Principal-Agent Issues in

Private Equity and Venture Capital

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Table of Contents

Section 1: Topic of Interest

The private equity and venture capital (PE/VC) industries have grown tremendously over the past few decades. However, due to the relatively recent development of the industry and the private nature of these investments, there have been relatively few studies addressing the structural and organizational factors that have led to a larger and more efficient PE/VC industry. While this paper will give a general overview of the PE/VC industries and the organizational characteristics of PE/VC funds, I am particularly interested in determining the key characteristics of limited partnership contracts that govern the relationship between the general partners (GPs) who manage PE/VC funds and the limited partners (LPs) who invest capital in these funds. Due to potential problems of adverse selection and moral hazard between the GPs and the LPs, the compensation structure and covenants set out in contracts are key factors by which investors are able to screen and monitor PE/VC professionals. If these contracts can be appropriately designed to align the GP's incentives with those of the investors, then the PE/VC industry will continue to be an attractive market for long-term, high-reward investments. This paper will address the various principal-agent problems that arise in PE/VC investing and will seek to provide a broad model that characterizes the key explanatory variables for GP compensation and covenant levels.

Section 2: Overview of the PE/VC Industry

From the first modern VC firm, American Research and Development (1946), organized as a publicly traded closed-end fund, to the first VC limited partnership, Draper, Gaither, and Anderson (1958) to the present day, the PE/VC industry has undergone significant structural change which has led to a dramatic increase in the amount of committed capital flowing into the industry and the number of PE/VC funds (Gompers and Lerner, 1999). During the 1980s and 1990s, the private equity market experienced tremendous growth, significantly outpacing the growth in the public equity and debt markets and the private placement debt market (Fenn, Liang, and Prowse, 1997). From 1980 to 1995, for example, the total amount of private equity capital under management increased from under $5bn to over $175bn, which represents over a 25% compounded annual growth rate (Fenn, Liang, and Prowse, 1997). Not surprisingly then, the capital committed to the private equity industry often exceeded the financing raised through initial public offerings and gross high-yield corporate bond issuances (Fenn, Liang, and Prowse, 1997).

There were three regulatory and structural changes fueling the unprecedented growth in capital committed to PE/VC funds and helping to make the PE/VC industry the fastest growing corporate finance market. First, in 1979 there was an amendment to the "prudent man" rule governing the types of investments allowable for pension funds. Prior to this amendment, the Employee Retirement Income Security Act (ERISA, 1974) placed restrictions on institutional investors that limited them from investing substantial amounts in venture, non-venture, and other high risk asset classes (Gompers and Lerner, 1999).

The "prudent man" rule amendment, however, permitted pension funds to make significant investments in venture capital and other high-risk assets. As a direct result of this amendment, pension funds became the single largest contributor to the venture capital industry. As of year-end 1996, for example, the two largest contributors to the private equity market were public pension funds and corporate pension funds, which contributed $39.5bn and $34.7bn, respectively, of the total $176.3bn private equity outstanding (See Exhibit 1 for a detailed breakdown of the contributions made by different players). In addition, a study showed that while only 11% of the three major investor groups (pension funds, endowments, and foundations) committed capital to private equity funds in 1975, approximately 56% of these same investor groups contributed capital to the private equity industry in 1995. Thus, the rapid growth in the private equity market has been driven significantly by the regulatory changes to the "prudent man" rule.

The second contributing factor to the growth in private equity was due to structural changes in the manner in which capital was contributed by investors to private equity funds. Specifically, through the 1970s and 1980s, the use of investment advisors, or *gatekeepers*, by institutional investors became more prevalent and these agents helped to monitor VC funds and advise investors on choosing appropriate VC funds in which to invest (Gompers and Lerner, 1999). These gatekeepers would pool capital from their many clients in order to gain more bargaining power when contracting with the private equity fund managers, whose fundraising costs would be significantly lowered by these gatekeepers. Thus, the rise of gatekeepers was an organizational innovation that helped the private equity market function more efficiently, and by the 1990s, roughly 1/3 of pension fund commitments came through the use of an investment advisor (Gompers and Lerner, 1999).

Third, and perhaps most important, was the development and use of the limited partnership structure as the primary financial intermediary between the investors, or limited partners (LPs) and the private equity fund managers, the general partners (GPs)[1]. While only accounting for 40% of the venture pool in 1980, the limited partnership organizational structure comprised over 80% of the VC pool of capital by 1992 (Gompers and Lerner, 1999). Similar to the increased use of investment advisors as lubricants for the private equity machine, the organizational innovations provided by the limited partnership structure has allowed for the mitigation of principal-agent problems prevalent between investors and entrepreneurs (See Exhibit 2 for an overview of the growth of the limited partnership structure). The next section will discuss the potential principal-agent relationships that can arise in the PE/VC industries, followed by an overview of the limited partnership structure.

Section 2.1: Principal-Agent Issues within PE/VC Settings

A fertile ground for studying principal-agent issues is within the PE/VC industries, where information asymmetry is rampant between the investors and entrepreneurs looking for start-up capital. Private equity/venture capital is a unique and expensive source of financing sought by companies that do not have access to traditional bank loans or capital market financing due to their high risk, sometimes unproven track records, and severe information problems presented to investors. Investments in these firms require intensive pre-investment due diligence, post-investment monitoring, and a long time horizon before returns can be realized, which further inhibits the ability of these firms to raise capital through traditional outlets such as public security offerings. Over time, however, the PE/VC industry has developed mechanisms to mitigate the various information asymmetry problems inherent in this industry in an attempt to

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[1] Here it should be noted that the term "GP" will refer the entire PE/VC organization even though often there are several GPs that manage the PE/VC fund together.

minimize the agency loss – the potential loss that arises due to imperfect information between principals and agents.

The two primary informational problems within the principal-agent framework are known as *hidden information*, or asymmetric information, and *hidden action*, or moral hazard (Pratt and Zeckhauser, 1985). These agency problems are prevalent in the PE/VC industry. Hidden information problems exist when an agent is privy to something that the principal has not observed. This information would influence how the principal values the agent's actions. The agent then uses this superior information when making business decisions, but the principal is not aware of whether or not the agent used the hidden information in the best interest of the principal. Rather, the principal only knows that the agent used the information in his own best interest. In the PE/VC industry, the entrepreneur (agent) may have better information than the investor (principal) regarding the prospects of his business, technology, and managerial skills. Consequently, it is in the best interest of the entrepreneur, seeking the highest valuation possible, to highlight the positives while downplaying the negatives of his enterprise. This hidden information is especially prevalent in the venture capital industry, where entrepreneurs may not have a proven track record and are not required to issue public financial statements.

Hidden action problems can arise throughout the normal operation of the business, when the investor (principal) cannot directly observe the effort levels exerted by the entrepreneur (agent). These entrepreneurs, if not appropriately incentivized by the investors, can take actions that give themselves private benefits at the expense of the investors; for example, if the entrepreneur did not retain an adequate equity stake in the firm, he may shirk and invest in perks rather than productive investments.

In order to mitigate these hidden information and hidden action problems, the limited partnership organizational structure has become the vehicle of choice for the majority of private equity investments. On one hand, the managers of these private equity partnerships have the requisite time and expertise necessary to conduct due diligence in selecting investments and monitoring the start-up funds following investment. Surely, it would be inefficient for each investor to conduct this time intensive diligence and monitoring because 1) there would be too much overlap in the monitoring conducted by the investors, or 2) some investors would free-ride off the monitoring services of others (Gompers and Lerner, 1999). Thus, it is often more efficient to allow the experienced private equity fund managers to solely engage in contracting and monitoring activities. In addition to the diligence and monitoring costs, institutional investors do not invest in private equity because they may not reach the critical mass necessary to achieve expertise in making these investments, and they could potentially lose the benefits of diversification that comes with investing through private equity funds, each holding a portfolio of firms (Gompers and Lerner, 1999).

Exhibit 3 outlines the basic relationship between the various participants in the private equity market and the organizational and contractual mechanisms utilized to align their incentives. Here, it should be noted that while the limited partnership structure is created as an intermediary to reduce the agency problems between the investor and entrepreneur, the limited partnership itself creates an agency relationship between the investor (principal) and the fund managers (agents). The focus of this research paper will be on the agency relationship created by the limited partnership structure between the GPs and the LPs.

The agency relationship between the LPs (principals) and the GPs (agents) can potentially lead to both adverse selection and moral hazard problems. One of the primary

adverse selection problems arises since the GPs may have better information regarding their talent or skill level in investing funds than do the LPs. If there were no profit sharing rule, then it would be more difficult for the LP to choose between two competing PE/VC organizations raising their first fund. With the profit sharing, the LPs can screen between those GPs that have a lot of confidence in their abilities and those who are not willing to take the majority of their compensation in carried interest. In addition, the profit sharing rule allows the LP to monitor the GP throughout the life of the fund. Since the GP receives the bulk of his compensation through the carried interest, he will be continually motivated to exert appropriate effort levels rather than shirking. Thus, the use of pay-for-performance incentives in typical PE/VC partnerships helps to alleviate the hidden information and hidden action problems that could potentially arise over the life of the partnership.

Likewise, various covenants are included in limited partnership agreements to mitigate the information asymmetry between the LPs and the GPs. For example, covenants may limit the amount a PE/VC fund can invest in the organization's earlier funds. The information on earlier funds' investments may not be publicly available, and venture capitalists may seek to invest more money in an unprofitable investment made by their earlier fund in the hopes of salvaging a failing investment. Since the LPs do not have as much information on these issues, this particular covenant curbs the hidden information problem.

In addition, one of the most common moral hazard problems between the LP (principal) and GP (agent) is monitoring the effort level exerted by the agent. In PE/VC funds, the GPs actively manage the fund's activities, but the LPs who commit capital cannot perfectly observe the effort levels exerted by the GPs. Since the effort levels are correlated with the outcome, or profitability of the fund, the LPs must incentivize the GPs to exert appropriate effort levels in

structuring and monitoring investments in order to maximize the LP's own returns. However, if GP compensation were a fixed amount, then GPs would shirk and exert the minimum effort level required to remain employed and retain the fixed salary. To address this moral hazard problem, LPs typically share profits with GPs to give them incentives to create the most value for the fund.

In addition, there are various covenants included in limited partnership agreements that specifically limit the activities of the GPs. For example, covenants may limit the amount of personal funds a GP can invest in a single firm, to ensure proper effort levels are exerted across all investments; other covenants restrict the different asset classes and amounts of capital that GPs can invest in order to reduce the level of risk chosen by the GP. Thus, contractual covenants and compensation schemes are two primary ways that the limited partnership structure addresses adverse selection and moral hazard problems between investors and the PE/VC fund managers.

For the reasons outlined above, the limited partnership has become an intermediary between the investor and the entrepreneur that allows for the private equity market to function more efficiently. The focus of this research paper will be on the extent to which the contractual features of the limited partnership structure, specifically *performance incentives* and *direct means of control*, help to align the interests of the investor (LP) who contributes capital and the fund manager (GP) who selects, structures, and monitors investments (Gompers and Lerner, 1999). The next section will give a general overview of the limited partnership structure and common contractual features embedded into the limited partnership agreement.

Section 3: Overview of the Limited Partnership Structure

As mentioned earlier, the most widespread organizational structure used in PE/VC investing is the limited partnership, through which limited partners (LPs) passively invest money in funds which are actively managed by general partners (GPs). In order to maintain their limited liability status, the LPs cannot participate in the day-to-day decision-making processes of the funds; hence, the LPs are not able to actively monitor the GP's actions (Gompers and Lerner, 1999). In the PE/VC industry, the agents are the GPs who have practically full information over the fund's activities, performance, and their own effort levels exerted. In order to protect the interests of the LPs, the limited partnership agreements try to maximize efficiency and minimize the informational asymmetries between LPs and GPs through contractual (*compensation and covenant)* features.

Typical PE/VC Limited Partnerships

The typical PE/VC limited partnership agreement is a long-term commitment, spanning a period of 10-13 years with terms renegotiated very rarely (Gompers and Lerner, 1999). During the first three to five years of the fund's life, the GPs conduct extensive due diligence on potential investments and execute investments in chosen portfolio firms. Following majority-stake investments, the GPs secure board and voting rights and actively help manage their portfolio firms. GPs typically add value through their industry and financial management expertise and through their experience in hiring key management personnel, dealing with suppliers, and overseeing daily operations (Gompers and Lerner, 1999). Once most of the committed capital is put to work in portfolio firms, GPs generally begin the fundraising process for another fund in order to continue to make investments in the market. However, in the later years of the fund's life, the GPs must return capital and profits to their LPs, and thus, they look

for potential *exits* for their portfolio firms. Common exit strategies can include a private sale to a third party, a recapitalization, or an initial public offering (IPO) which generally provides the bulk of returns for PE/VC funds. The venture capital cycle beginning with fundraising, followed by GPs structuring and monitoring investments, and concluding with exiting investments occurs continually so long as there is enough demand for the services that the PE/VC GPs provide.

The limited partnership structure incorporates two key features to align the incentives of the GPs with those of the LPs throughout this PE/VC cycle: 1) Performance Incentives and 2) Direct Means of Control (Gompers and Lerner, 1999). Exhibit 4 gives an overview of the common oversight mechanisms between the various parties in PE/VC transactions.

Section 3.1: Performance Incentives

The two main types of performance incentives for the GPs are reputation and compensation. Developing a sound reputation is critical in the PE/VC industry in which there are a relatively few number of key players who interact repeatedly (Gompers and Lerner, 2001). Due to the limited lifetime of the limited partnership structure, a fund must develop a proven track record in order to raise additional funds in the future and remain in the PE/VC business. Reputation may also allow GPs to raise larger funds, to negotiate higher profit sharing percentages, and to gain access to better deals.

In addition to developing a good reputation with the investment community, GPs are very concerned with their compensation structure, which has a fixed component and variable component (Covitz and Liang, 2002). The GPs generally receive a fixed annual payment, or *management fee*, of roughly 1.5-2.5% of the fund's total committed capital in order to cover day-to-day operations and monitoring costs of the portfolio companies. The bulk of the GP's compensation, however, typically comes in the form of a variable payment, or *carried interest*, in

which the GP shares a certain percentage, usually 20%, of the profits of the fund after the initial capital is returned to the LPs. This performance-based pay reduces hidden action problems by giving GPs an incentive to exert appropriate effort levels in managing the fund. The carried interest can also help to limit excessive risk taking, or "swinging for the fences" which could result in lower overall profits for the fund and thus lower GP carry (Covitz and Liang, 2002). The carried interest induces GPs to make responsible investments in order to first return capital to their investors because then only will they share in any profits. At the same time, however, the typical carried interest structure can be viewed as a fraction of a call on the value of the fund. From this perspective, the performance-based pay could induce GPs to increase the riskiness of their investments in order to increase the value of their call option. The true affect of this carried interest feature will only be borne out through time, but here it will suffice to say that the preferred return can have different implications for its use in different situations.

In addition, certain non-venture funds, and to a lesser extent venture funds, have the added provision that GPs must meet some minimum hurdle-rate or achieve a "preferred return" before taking their 20% share of the profits. The most common preferred return, or hurdle rate, is 8% for both venture and non-venture funds. The 8% represents the annual compounded return that GPs must provide for their investors, over and above returning their initial capital, before beginning to share in the upside profits of the fund.

While the payoff structure for carried interest without preferred return provisions is similar to a fraction of a call option on the total value of the fund's capital, the payoff diagram for carried interest with preferred returns is significantly different from a call option (See Exhibit 5 for typical payoff diagrams for carried interest and preferred returns). Under preferred returns, the GP must first return to investors their total invested capital including growth at the preferred

return rate. Then, the GPs are entitled to 100% of the profits until it catches up to its carried interest percent on the total committed capital; any incremental revenue above this amount is split between the GP and LP according to the carried interest amount (Covitz and Liang, 2002). Since the probability that the GP begins sharing in the profits is reduced by preferred return provisions, the expected and actual compensation received by GPs may be much lower than without these provisions.

Section 3.2: Direct Means of Control

While carried interest and preferred returns represent performance-based metrics utilized by limited partnerships to align the incentives of the LPs and GPs, there are also direct means of control that influence and restrict the actions of the GPs. Thus, in some cases, the largest LPs are able to sit on *advisory boards* for the limited partnership. While these advisory boards cannot take an active role in the management of the fund's resources, the board can provide an advisory and oversight role when key decisions are made for the fund – such as the hiring or firing of a GP. More commonly, however, LPs are able to add a variety of covenants that control the actions of the GPs. These restrictive covenants can be viewed as a cost to the GPs of entering a partnership agreement or conversely, an added perk for LPs that enter into partnerships.

Although the power and extent to which advisory boards are used is fairly limited, it is common for these partnership agreements to include *covenants* which protect the interests of the investors (LPs) and help to ensure that proper actions are taken by the GPs. Here, it should be noted that these additional information problems could potentially be mitigated by variations in compensation structures, such as lower fixed pay and higher carried interest. However, we do not observe drastic changes to compensation structures in practice because this would attract unwanted attention from regulators and investors. For example, in a sample of over 400 venture

capital partnerships whose first fund closed between January 1978 and December 1992, Gompers observes that 81% of the funds had carried interest figures ranging from 20-21%, which seems quite homogenous (Gompers and Lerner, 1999).

This apparent clustering may indicate that while carried interest remains fairly stable across funds, variations in control may primarily come through the addition or subtraction of covenants which are a much less obvious way to adjust for particular informational asymmetries that exist within the PE/VC industry. Thus, Gompers (1999) classifies 14 common covenants into three functional groups: those related to overall fund management, those governing the activities of GPs, and those restricting the type of investments made by the VC fund. Since carried interest shows little variation, covenants may be a key factor in the total benefits received by GPs since covenants serve as a *restriction* on GPs time, action, and compensation.

Gompers (1999) analyzes a broad sample of 140 partnership agreements and identifies the key covenant provisions that are prevalent in greater than 5% but less than 95% of the total number of covenants. There were 14 different covenant types that fit this criterion, and each was categorized into one of three groups depending on whether the covenant governed 1) the overall management of the fund, 2) the activities of the GP, or 3) the permissible types of investments (Gompers and Lerner, 1999).

The first category involves covenants that control the overall management of the fund. An example of such a covenant would be to limit the dollar amount invested in any one firm. Since GPs may be inclined to bail out faltering investments through additional follow-on funding, this covenant reduces the potential agency costs between GP and LP. Another way to look at the agency problem is to consider the GP as holding a call option on the value of the fund; all else equal, the GP would like to increase the variance of the fund by investing in only a

few firms. Hence, this particular covenant limits the GP's ability to take on excessive risk. Using the same options framework, the GP would be able to increase the variance of the funds' returns by taking on debt or guaranteeing the debt of portfolio firms. Consequently, LPs may contract for a covenant that limits the GPs ability to borrow additional funds. Other covenants that fall into this category include restrictions on coinvesting with earlier or later funds or reinvesting profits of the fund into firms requiring additional capital. These covenants make specific actions prohibitively unlikely by mandating approval from an advisory board or a supermajority vote (Gompers and Lerner, 1999).

The second broad class of covenants includes those associated with restricting specific activities of the GPs. Since the GP's effort is unobservable to the LP, yet highly correlated with fund performance, LPs favor covenants that prevent GPs from shirking or focusing on only certain portfolio firms. Thus, limited partnerships agreements can include covenants that limit the GP's ability to invest personal funds in portfolio firms. If a GP invests a large sum in one portfolio fund, for example, he would be motivated to put more effort into monitoring that one investment perhaps at the expense of other portfolio firms. Thus, the LP may require the GP to invest equally across all investments, if allowing them to invest any money at all.

In addition, to keep GP effort levels high it is critical that GPs do not sell off their interest in the profits of the fund to a third party. Even though only a weak and illiquid market exists for GP interests, a covenant preventing this type of GP activity is critical in keeping GP effort level high. Other covenants in this group may restrict the GP's ability to participate in outside activities, such as sitting on the advisory boards for the community, since this may reduce the time available for GPs to add value to their investments. Similarly, the GP may be restricted from raising additional funds, which is a time consuming process, before all of the capital of the

current fund is invested. Finally, GPs may try to reduce their effort levels or increase the scope of their fund by bringing on less experienced GPs. However, this would reduce fund returns for the LPs, and thus, they try to restrict the ability of the GP to hire additional personnel to manage a given fund.

The third general category of covenants restricts the permissible types of investments that can be made by the GPs. These covenants are primarily motivated by the fact that compensation levels for PE/VC professionals are much higher relative to typical money managers and investment manager. While the typical money manager investing in public securities receives an annual fee of a mere .5% of asset, the typical PE/VC GP will receive a management fee of 2% along with carried interest of 20% (Covitz and Liang, 2002). Thus, it would not be efficient for LPs to compensate GPs at such high levels if GPs merely invested in public securities. Thus, LPs typically specify the different types of asset classes and the allowable percentage of total capital that can be dedicated to each asset class. Another agency conflict can arise if the GP wishes to accumulate private benefits from investing LP money in markets that the GP has no prior experience in the hopes of gaining experience. With this additional experience, the GP will be able to raise more and larger funds focusing on other industries; this was a concern in the 1980s when many venture capitalists began investing in leveraged buyouts in the hopes of gaining this additional experience. All else equal, however, the LP would like to limit these actions that may reduce the expected value of their fund (Gompers and Lerner, 1999).

Section 4: Principal-Agent Framework

Now that we have explored the basic structure of the PE/VC industry and the common contractual features of the limited partnership organization, we will take a closer look at the principal-agent relationship that can arise between the investor (LP) and the fund manager (GP). We will first evaluate the general principal-agent relationship and then discuss 4 models which we will use to measure the time-series and cross-sectional variations in contracting between the GPs and LPs. The learning and signaling models help to explain the differences over time in compensation and covenant levels, while the supply-demand and costly contracting models help to explain differences in compensation and covenant levels across PE/VC funds.

The general principal-agent relationship is prevalent in many business settings and everyday life. Generally, when one individual, the principal, depends on the actions of another individual, the agent, an agency relationship exists. Thus, the patient is the principal and the doctor the agent, and corporate managers are the agents, the shareholders their principals. Within this agency framework, the agent must choose an action from a number of alternative possibilities knowing that this action affects the welfare of both the principal and the agent. An added characteristic is that the principal generally determines the payoff rules before the agent chooses an effort level and undertakes a specific action. While the agent's action or effort level is not directly observable by the principal, the outcome of the agent's action is discernible. However, the outcome is only partially driven by the agent's chosen effort and action since the outcome may be influenced by some exogenous random variable. If the action were completely dependent on the agent's action, then the principal would be able to determine with certainty the agent's action once the outcome is observed.

The central problem arises in agency relationships whenever the principal cannot costlessy monitor the agent's information and effort level. While the agent has better information about the specific nature of his task, the principal has a better idea of what he wants accomplished. Due to this information asymmetry, the interests of both the principal and agent may not be aligned. Thus, the real-world firm performs less efficiently than if there were perfect and costless information shared between principal and agent, and this reduction in efficiency is known as *agency loss* (Pratt and Zeckhauser, 1985). Over time, principals and agents have created mechanisms to minimize this agency loss through contractual agreements that help principals to monitor and to provide proper incentives for agents.

There are four different principal-agent models that will be used to analyze the PE/VC limited partnership contracts and the key compensation schemes for GPs. The first two models, the Learning Model and the Signaling Model, deal primarily with time series differences in GP contract features; the second two models, the Costly Contracting Model and the Supply-Demand Model, will help to explain cross-sectional variations in limited partnership contracts. Each of these models makes predictions regarding the actions of the principal and agent when contracting and the resulting effect on GP (agent) compensation.

Section 4.1: Learning Model

The learning model assumes that neither the venture capitalist nor the investor knows the ability of the venture capitalist when raising a first fund (Gompers and Lerner, 1999). This is not unlikely since GPs may have been hired from various professions, such as academia or industry, which may require different skill sets from those required for successful private equity investing. The fund's return is then a function of the GP's ability to select and monitor investments, the GPs effort, and some random noise. While the LPs cannot directly observe the GP's effort level,

the LP can determine the general quality of the GP from analyzing the fund's performance, which will be positively correlated with GP effort and ability. Thus, investors in the second fund will have better information about GP quality due to verifiable information about returns from the GP's first fund returns.

Section 4.2: Signaling Model

Unlike the learning model which assumes symmetric information (insofar as neither the GP nor the LP knows the ability of the GP in the first period), the signaling model assumes that the GP and investor have asymmetric information regarding the skill level of the GP when raising an initial fund (Gompers and Lerner, 1999). Specifically, the signaling model assumes that the GP has better information regarding his skill level than the investor in the first period. To differentiate themselves, the high-ability GPs will attempt to signal their superior capabilities by accepting more risky, variable compensation at the expense of more stable, fixed compensation. Even low-ability GPs will attempt to signal that they are of high-ability by accepting higher variable compensation at the expense of fixed compensation. This model predicts that the second fund's carried interest will be the same for both high- and low-ability GPs, but the second fund's compensation will differ in the fixed management fees charged. The more experienced GPs will require higher fixed fees as a form of insurance, which the lower quality GPs will not be able to negotiate (Gompers and Lerner, 1999).

Section 4.3: Costly Contracting Model

The basic premise of the Costly Contracting model is that negotiating contracts between LPs and GPs is costly and that renegotiation of contracts is prohibitively expensive (Gompers and Lerner, 1999). Thus, when establishing a contract that will serve for the fund's entire life, GPs and LPs must weigh the potential benefits of including a provision into the contract against

the costs of having that feature included. For example, the benefits of adding covenants that restrict the behavior of GPs must be weighed against the costs of monitoring behavior based on the covenant and the extra time and resources used in adding that covenant to the contract. This theory predicts that an LP will be more likely to add contractual features that restrain GP action when there are either more benefits associated with adding that feature or fewer costs associated with monitoring it. The different costs and benefits associated with funds of different size, age, reputation, and industry focus lead to cross-sectional variations in limited partnership contracts.

Section 4.4: Supply-Demand Model

A second model that seeks to explain cross-sectional variation in limited partnership contract features is the Supply-Demand model (Gompers and Lerner, 1999). The premise of this theory is that the supply of experienced PE/VC services is relatively fixed in the short-run. This is because PE/VC funds generally raise funds every 3-5 years once their initial fund's capital has been fully invested (Gompers and Lerner, 1999). Since it takes a long time to develop expertise in PE/VC investing, the number of new, experienced entrants into the PE/VC industry is limited in the short run as well. Also, because PE/VC funds are often highly specialized by size, industry focus, stage of investment, and reputation, they are imperfect substitutes for each other, which further limits the supply of experienced PE/VC professionals in the short-run. Holding the supply of PE/VC funds fixed, an increase in demand for PE/VC services, measured by either the number of entrepreneurs looking for start-up capital or the number of institutional investors looking to invest, will cause an increase in the price charged to an LP to buy into a limited partnership agreement. In addition, size and age characteristics of PE/VC funds can be a proxy for reputation and skill of the GPs. Since more reputable funds will be in more demand, the Supply-Demand model predicts that the GPs of these funds will have more bargaining power

relative to the LPs. Consequently, the GPs of older and larger funds will be able to negotiate more favorable contracts than those at less reputable funds.

Section 5: Empirical Findings

Having analyzed the structure and shape of the PE/VC industry and having introduced various principal-agent models to help explain variations in limited partnership contracts, the focus of the paper will now turn to analyzing empirical results from past literature. Specifically, this research paper will focus on the following contractual features: 1) Carried Interest, 2) Preferred Returns, and 3) Covenants. Each of these features will be analyzed from both a theoretical and empirical perspective in the following sections.

Section 5.1: Carried Interest

Since most limited partnership agreements do not afford the same oversight mechanisms to discipline managers as corporations offer, such as corporate boards and the market for corporate control, the compensation structure in partnership agreements is a critical way in which the incentives of the GP are aligned with those of the LP (Gompers and Lerner, 1999). Moreover, unlike typical executive employment contracts, the compensations scheme for GPs is rarely renegotiated over the course of the limited partnership's 10 year life. Thus, the carried interest feature, which comprises the bulk of GP compensation, is a critical feature of limited partnership agreements. Even though Gompers (1999) finds the typical carried interest percentage to be quite homogeneous, with 81% of funds in his sample charging between 20-21% carry, there are still distinct differences across funds as the carried interest percentage ranges from .7% to 45% in his sample (Gompers and Lerner, 1999). There are two theoretical models, the *learning model* and *signaling model* discussed below, which can help explain cross-sectional and time-series variations in GP carried interest.

Carried Interest and the Learning Model

The learning model has 5 key implications for GP compensation (Gompers and Lerner, 1999). First, the *level carried interest should increase over time*. In the first fund, the GP is motivated to work hard even without high levels of carried interest in the hopes of establishing a solid reputation and track record, which will in turn facilitate raising follow-on funds with higher expected carried interest percentages. However, as the GPs reputation is established over time, the GP will require more carried interest as an incentive to exert appropriate effort levels. Second, the *level of fixed fees over time is ambiguous*; although the variable compensation unambiguously should increase, fixed management fees can either increase, decrease, or remain constant through time. Third, all else being equal, the level of *fixed management fees should be positively correlated with the effort level required to select, invest in, and monitor portfolio firms.*

The fourth implication of the learning model is that the *variance in pay-for-performance sensitivity should increase over time*. In initial funds, when neither the GPs nor the investors know the true abilities of the GPs, the carried interest percentage should be clustered across all funds due to the lack of information. However, as fund performance information is gleaned by investors and GP ability becomes known to both parties, the carried interest offered in subsequent funds should vary according to the skill level of GPs. The fifth characteristic predicted by the learning model is that the *level of pay-for-performance sensitivity should not be related to performance*. This implication stems from the fact that in the first period, the GP is still motivated to exert appropriate effort levels in the hopes of establishing a good reputation even though the level of carry is not as high (Gompers and Lerner, 1999).

Carried Interest and the Signaling Model

The different assumptions of the signaling model lead to different implications for GP compensation than those purported by the learning model discussed earlier. First, *the level of carried interest will decrease over time*. Thus, older and larger funds will be more likely to demand higher fixed fees as a form of insurance as a trade-off for lower carried interest. Second, the *level of fixed management fees should increase over time* as more experienced GPs require more stable fees as a form of insurance. Third, the *level of fixed fees should be positively correlated with higher levels of effort required to invest and to monitor portfolio investments*, which is the same result predicted by the learning model (Gompers and Lerner, 1999).

Unlike the results predicted by the learning model, however, the signaling model predicts that the *variance of carried interest should decrease over time*. This holds because more funds are willing to accept riskier, variable pay to signal their different ability levels in initial funds, while demanding less variable pay and more different levels of fixed pay in the second period, once skill and ability is revealed to the investor. Also different from the learning model prediction is the signaling model's prediction that the *level of carried interest is positively related to performance*. This is because those firms that are willing to accept higher carried interest in the first period are those with higher ability and skill and thus will also have better fund performance (Gompers and Lerner, 1999).

Empirical Model for Carried Interest

Empirical evidence from a sample of 419 venture capital partnerships whose first fund closed between January 1978 and December 1992 supports the learning model framework (Gompers and Lerner, 1999). Gompers finds that the oldest and largest venture capital partnerships are able to capture a 1% greater carried interest than less established funds. This is consistent with the learning model prediction that the level of pay-for-performance sensitivity

will increase over time as more established and reputable GPs will require higher carried interest in order to be motivated to exert appropriate effort levels; at the same time, this finding is in direct contrast to the signaling model prediction that the pay-for-performance sensitivity will decrease over time as more reputable GPs demand more fixed management fees as a form of insurance. Additional support for the learning model comes from Gompers' empirical finding that the variance of pay-for-performance sensitivity is higher for larger and older venture capital funds. Thus, the signaling model prediction that carried interest variance will be higher for younger funds seeking to signal their different ability levels is not borne out in practice. Exhibit 6 provides an overview of the key findings on carried interest models (Gompers and Lerner, 1999).

In order to explain variations in the most visible and dominant form of compensation for GPs, the carried interest, Gompers conducts several regression analyses. The basic ordinary least squares (OLS) models specified are the following (Gompers and Lerner 1999):

(1) Carried Interest % = $\alpha + \beta_1$*(Date of Closing) + β_2*(Size of Venture Organization) + β_3*(Flag for High-Tech Focus)

(2) Carried Interest % = $\alpha + \beta_1$*(Date of Closing) + β_2*(Age of Venture Organization) + β_3*(Flag for Early Stage Focus)

As Exhibit 6 shows, the coefficients on the size and age of the venture organization are positive and significant at the 95% confidence level, indicating strong evidence of the learning model over the signaling model.

Empirical Model for Management Fees

In addition to carried interest, fixed management fees are also a significant portion of GP compensation, especially when investments do not provide very attractive returns. Thus, the carried interest regressions discussed above may be lacking to the extent that variations in carried interest percentages may be due to underlying changes in the level of management fees charged by the GP. Thus, Gompers also conducts univariate analyses and OLS regression analyses on the level of management fees, with the following basic model specifications:

(1) NPV of Mgmt Fees = α + β_1*(Date of Closing) + β_2*(Size of Venture Organization) + β_3*(Flag for High-Tech Focus)

(2) NPV of Mgmt Fees = α + β_1*(Date of Closing) + β_2*(Age of Venture Organization) + β_3*(Flag for High-Tech Focus)

In both univariate and multivariate analyses, older and larger venture capital organizations have been shown to be associated with lower levels of fixed management fees relative to younger, smaller funds (Gompers and Lerner, 1999). This finding too is in support of the learning model which predicts that larger and more reputable funds will require more variable pay as incentive for GPs to work hard at the expense of lower fixed management fees; at the same time, this finding contradicts the signaling model, which predicts that management fees would be higher for older and larger venture capital organizations that demand more insurance due to their superior reputation.

Empirical Model for Total Compensation Sensitivity

A more complete picture of GP compensation accounts for both the management fees and carried interest given to the GP. Recognizing this, Gompers also runs regression analysis on the sensitivity of total compensation (fixed and variable) to fund performance. This is done by

measuring the difference in compensation given a one percentage increase in asset growth, from 20% to 21%. While additional assumptions are made regarding the risk levels of cash flows and growth in the asset base, Gompers finds that older and larger funds exhibit significantly greater compensation sensitivity to performance. Once again, this is telling evidence in favor of the learning model, which predicts that more reputable GPs will need higher pay-for-performance incentives to continue exerting proper effort levels. Furthermore, Gompers finds that the variance of performance sensitivity is significantly higher for larger and older venture capital organizations, which corresponds with the predictions of the learning model.

Section 5.2: Preferred Return Provisions

Another key factor in the GP's compensation scheme is the use of a preferred return provision in the partnership agreement. While preferred returns are common in non-venture partnership agreements, they represent a new and growing feature in venture capital settings. For example, in a survey of 122 firms that managed private equity funds in 2000, Toll (2001) finds that preferred returns were included in 90% of buyout funds, while the fraction of venture capital funds with preferred returns was 35%, up from 19% in 1998" (Covitz and Liang, 2002). Since preferred return provisions are becoming more prevalent in limited partnership agreements and since they can alter significantly the GP's level of compensation, their basic structure and the specific instances in which they are used will be analyzed.

Since preferred returns can prove to be costly for GPs, the inclusion or exclusion of preferred returns in partnership agreements is an important consideration when determining total GP compensation. While there are various theories that explain the use of preferred return provisions, this research will focus on two over-arching theories: the *costly contracting theory* and the *supply-demand theory*. It should be noted, however, that unlike the learning and

signaling models, which lead to different predictions for compensation over time, the costly contracting and supply-demand theories can both be at work simultaneously, and both theories may help to explain the inclusion or exclusion of preferred return provisions in limited partnership contracts.

Preferred Returns and the Costly Contracting Model

The Costly Contracting model tells us that the benefits of including preferred return provisions into limited partnership agreements should be weighed against the costs of contracting for that provision. If either the benefits of including preferred return provisions increases or if the costs associated with contracting for the said provision decreases, this will increase the likelihood of preferred return provisions being written into the partnership agreement. The benefits associated with preferred returns include screening for GP quality, since less skilled GPs may not be able to surpass the preferred return hurdle rate, and eliciting appropriate GP effort levels because a higher portfolio value must be reached before they begin sharing in the profits of the fund. On the other hand, the costs associated with preferred returns, above and beyond contracting costs, include the fact that they may encourage risk-taking on the part of the GP, who wishes to increase volatility to maximize the value of the call option (now with a higher strike price) he holds on the firm's capital.

The costly contracting hypothesis makes a variety of predictions regarding when preferred return provisions would be most beneficial in limited partnership agreements. First, it predicts that LPs investing in inexperienced funds will be more likely to use preferred returns; this provision would serve as a screening mechanism because the potential for inexperienced GPs to act opportunistically is high given their low reputational capital. Second, the costly contracting hypothesis predicts that preferred returns would be more prevalent in less risky non-

venture funds as opposed to venture funds where the distribution of returns is wider. Since variance of returns is lower in non-venture funds, effort is more likely to be correlated with performance and thus GPs would be more likely to be motivated by preferred returns when they feel that their effort can have tangible results for their compensation. An extension of the costly contracting hypothesis is the idea that some LPs will benefit from including preferred returns in partnership agreements as a form of insurance to receive their invested capital and a preferred return before GPs can share in the upside. Thus, the costly contracting hypothesis would predict that as a form of compensation for this insurance, GPs will tend to receive more carried interest from LPs when preferred returns are embedded into partnership agreements. This theory is classified as the insurance hypothesis by Covitz and Liang (2002).

Preferred Returns and the Supply-Demand Model

Since preferred returns are a potential restraint on the GP's compensation, it is viewed as a cost to the GP. Thus, in times of high demand for experienced PE/VC services, we would expect for GPs to gain relatively more bargaining power than LPs which would result in fewer preferred return provisions in limited partnership agreements. The supply-demand theory also makes predictions regarding the likelihood of preferred return provisions in various limited partnership agreements. The fundamental prediction is that more experienced, reputable funds will be in relatively more demand, and consequently the GPs of these more experienced funds will have more contracting power than the LPs wishing to invest their capital.

Here, it should be noted that age and size of partnerships are generally positively correlated with experience and reputation of the fund. For example, since PE/VC funds must continually raise funds every 3-5 years, those that are able to continue raising funds will be those that have had the most successful track records. Also, funds that are oversubscribed by investors

may be able to raise more capital than funds that are in less demand by investors. Thus, both age and size of fund is a proxy for reputation and experience. The supply-demand theory, then, would suggest that older and larger PE/VC funds will be less likely to include preferred return provisions in their partnership agreements with LPs. In addition to less preferred return provisions, the GPs would also be able to negotiate equal or greater carried interest due to their greater bargaining power. Accordingly, inexperienced PE/VC funds would be predicted to have more preferred return provisions as well as lower carried interest owing to the superior bargaining power of the LPs in this case (Covitz and Liang, 2002).

Covitz and Liang (2002) analyze the use of preferred returns in private equity limited partnership contracts to address four information asymmetries: 1) GP effort 2) level of risk 3) talent and 4) the value of portfolio firms prior to exit. First, they argue that since preferred returns only reward GPs for higher returns (i.e. once the hurdle rate is reached), and since effort is generally positively correlated with returns, then the GPs will be more inclined to exert appropriate effort levels when preferred returns are present. Second, Covitz and Liang (2002) point out that the GP's performance-based pay can be viewed as a fraction of a call option (typically 20%) with the strike price equal to the committed capital and time to maturity equal to the life of the fund. Thus, GPs are inclined to increase volatility in order to increase the value of their option, and since a preferred return increases the strike price and brings the option more out-of-the-money, the payoff for added risk would be even greater with preferred returns.

The third information problem addressed is that of unobservable GP quality, and Covitz and Liang (2002) argue that preferred returns can be an effective screen for this, since less talented GPs would be less likely to earn their carried interest when preferred returns are specified. The fourth information asymmetry discussed centered on the GP's private knowledge

about the value of portfolio investments prior to their exit. Since LPs contribute most of the capital and GPs compensation is highly leveraged, the GPs have an incentive to delay exiting investments. However, preferred returns can mitigate this incentive to delay exits because GPs only receive variable compensation when the portfolio value is greater than or equal to the point when the GP catches up to the carried interest and this value increases with time when preferred returns are contracted (due to annual compounding of the preferred return). In contrast, with no preferred returns, the GP always receives a fixed amount of the profits as carried interest and may benefit from delaying an exit. Refer to Exhibit 5 for an overview of the typical payoff diagram for the GP under a preferred return provision.

Empirical Findings on Preferred Returns

Covitz and Liang (2002) put theory to empirical test through cross-sectional and time-series studies as they hypothesize that variations in the use of preferred returns are caused by differences in information between the GP and LP. Both the costly contracting theory and supply-demand theory help to explain variations in the use of preferred returns in different settings. First, they find support for the costly contracting theory by finding evidence that preferred returns are more prevalent in less risky non-venture investments than in more risky venture investments. This is because when return distributions are tighter, higher returns are a better signal of higher GP effort, and consequently, LPs benefit from including preferred return provisions since it will better motivate the GP to exert appropriate effort. Hence, 90% of buyout funds compared to only 35% of venture capital funds used preferred returns. Second, Covitz and Liang (2002) find evidence that preferred returns are more likely to be used in younger funds as opposed to older funds. These findings are consistent with both the costly contracting theory and the supply-demand theory since younger funds may also have less reputational capital, and

therefore, these funds may be in less demand by investors. In addition, the preferred return can be used as a screening mechanism to better identify skilled from non-skilled PE/VC professionals.

While these findings help to broaden our understanding of the various compensation features that comprise limited partnership agreements, it is important to note the limited scope of Covitz and Liang's findings. For instance, their research was unable to produce any convincing evidence for the insurance hypothesis – that LPs require preferred returns as a form of insurance. They attempted to test this by considering funds that had a majority of their capital contributed by pension funds because pension fund managers' compensation is based on meeting minimum return requirements and does not feature much upside potential. However, this information is difficult to gather and the data available did not produce robust results (Exhibit 7 gives an overview of Covitz and Liang's empirical findings).

In addition, Covitz and Liang (2002) were not able to solidify a definitive relationship between preferred returns and carried interest. As mentioned earlier, however, the carried interest amount is fairly stable across most PE/VC funds at approximately 20%. Thus, the low variation in carried interest may make it difficult to find a link with preferred return provisions. However, total compensation is not only driven by carried interest, but can also be driven by the use of covenants which act as a restraint on the time and resources of the GP. Thus, Covitz and Liang's empirical study may indeed be improved if they were to take a more complete view of GP compensation and test for a relationship between preferred returns and covenants, which may be more variable in nature. The use of these varying restrictive covenants in partnership agreements will be the focus of the next section.

Section 5.3: Covenants

Since covenants and preferred return provisions, discussed earlier, share similar characteristics, in that they are both costly for the GP and beneficial for the LP, similar theories can help to explain when and why each will be used in partnership agreements. Gompers and Lerner (1999) predict that the use of covenants is driven by the same two underlying forces that were discussed in regards to preferred returns: the Costly Contracting model and the Supply-Demand model.

Covenants and the Costly Contracting Model

To review, the costly contracting model predicts that since negotiating partnership agreements is a costly process, covenants will be included only to the extent that the benefits of restricting GP behavior outweighs the costs associated with taking such actions. Thus, any circumstance which decreases the costs associated with monitoring GP action or which increases the benefits from restricting GP behavior will lead to more covenants contracted. The costly contracting theory leads to a variety of hypotheses regarding the use of covenants in partnership agreements. For example, larger VC funds make more investments which disclose more information, so they are easier to monitor and should include more covenants in their contracts. In addition, reputable PE/VC funds may be less likely to engage in opportunistic behavior since they have a lot of reputational capital to protect; thus, since the benefits of acting opportunistically are reduced for these GPs, it is less likely for reputable PE/VC funds to have restrictive covenants included in their contracts. Similarly, the benefits of acting opportunistically are reduced when the pay-for-performance sensitivity, or carried interest percentage, is increased. Since the GP will suffer from shirking in these cases, covenants are predicted to be negatively related to the carried interest charged by the GP.

On the other hand, early-stage and high-tech focused VCs have more to gain from opportunistic behavior because they have much better information about the prospects of a start up fund than does the LP, and since there are increased benefits to LPs of limiting opportunistic behavior, Gompers would predict more covenants to be used for early-stage VCs. At the same time, however, it may be difficult to monitor the actions of GPs focusing on early-stage and high-tech industries because of the lack of information available regarding the firms in which they invest. Thus, the net result for the number of covenants to be included for these funds is ambiguous. Over time, however, it is generally thought that the number of covenants will increase as more LPs become aware of the PE/VC industries, the potential agency problems that may arise, and the potential covenants that may help them to monitor and align the incentives of the GPs with their own (i.e. the costs of contracting are significantly reduced).

Covenants and the Supply-Demand Model

In addition to the costs and benefits of contracting for covenants, Gompers and Lerner (1999) assert that the relative supply and demand of venture capital services will affect the use of covenants in long-term contracts. Specifically, as demand for VC increases, holding the short-term supply of VC relatively constant, the cost of buying into limited partnership increases for the LPs as the GPs gain more bargaining power (Gompers and Lerner, 1999). Consequently, the LPs must settle for fewer covenants in limited partnership contracts, which in turn increases the total amount of benefits (monetary and non-monetary) given to the GP. Thus, Gompers and Lerner (1999) predict that funds that are in heavy demand, those that are better performing, older, and those that have higher amounts of carried interest due to their proven track record, will have fewer covenants included in contracts.

Also, from a macroeconomic perspective, those funds raised when capital flowing into the PE/VC industries is increasing, relative to the existing pool of capital, should have fewer covenants since capital inflow is a proxy for demand. Another proxy for the relative demand for a PE/VC fund is whether or not investment managers or "gatekeepers" were involved with helping to raise the funds. These "gatekeepers" often pool the capital from a variety of LPs and thus have more bargaining power when dealing with GPs since they also reduce the costs of fundraising greatly. However, those funds that are able to raise enough capital without the added help of an investment manager are thought to be highly sought after and consequently should feature less covenants in their contracts.

Empirical Evidence on the Use of Covenants

Through empirical studies and regression analyses, Gompers and Lerner (1999) attempt to explain the variation in the total number of covenants and the different categories of covenants used in limited partnership agreements. In order to do this, Gompers establishes four variables to test for the costly contracting theory and four variables to test for the supply-demand theory. These four variables are described in the chart below:

4 Variables focused on Supply-Demand Hypothesis:
1) Funds focused on early-stage investments (more scope of opportunistic behavior)   2) Funds focused on high-tech sectors (more scope of opportunistic behavior)   3) Fund size: larger fund size, the more potential agency costs; however, larger funds may be raised by more reputable funds, so they may need less covenants because they are less likely to engage in opportunistic behavior.   4) Pay Sensitivity: covenants should be positively related to pay sensitivity because LPs must give up carry in order to include certain covenants.
4 Variables that measure Supply/Demand of experienced PE/VC services
1) Inflow of new capital into venture funds in the year the fund is established (1982-1986) relative to existing capital is a proxy for demand for PE/VC services.   2) Presence of investment managers indicates more demand for VC services   3) Total compensation that venture capitalists receive   4) Age of Venture Organization is anticipated to be in greater demand

Through univariate analysis, Gompers was able to show that a statistically significant relationship exists between the number of covenants and presence of an investment manager (+), pay sensitivity (-), rate of growth of the venture pool in the year of the fund's closing (-), total compensation for the GP (-). In addition, Gompers conducts multiple regression analysis to explain the variation in the number of covenants (dependent variable) in limited partnership agreements. The basic regression specification is shown below:

(1) Number of Covenants = α + β_1*(Early-Stage Focus) + β_2*(Pay Sensitivity) + β_3*(Size of Venture Fund) + β_4*(Venture Pool Growth) + β_5*(Investment Manager) + β_6*(Age of Venture Org.)

Exhibit 8 summarizes Gompers' key results for his empirical study on the use of covenants. As seen through the exhibit, the support for variables measuring the supply-demand theory yield more robust results than those variables representing the costly contracting hypothesis.

Here, it should also be noted that there is statistical evidence favoring the supply-demand variables over the costly-contracting variables. For example, Gompers and Lerner (1999) show that the coefficients on the supply-demand variables are jointly different from zero proven by a low p-value (0.000); however, the same cannot be said for the coefficients on the costly contracting variables which have a joint p-value of .231. This gives further empirical support to the supply-demand theory in explaining variations in the number of covenants in partnership agreements (Gompers and Lerner 1999).

As a side note, Gompers continues his analysis by including first difference regressions as well as using the number of covenants within each category of covenants (management of

fund, activity of partners, and permissible types of investment) as dependent variables using similar dependent variables that represent the costly contracting and supply-demand theories. While the results of these additional regressions are important to the understanding of the use of covenants in limited partnership agreements, the general regression specification shown above will suffice for our discussion of covenants as an additional form of compensation in partnership agreements. The final sections of this paper will discuss the interrelatedness of all three topics related to limited partnership agreements that have been discussed above: the carried interest, preferred returns, and covenants. Specifically, key areas will be highlighted where past literature has failed to include the link between all three factors as components of total GP compensation.

Section 6: Dynamic Model for Compensation

While the compensation structures of most private equity and venture capital partnerships has remained relatively constant over time, with over 80% of funds featuring the standard 80/20% profit sharing rule, there are various other non-monetary factors that should be considered when computing the total benefits received by PE/VC general partners. Specifically, *covenants*, which limit the actions of the GPs, as well as *preferred return provisions* should also be factored in when trying to explain variations in carried interest percentages across limited partnership agreements.

However, the past theoretical and empirical studies on carried interest, preferred returns, and covenants (discussed at length in earlier sections), do not take into account this more complete view of total GP benefits, which is a function of carried interest, preferred returns, and the use of covenants. Rather, by focusing on only one or two of the three components that comprise total GP compensation, the regression results of earlier researchers may suffer from omitted variable bias and may consequently yield biased estimates for key variables (Stock and Watson, 2003). Creating a more broad regression framework, which accounts for the interconnectedness of all three of the key compensation variables, will give a better and more accurate understanding of when, how, and why GPs get compensated the way that they do.

In order to develop this dynamic regression framework, it will be helpful to review the basic models, both univariate and OLS, derived to explain variations in each of the three key compensation variables.

<table>
<tr><td colspan="3">

1) Carried Interest

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(a) Carried Interest % = $\alpha + \beta_1$*(Date of Closing) + β_2*(Size of Venture Organization) + β_3*(Flag for High-Tech Focus)

(b) Carried Interest % = $\alpha + \beta_1$*(Date of Closing) + β_2*(Age of Venture Organization) + β_3*(Flag for Early Stage Focus)

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<tr><td colspan="3">

2) Preferred Returns

</td></tr>
<tr><td>

(a) ρ(Preferred Returns, Size of Venture Organization)

</td><td>=</td><td>+/-</td></tr>
<tr><td>

(b) ρ(Preferred Returns, Age of Venture Organization)

</td><td>=</td><td>+/-</td></tr>
<tr><td>

(c) ρ(Preferred Returns, GP Carried Interest)

</td><td>=</td><td>+/-</td></tr>
<tr><td colspan="3">

3) Covenants

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Number of Covenants = $\alpha + \beta_1$*(Early-Stage Focus) + β_2*(Pay Sensitivity) + β_3*(Size of Venture Fund) + β_4*(Venture Pool Growth) + β_5*(Investment Manager) + β_6*(Age of Venture Org.)

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Section 6.1: Limitations on Past Research

One of the key shortcomings of the carried interest regression specifications above is their failure to factor in *preferred returns* and *covenants* as independent variables. As discussed previously, Gompers finds that both the learning model and signaling model have different predictions for the level of GP carried interest over time. However, in addition to variables testing for these two hypotheses, it may be helpful to add variables that represent the supply-demand and costly contracting theory that have been used to explain preferred returns and covenant use in partnership agreements. In addition, carried interest levels may be driven by not only by the size and age of a fund, but also by the extent to which other limitations or restraints are placed on the GP, such as preferred return provisions and covenants.

Since Covitz and Liang (2002) shows that preferred returns are negatively correlated to larger and older PE/VC firms and since preferred returns may also be a trade-off for higher GP

carried interest, preferred returns may represent an omitted variable in the carried interest regression model (Covitz and Liang, 2002). Specifically, the definition of an omitted variable is one that is correlated with one of the included independent variables and also helps to explain variations in the dependent variable. Both of these conditions are satisfied by preferred returns, and consequently, the point estimates and confidence intervals for the independent variables included in the carried interest model developed by Gompers and Lerner (1999) will give inaccurate and biased results. This clearly limits the model's usefulness, and it could potentially lead to inaccurate predictions regarding whether the learning or signaling model determines the actual contracting behavior of GPs and LPs. This omitted variable bias could be mitigated by including a dummy variable equal to 0 for no preferred returns and 1 for preferred returns into the general carried interest model.

Similar to preferred returns, the exclusion of covenants from the carried interest model may also lead to omitted variable bias. Specifically, Gompers and Lerner (1999) show that the number of covenants included in partnership agreements is negatively related to reputational factors and relative demand factors for PE/VC services, such as the included independent variables of age and size of venture organization in Gompers' carried interest model. Additionally, covenants may be viewed as a restriction on the GP's activities, and consequently, a GP may be willing to trade-off a lower carried interest percentage in return for a reduction in the number of covenants included in the final contract. Since covenants are negatively correlated with the included regressors (representing the age and size of venture organization) and at the same time key drivers of the carried interest percentage offered to GPs, they can pose an omitted variable bias in an OLS framework. In order to get around this omitted variable bias, three additional independent variables can be included into the carried interest regression model:

1) a flag for Covenants Governing the Overall Management of Fund (N=0, Y=1)

2) a flag for Covenants Limiting the Activities of the GP (N=0, Y=1)

3) a flag for Covenants Limiting the Permissible types of Investments (N=0, Y=1)

The inclusion of these three variables will give a better understanding of the prevalence of each category of covenants and their respective ability to help explain variations in the dependent variable, the carried interest percentage.

Making the two adjustments described above, one for preferred returns and another from covenants, we can develop a more robust regression model that may provide a better indication of the various factors that go into determining GP compensation. Surely, omitting variables correlated with the included independent variables and the dependent variable will provide unreliable results. With these adjustments, our new "Dynamic Carried Interest Model" will look like the following:

Dynamic Carried Interest Model

(1) Carried Interest % = α + β_1*(Date of Closing) + β_2*(Size of Venture Organization) + β_3*(Flag for High-Tech Focus) + β_4*(Preferred Return Flag) + β_5*(Overall Mgmt Covenant) + β_6*(Activity of GP Covenant) + β_7*(Permissible Investments Covenant Flag)

Section 6.2: Discussion of Research

Unfortunately, due to the private nature of the PE/VC industries, which does not require public financial filings of information regarding contract provisions and fund returns, it is difficult to accumulate data on the various limited partnership agreements that are established. Past researchers have relied on personal connections with various LPs (such as Pension Fund Managers) as well as PE/VC professionals in order to gather proprietary information on the

partnership agreements. The limited public information available on the industry is a key limitation for research on the PE/VC industry going forward, and due to these information problems, the dynamic regression model specified above was not tested empirically.

Even without being able to quantify the sign and magnitude of the different components that factor into GP carried interest, however, conclusions can be drawn regarding past empirical models and predictions can be made for future studies, if data were available. A key finding is that carried interest should not be considered in isolation. Rather, the true economic relationship should exist between the amount of carried interest, the use of preferred returns, and the number of covenants embedded into partnership agreements. It is the purpose of the dynamic carried interest model to specify the magnitude and sign of these relationships.

Total GP compensation is thus a function of all three of the factors mentioned above, which may even be contracted for at the same time, or endogenously. Thus, rather than showing causality one way or another, it might be the case that each of the three decision variables, or components of compensation, are determined simultaneously during negotiations between the GP and LP. Thus, the GP and LP would contract for carried interest, preferred returns, and covenants all at the onset of the limited partnership agreement negotiations. However, regardless of whether one form of compensation causes another form or whether all forms are determined endogenously, the limitation of the basic carried interest regression model developed by Gompers is still apparent. Namely, the exclusion of preferred returns and covenants from the model can bias the coefficients on the other independent variables, leading to unreliable conclusions and a faulty understanding of the true economics of limited partnership agreements.

Another approach to get around the potential endogeneity problem could be through the use of instrumental variable regression. As noted above, the basic problem with Gompers and

Lerner's previous regression models was that the included regressors (age or size) may have been correlated with the error term of the regression. To get around this, an instrumental variable could be used to isolate that portion of the included regressor that is uncorrelated with the error term. Then, these new values for the included regressor could be used to run a regression with the independent variable, carried interest in our case. The problem, however, lies in finding instrumental variables that are 1) relevant and correlated with the included regressors and 2) exogenous and uncorrelated with the error term. Potential instruments such as size of a PE/VC organizations office or number of PE/VC professionals working at the organization may be correlated with size and age of the PE/VC fund (included regressors) and also uncorrelated with the error term. However, this methodology is limited to the extent that statistically significant data exists on these variables.

Here it should be noted that just as the PE/VC organizations are highly specialized, so too are the law firms that draft the limited partnership agreements. Thus, a particular law firm may be highly specialized in drafting contracts with particular covenants or particular preferred return provisions. The contracting activity, then, is determined by rules of thumb or by the law firm's past experience with drafting contracts. If certain PE/VC firms continually go to the same law firms for help in drafting limited partnership agreements, then the law firm chosen may have a significant impact on the nature of the contract and compensation terms for the GPs. This notion that the choice of law firm may be an omitted variable from the carried interest regression model leaves room for future research on the various law firms focused on the PE/VC industry.

Even though data is not available to test the true point estimates and confidence intervals for the dynamic regression model for carried interest, we can still provide explanations for what may be observed if the data were available. For example, if the coefficient on the Preferred

Return Provisions Flag is positive and significant, this would imply that there is a substitution effect or trade-off between carried interest and preferred return provision. In essence, the LPs must pay or give up carried interest in order to include covenants. This result would indicate that GPs may not have superior bargaining power over LPs because if they did, then they would be able to negotiate both higher carried interest and lowered preferred returns. However, if the coefficient on Preferred Return Provisions is negative, this could imply that the LP has superior bargaining power and is able to negotiate both more covenants and lower carried interest simultaneously.

In addition, we can consider the three coefficients on the covenant flags together to determine the effect that covenants have on the amount of carried interest given to GPs. For instance, if the coefficients on the three covenants flags are positive, then this may imply that there is a substitution effect or trade-off between monetary compensation and non-monetary restrictions on the GP's actions. Thus, LPs must pay or give up more carried interest to GPs in order to include restrictive covenants in partnership agreements. On the other hand, if the coefficient on Number of Covenants is negative, this would suggest that LPs may have superior bargaining power and are able to negotiate both more covenants and lower carried interest simultaneously. Here it should also be noted that due to the inclusion of these additional regressors, the original point estimates and confidence intervals for the other regressors, as well as the overall fit of the model, may be altered significantly. Thus, prior conclusions drawn regarding which theory is best at predicting compensation levels may be invalidated.

The implications of the new dynamic regression framework should provide new insights into the contracting behaviors of both GPs and LPs. This will have important implications going forward as the PE/VC industries continue to grow in the United States and abroad. This greater

understanding of contracting mechanisms can help to mitigate potential adverse selection and moral hazard problems, encouraging more LPs to invest in private equity and more GPs to raise additional funds in the hopes of making attractive risk-adjusted returns. The nature and extent to which limited partnership agreements and compensation structures evolve over time, however, ultimately revolves around the successes and failures of current contracting mechanisms that help to align the LP's incentives with those of the GPs and those between the GPs and the entrepreneur seeking venture funding.

Bibliography

Covitz and Liang. *Recent Developments in the Private Equity Market and the Role of Preferred Returns*. Board of Governors of the Federal Reserve System. Washington, DC 20551.

Fenn, Liang, and Prowse. *The Private Equity Market: An Overview*. Financial Markets, Institutions & Instruments, volume 6, number 4. Blackwell Publishers 1997.

Gompers and Lerner. *The Venture Capital Cycle*. MIT Press 1999. Cambridge, Massachusetts.

Pratt and Zeckhauser. *Principals and Agents: the Structure of Business*. Harvard Business School Press 1985.
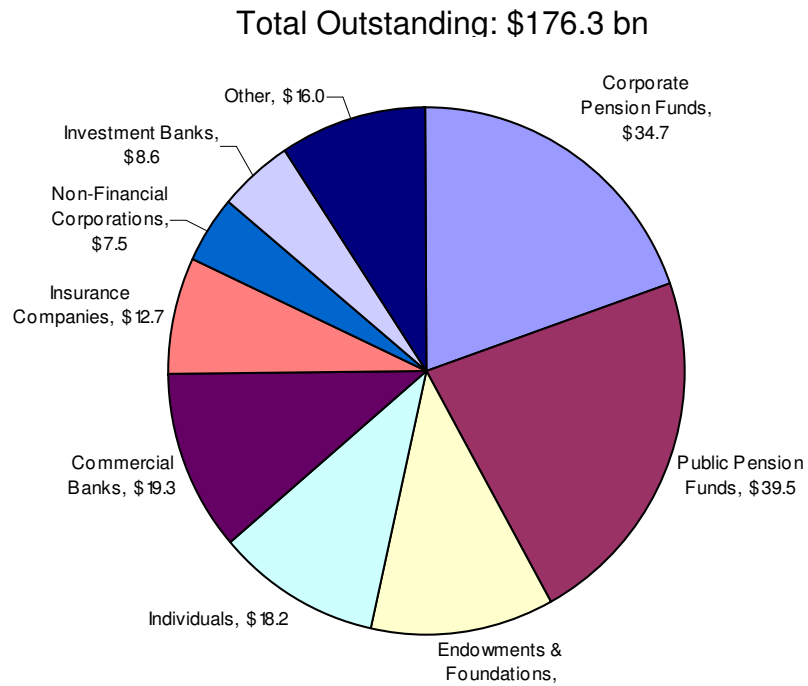
Stock and Watson. *Introduction to Econometrics*. Pearson Education 2003.

Appendix

Exhibit 1: Overview of PE/VC Investing (Pension Funds)

**Investors in the Private Equity Market
(Year-End 1996 in $US bn)**

Total Outstanding: $176.3 bn

Other, $16.0

Investment Banks, $8.6

Non-Financial Corporations, $7.5

Insurance Companies, $12.7

Commercial Banks, $19.3

Individuals, $18.2

Endowments & Foundations,

Corporate Pension Funds, $34.7

Public Pension Funds, $39.5

Source: Fenn, Liang, Prowse. The Private Equity Market: An Overview. Pg. 71

Exhibit 2: Overview of Growth of PE/VC Industry

Private Equity Capital Outstanding ($US bn) Source of Funds

- Limited Partnership
- Other

1980: $2.0, $2.7
1995: $143.2, $33.2

Private Equity Capital Outstanding ($US bn) Type of Investment

- Venture
- Non Venture

1980: $3.0, $1.7
1995: $44.3, $132.0
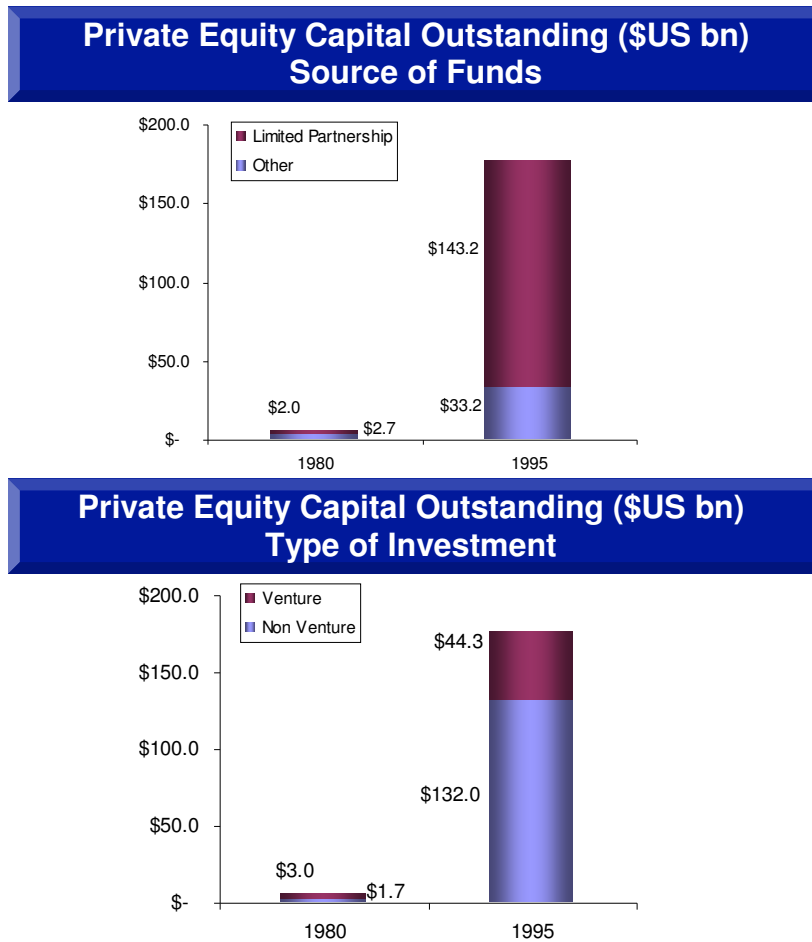
Source: Fenn, Liang, Prowse. The Private Equity Market: An Overview. Pg 3

Exhibit 3: Overview of Key Players in PE/VC Industry

| Investor (Limited Partner) | → Committed Capital → ← Profits from Investments ← | PE/VC Limited Partnership (General Partner) | → Portfolio investments → ← Private Equity Securities ← | Portfolio Firms (Entrepreneur) |

Source: Fenn, Liang, Prowse. The Private Equity Market: An Overview. Pg. 6.

Exhibit 4: Overview of Oversight Mechanisms for All Parties in PE/VC
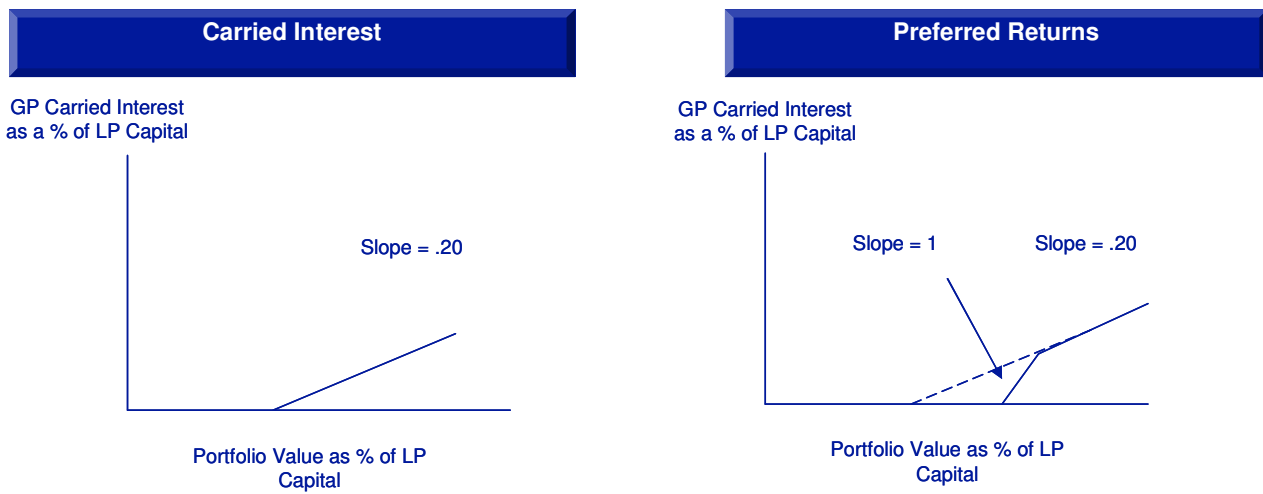
Means of Control

Means of Control

➤**Direct Control**
- Partnership Covenants
- Advisory Boards

➤**Performance Incentives**
- Reputation
- GP Compensation

➤**Direct Control**
- Voting Rights/Board Seats
- Access to Capital

➤**Performance Incentives**
- Managerial Ownership
- Managerial Compensation
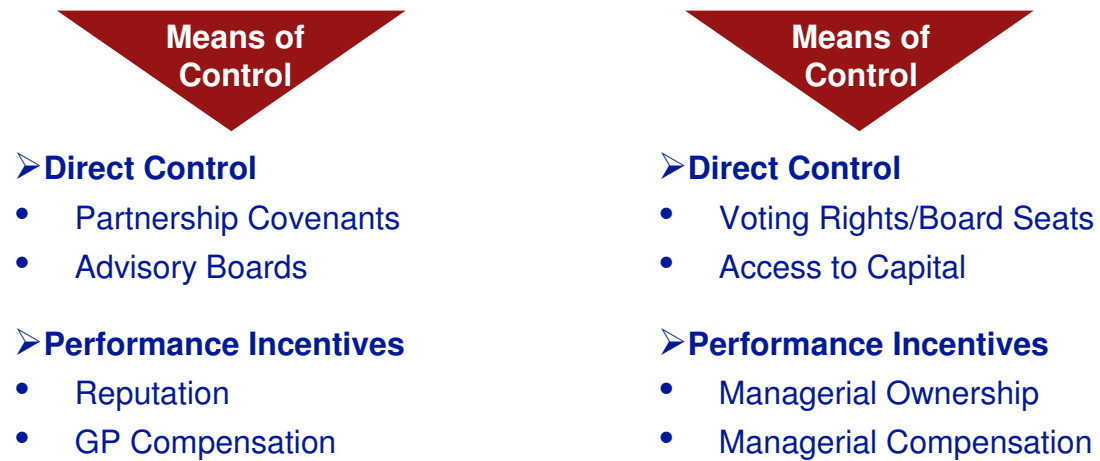
Source: Fenn, Liang, Prowse. The Private Equity Market: An Overview. Pg. 43

Exhibit 5: Typical Payoff Diagrams for GP Compensation

Carried Interest

GP Carried Interest
as a % of LP Capital

Slope = .20

Portfolio Value as % of LP
Capital

Preferred Returns

GP Carried Interest
as a % of LP Capital

Slope = 1   Slope = .20

Portfolio Value as % of LP
Capital

Source: Covitz and Liang. Recent Developments in the Private Equity Market and the Role of Preferred Returns. Pg. 8.

Exhibit 6: Empirical Evidence on Carried Interest %
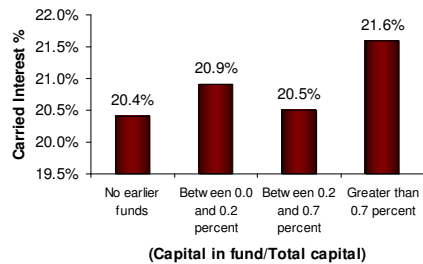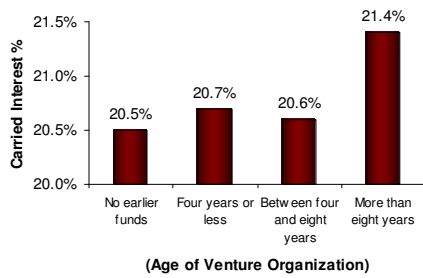
(Age of Venture Organization)

(Capital in fund/Total capital)

Dependent Variable Independent Variables	Carried Interest %	Carried Interest %
Date of closing	0.04 *(0.80)*	-0.002 *(0.03)*
Size of venture organization	**50.67** *(2.54)*	
Age of venture organization		**0.07** *(2.47)*
Fund focuses on high tech?	0.93 *(3.08)*	
Fund focuses on early stage?		0.75 *(2.41)*
Constant	-58.52 *(0.60)*	23.53 *(0.23)*
Adjusted R-Squared	0.03	0.02
p-value	0.002	0.016
Number of Observations	416	416

Source: Gompers and Lerner. The Venture Capital Cycle. Pg. 65-69.

Exhibit 7: Empirical Evidence on Preferred Return

Correlation	Sign	Reasoning	Supports
ρ(Preferred Return, Experience of Fund)	-	LPs use preferred returns as a screening mechanism or because these funds are in more demand	Costly Contracting, Supply-Demand
ρ(Preferred Return, Riskiness of Fund)	-	Preferred Returns used more often in less risky non-venture funds where effort is indicative of outcome; tighter distribution of returns	Costly Contracting
ρ(Preferred Return, Carried Interest)	?	Inconclusive Data due to lack of variation in carried interest	N/A

Source: Covitz and Liang. Recent Developments in the Private Equity Market and the Role of Preferred Returns. Pg. 23.

Exhibit 8: Empirical Evidence on the Use of Covenants

Dependent Variable Independent Variables	# of Covenants	Sign of Coefficient	Costly Contracting Prediction	Supply-Demand Prediction
Fund focuses on early stage?	0.19 *(0.34)*	+	+	
Age of venture organization	-0.06 *(1.11)*	-		-
Size of venture organization	0.005 *(1.45)*	+	+/-	-
Venture pool growth	-5.06 *(5.83)*	-		-
Investment Manager?	1.47 *(2.23)*	+		+
Total compensation	-13.19 *(1.33)*	-		-
Sensitivity of pay to performance? (Carry)	-51.67 *(1.63)*	-	+/-	-
Constant	12.51 *(2.85)*			
Adjusted R-Squared	0.22			
Root MSE	2.658			

Source: Gompers and Lerner. The Venture Capital Cycle. Pg. 49.