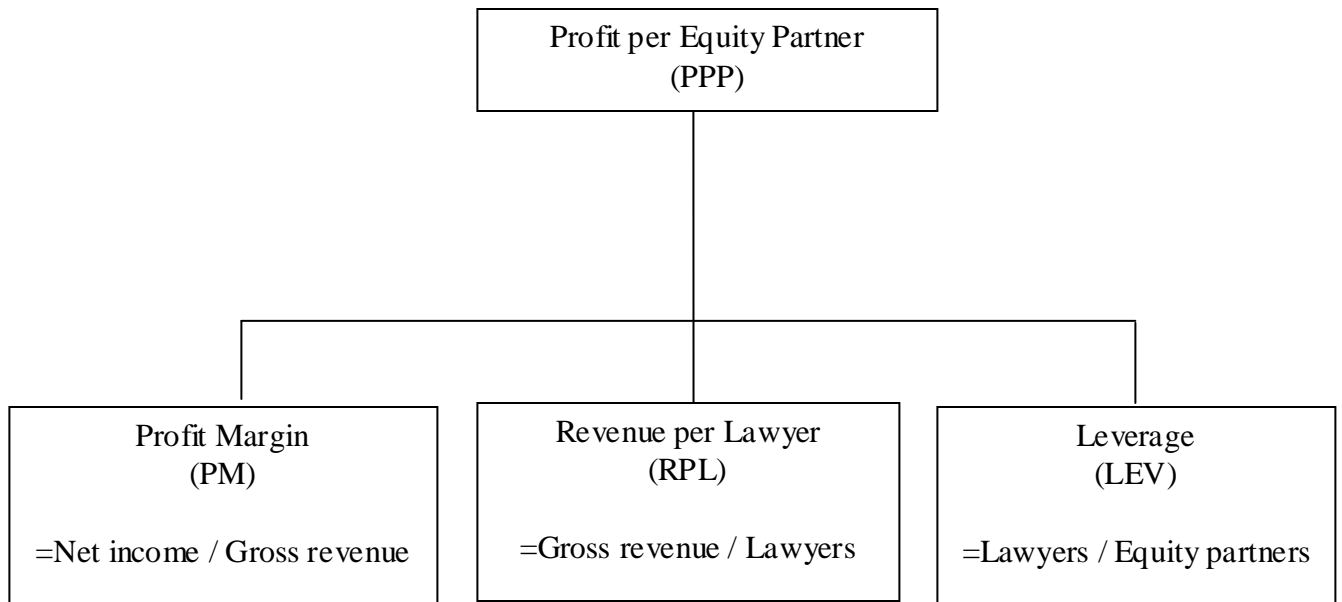




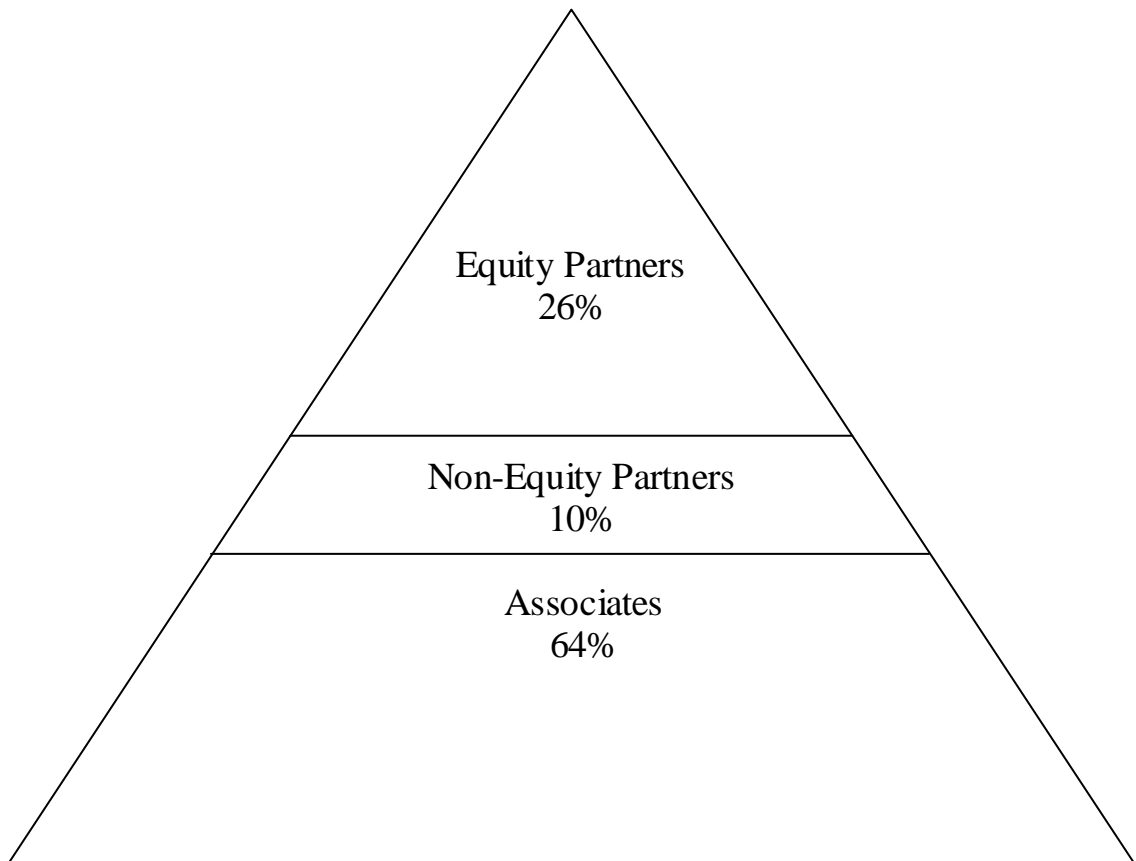
**Figure 2: Profitability Ratio Model for Professional Service Firms**



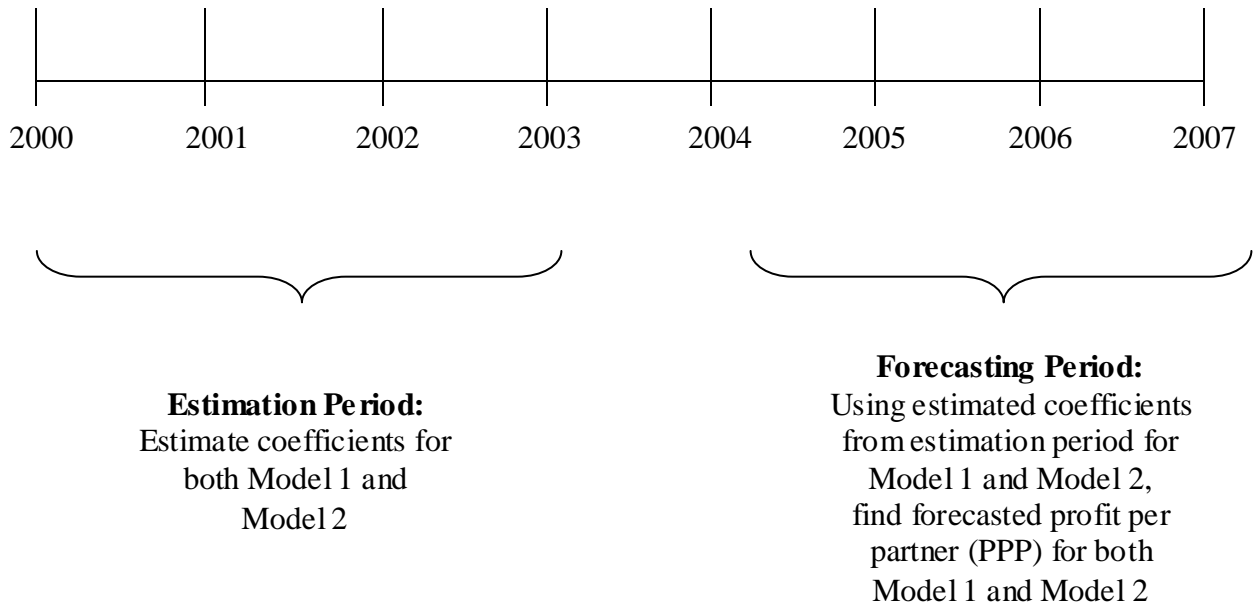
**Figure 3: Profitability Ratio Model for Law Firms**



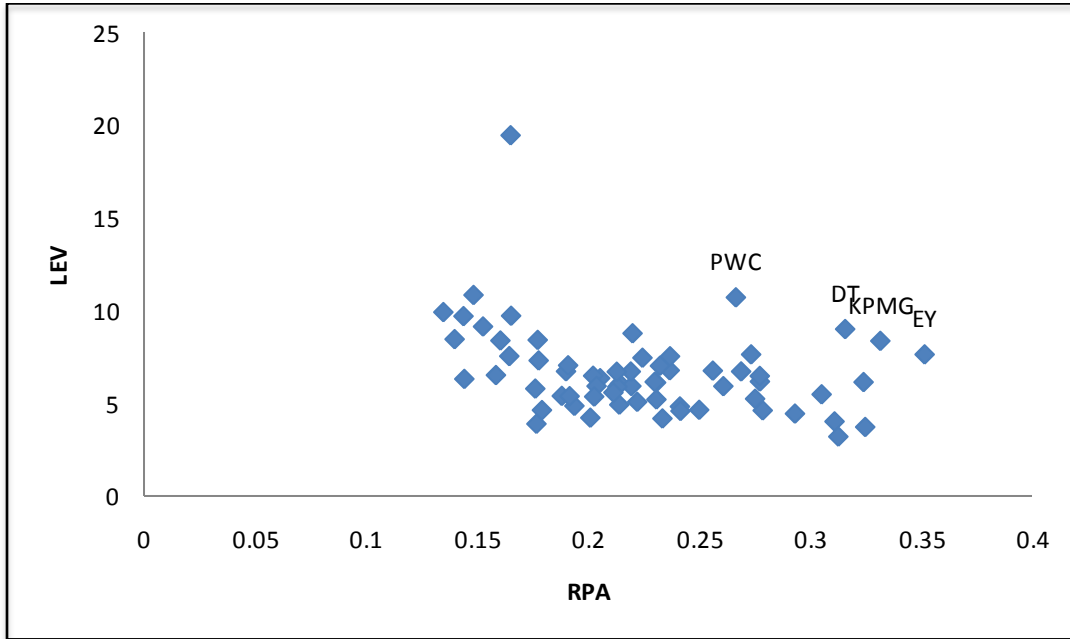
**Figure 4: Structure of law firms**



**Figure 5: Estimation and Forecasting Sample Periods**



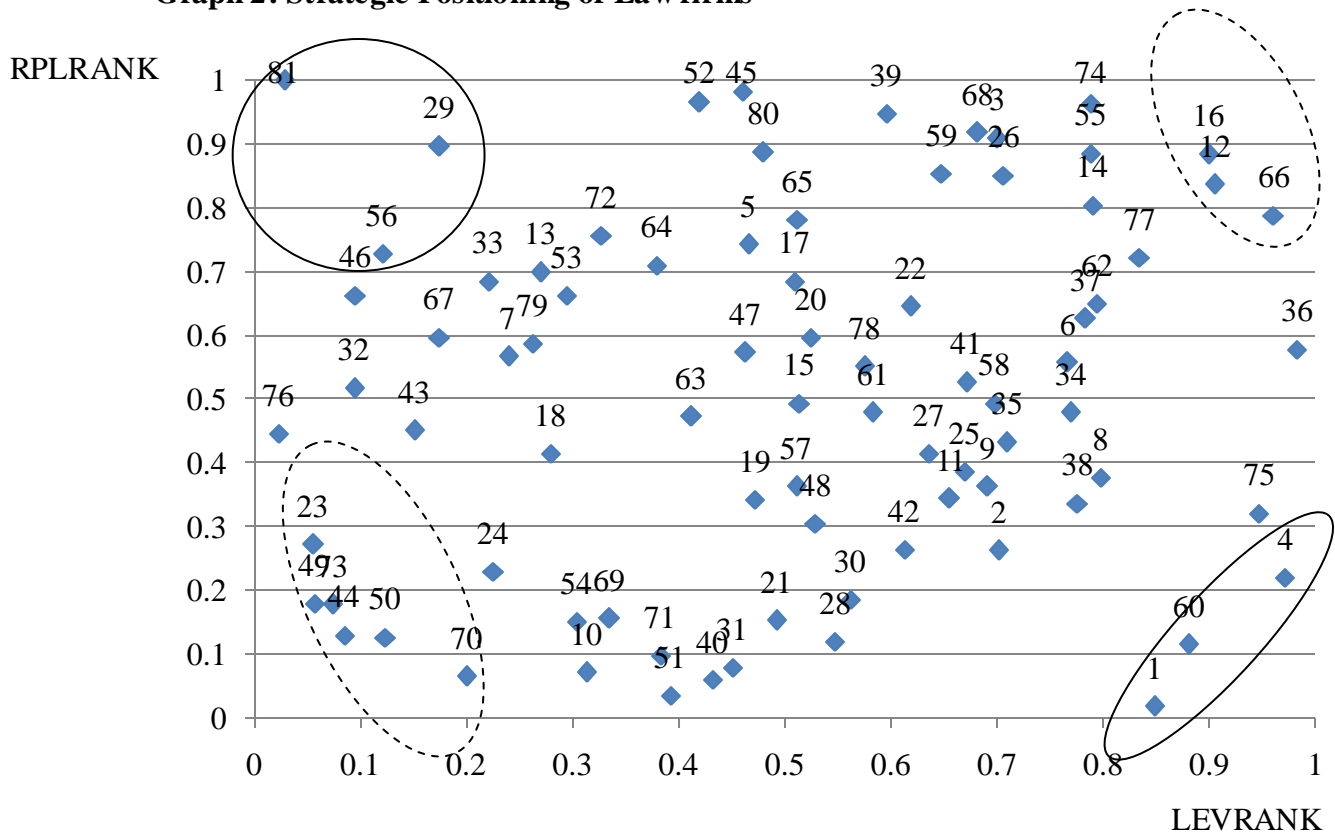
**Graph 1: Average Revenue per Accountant (RPA) and Average Leverage (LEV) for Accounting Firms**



RPA	= (revenue in millions /number of accounting professionals)
LEV	= (accounting professionals/partners)

PWC                    PricewaterhouseCoopers  
 DT                     Deloitte and Touche  
 KPMG                 KPMG  
 EY                      Ernst & Young

**Graph 2: Strategic Positioning of Law firms**



<b>High RPL and Low LEV</b>	<b>High LEV and Low RPL</b>
Wachtell, Lipton, Rosen & Katz (Firmid 81)	White & Case LLP (Firmid 4)
Gibson, Dunn & Crutcher LLP (Firmid 29)	Shook, Hardy & Bacon, LLP (Firmid 60)
Rope & Gray LLP (Firmid 56)	Baker & McKenzie LLP (Firmid 1)

<b>Low RPL and Low LEV</b>	<b>High RPL and High LEV</b>
Dorsey & Whitney LLP (Firmid 44)	Kirkland & Ellis LLP (Firmid 16)
Nixon Peabody LLP (Firmid 49)	Weil, Gotshal & Manges LLP (Firmid 12)
Blank Rome LLP (Firmid 73)	Cadwalader, Wickersham & Taft LLP (Firmid 66)