# Alternative Investment Analyst Review™

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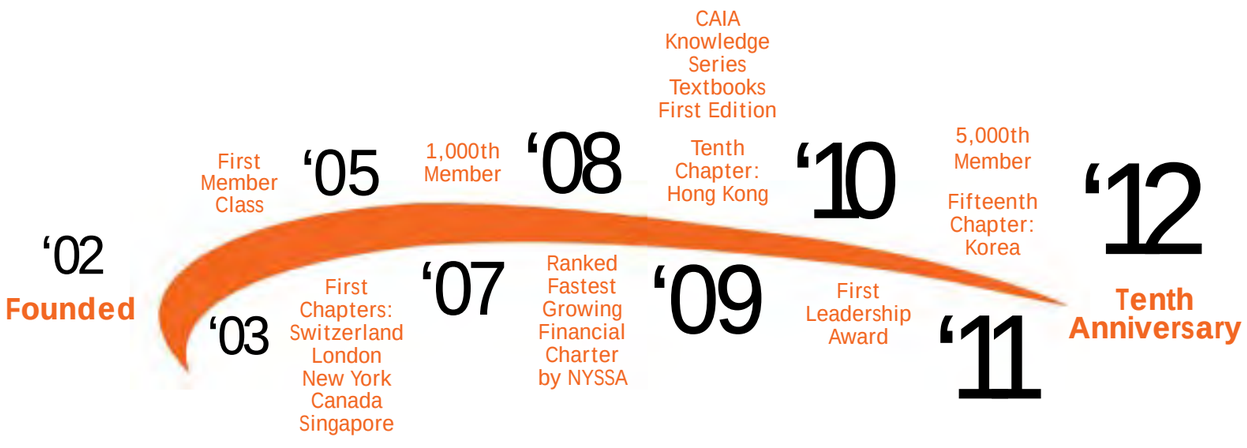



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Alternative Investment Analyst Review

## Editors' Letter

Over the past few years, investors have encountered significant turmoil in global financial markets. The current sources of tension in the financial markets include stresses originating in Europe, high unemployment, depressed real estate prices, and budgetary challenges at all levels of government in Europe and the United States. Many investors argue that this is an ideal time to turn one's attention to alternative investments. Alternative investments have traditionally provided opportunities for investors to diversify their portfolios, along with the potential for positive returns in challenging times, such as the current environment. In this issue of the *Alternative Investment Analyst Review*, we offer a series of articles that provide insights into a wide variety of alternative investments, including infrastructure investment, distressed debt, closed-end funds, and hedge funds.

"*Risk, Return, and Cash Flow Characteristics of Private Equity Investments in Infrastructure,*" by Florian Bitsch, Axel Buchner and Christoph Kaserer, examines a number of commonly held beliefs about infrastructure investment. The authors find that infrastructure deals exhibit higher performance than non-infrastructure deals. However, they uncover evidence that the higher returns may be accompanied by higher market risk.

The second paper in this issue, "*Investing in Distressed Debt,*" by Sameer Jain, provides a comprehensive look at distressed debt investing. While recent market conditions have been challenging for many firms, they have created opportunities for investors in distressed debt. Jain's paper outlines the fundamentals of distressed debt investing from an alternative investments perspective including the risks, sources of returns and market dynamics.

"*The Wisdom of the Right Crowd: Service Provider Choice and Hedge Fund Performance,*" by Chartered Alternative Investment Analyst (CAIA) member James B. Crystal, examines an under-analyzed area in the extant hedge fund literature: the impact of the qualitative characteristics of a hedge fund on its performance. Crystal considers the impact of key service providers (e.g., prime brokers, auditors, administrators, and legal counsel) on hedge fund performance. The author's analysis indicates a relationship between the use of the most popular key service providers and outperformance over five- and ten-year horizons.

This issue's research review section focuses on closed-end funds. In Ben Branch and Liping Qiu's article, "*What We Like about Closed-End Funds that Trade at a Discount*," the authors provide an overview of research on closed-end funds, and suggest that investors may be able to generate enhanced returns by investing in diversified portfolios of deeply discounted closed-end funds. Branch and Qiu argue that investors should form portfolios of fundamentally attractive funds that are trading at substantial discounts to their net asset values (NAV). Excess returns may be realized if (a) some of the funds experience a reduction in their discounts, (b) they self-tender, (c) they provide large distributions, or (d) they convert to open-end status. A list of further readings on closed-end funds is provided after the article.

One of the distinguishing characteristics of many alternative investments is their asymmetric exposure to traditional market factors. In "*Attribution Analysis of Bull/Bear Alphas and Betas,*" Andreas Steiner develops a model of asymmetric alpha/beta, and builds a framework to analyze the impact of alpha/beta asymmetry on a traditional single-index (symmetric alpha and beta) model. Furthermore, Steiner illustrates that the asymmetrical model can be used to discover "false" alphas as well as to manage tail risk.

Finally, Keith Black speaks with four CAIA members who were recently awarded the title of "*Rising Stars of Public Funds*" by Institutional Investor: Derek Drummond of the State of Wisconsin Investment Board (SWIB), Samuel Gallo of the University System of Maryland Foundation, Bryan Hedrick of Fort Worth Employees' Retirement Fund and Chris Schelling of Kentucky Retirement Systems (KRS).

Our goal with the Alternative Investment Analyst Review is to provide a combination of original research papers and reviews of extant research in a format that is both educational and more accessible than many of the existing academic journals. The AIAR can only be effective if it provides subject matter that is of interest to CAIA members. As a CAIA member, your feedback and your submissions are critical to AIAR's mission. As always, we encourage you to submit your feedback, and articles to us at **AIAR@CAIA.org**.

*Hossein Kazemi*
*Ed Szado*
*Editors of Alternative Investment Analyst Review*

# INDEX




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**ABSTRACT**: An analysis of funds reporting five- and ten-year track records to performance databases demonstrates a relationship between reported use of the most popular key service providers–prime brokers, auditors, administrators, and domestic legal counsel–and significant reported outperformance relative to the peer group, over historic five- and ten-year time horizons.

The most popular key service providers are able to be selective in the hedge funds with which they choose to work. Therefore, a hedge fund that reports the use of leading key service providers has, necessarily, persuaded such providers that the fund's combination of investment and operational strength positions it relatively well to survive and thrive; and the key service providers have-, in turn, concluded that the fund poses relatively low reputational risk to them and is reasonably likely to grow and, consequently, to increase the revenues it pays to them. Having passed this due diligence screen appears, on balance, to be a marker for superior performance relative to the overall hedge fund population.



**ABSTRACT**: Closed-end fund (CEF) shares usually trade at a discount, and less frequently for a premium, to their net asset values (NAVs, the total value of all the fund's assets divided by its outstanding shares). While much has been written on why such funds typically trade for a discount, no consensus explanation has yet emerged. This article provides an overview of the research on CEF discounts/premiums as well as a description of a potentially attractive approach to CEF investing.

The authors argue that one should begin by identifying funds that are attractive on their own fundamental terms. For example, an investor who seeks exposure to emerging markets could search among the emerging market closed-end funds for well-managed funds with relatively low expense ratios, low management fees, and superior track records. From this set of funds, the investor can then select one or more that are trading at a substantial discount. Over time, the discount may narrow, the fund may self-tender, the fund may make some large distributions, and it may even convert to open-end status. By no means will every fund do one or more of these things. But a diversified portfolio of such funds is very likely to have at least some funds that do some of these things, which add to their returns.



**ABSTRACT**: Asymmetries in risk and return characteristics come in various forms: assets with highly non-linear payoff profiles, correlations that increase in times of market turbulence, successful information-driven market timing strategies and data-driven dynamic portfolio insurance strategies lead to gain and loss sensitivities which can be very different in bull and bear markets.

This contrasts strongly with traditional models, which are dominated by symmetric risk measures such as volatility and beta. In this research note, the author discusses a specific asymmetrical model and build an attribution framework that allows an analysis of the impact of asymmetric alpha and beta on the traditional single-index model, with its symmetric alpha and beta. The author illustrates how such an asymmetrical model can be used in ex-post portfolio analysis to detect "false" alphas caused by "hidden" asymmetrical betas, and how asymmetrical betas can be used in ex-ante portfolio construction for the purpose of downside risk management.



**ABSTRACT**: Each year, Institutional Investor honors a select number of financial professionals with the "*Rising Star of Public Funds"* award. Of the fourteen recipients of the 2012 award, four are members of the CAIA Association. This article profiles the four Charter holders and discusses how CAIA membership has benefitted their careers and their employers.

## Call For Papers

*Articles should be approximately 15 pages in length (single spaced) and on a topic of general interest to the CAIA community.*

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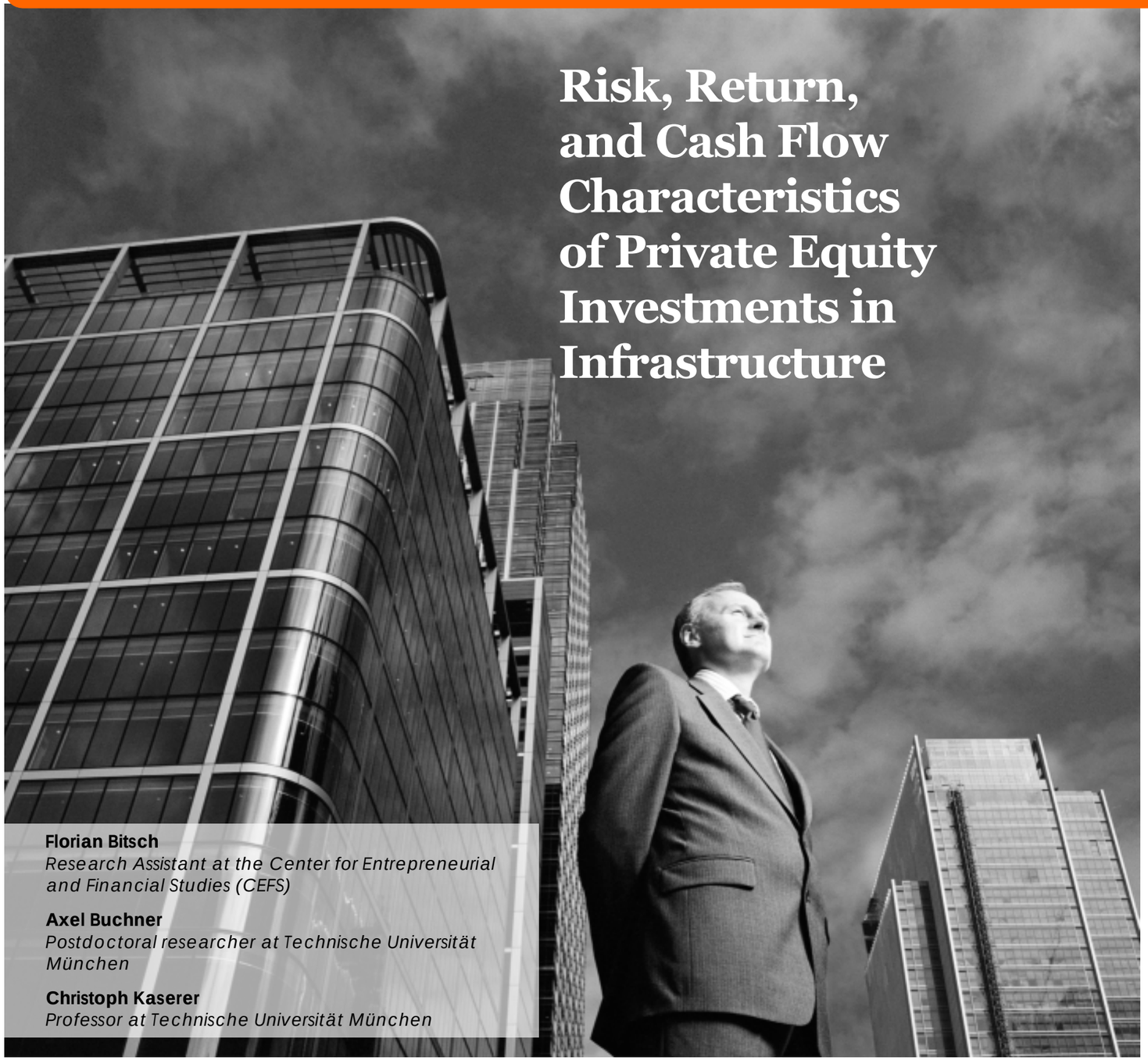

# Risk, Return, and Cash Flow Characteristics of Private Equity Investments in Infrastructure

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## Introduction

In this paper, we analyze the risk, return and cash flow characteristics of infrastructure investments and compare them to non-infrastructure investments. It is generally argued in the literature that infrastructure investments offer typical characteristics such as long-term, stable and predictable, inflation-linked returns with low correlation to other assets (Inderst 2009, p. 7). However, these characteristics attributed to infrastructure investments have not yet been proven empirically. The goal of this paper is to fill this gap and provide a more thorough understanding of infrastructure returns and cash flow characteristics.

One of the main obstacles in infrastructure research has been the lack of available data. In this paper we make use of a unique and novel dataset of global infrastructure and non-infrastructure investments done by unlisted funds. Overall, we have information on 363 fully-realized infrastructure and 11,223 non-infrastructure deals. The special feature of the data is that they contain the full history of cash flows for each deal. This enables us to study the risk, return and cash flow characteristics of infrastructure investments and to draw comparisons between infrastructure and non-infrastructure investments.

Our results indicate that infrastructure deals have a performance that is uncorrelated to macroeconomic development and that is higher than that of non-infrastructure deals despite lower default frequencies. However, we do not find that infrastructure deals offer cash flows that are more stable, longer term, inflation-linked or uncorrelated to public equity markets. To measure "stability", we introduce a measure of the variability of cash outflows from the portfolio company to the fund. We also find evidence that infrastructure assets are higher levered but that they have not been exposed to overinvestment as often stated. Finally, we offer some evidence that higher returns might be driven by higher market risk or higher political risk. However, returns in the infrastructure sector might also be driven by defective privatization mechanisms.

This article contributes to the emerging literature on infrastructure financing. Recent publications in this area include Newell and Peng (2007, 2008), Dechant and Finkenzeller (2009) or Sawant (2010a). These previous studies exclusively focus on data from listed infrastructure stocks, indices of unlisted infrastructure investments or infrastructure project bonds. In contrast, we are the first to use data of unlisted infrastructure fund investments.

The article is structured as follows. Section 2 highlights the importance and need for infrastructure assets and summarizes what forms of infrastructure investments are available for investors. Section 3 describes the main investment characteristics that are assumed to be infrastructure-specific and derives the hypotheses on infrastructure fund investments to be tested in this paper. Section 4 describes our database and sample

selection. Section 5 presents and discusses the empirical results. Section 6 summarizes the findings and gives an outlook on future research in this area.

## Infrastructure investments

### 2.1 The infrastructure investment gap

Several studies estimate that in the course of the 21st century, increasing amounts of money need to be spent on infrastructure assets globally. In this context, infrastructure is generally understood as assets in the transportation, telecommunication, electricity and water sectors (OECD 2007, p. 21). Sometimes other energy-related assets such as oil and gas transportation and storage or social institutions such as hospitals, schools or prisons are included as well.

These estimates are based on an increasing need for such assets in developing countries due to population growth and economic development. Developing countries need more of the existing infrastructure as well as new infrastructure, such as better telecommunication or transportation systems. In addition, developed markets will exhibit increasing demand for infrastructure assets driven not by population growth but by replacement of existing but aging infrastructure systems. Moreover, technological progress is an important factor for emerging and developed countries alike as it enables and requires more spending on infrastructure assets. For example, power grids must be upgraded to match the special requirements of newly installed offshore wind energy parks. Taken together, the worldwide demand for infrastructure investments between 2005 and 2030 could be as high as USD 70 trillion according to the OECD (OECD 2007, p. 22 and p. 97).

Although the increasing demand for infrastructure assets is generally recognized, the supply is constrained by a lack of financing resources: Governments of emerging countries often are yet capable of financing and administering the high volume of targeted projects, whereas governments of developed countries have limited budgets for infrastructure due to rising social expenditures – partly due to ageing populations (OECD 2007, p. 24). While infrastructure assets have historically been, and still are to a large extent, financed by the public sector, this traditional financing source is unlikely to cover the large estimated investment needs (OECD 2007, p. 29). This gap between the projected needs for infrastructure assets and the supply is popularly referred to as the "infrastructure investment gap" (OECD 2007, p. 14).

A natural solution is to make the infrastructure sectors more accessible for private investors. Pension funds of OECD countries have assets under management of about USD 25 trillion (OECD 2010, p. 2) representing a weighted average asset-to-GDP ratio of 67.1 percent in 2009 (OECD 2010, p. 8). This suggests that institutional investors, such as pension funds or insurance companies, could significantly narrow the infrastructure investment gap if they invested a portion of their assets in infrastructure assets. Some pension funds have already started doing this with some individual funds showing an infrastructure share of over 10 percent (Inderst 2009, p. 3 and p. 13; Beeferman 2008, p. 16). Nevertheless, only a small proportion of overall pension assets are allocated to infrastructure (OECD 2010, p. 37).

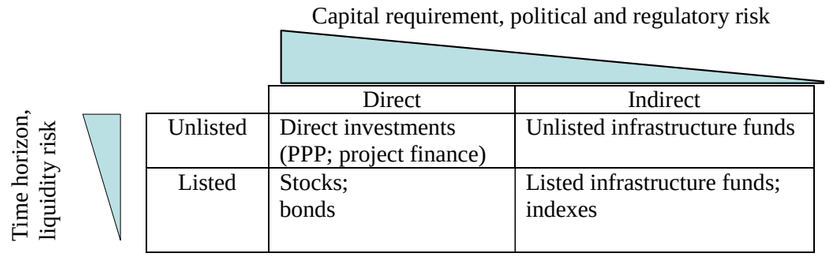
### 2.2 Forms of investment

Investors not only have to decide on the optimal weight of infrastructure assets in their portfolio but also on the form of investment within the infrastructure sector. The various forms of investment have different profiles regarding minimum-capital requirements, time horizon and risk exposures (such as liquidity or political risk). Figure 1 provides a schematic overview.





Figure 1. Most common forms of infrastructure investment




Notes: The figure shows the most common forms of infrastructure investments grouped into the categories listed / unlisted and direct / indirect investments. It also shows schematically the exposure to the different risks associated with them.

**Direct investments** into infrastructure assets such as toll roads or power plants usually require the longest time horizon for an investor since infrastructure assets have long lives - up to 60 years on average (Rickards 2008). Some investments can last as long as 99 years (Beeferman 2008, p. 7). Due to the physical nature of these assets, direct investments cannot easily be sold and thus bear high liquidity risk. Since infrastructure assets are generally very capital-intensive, they require large capital outlays. Furthermore, committing a large amount of capital over a long period of time into a single infrastructure asset exposes the investor to high political and regulatory risk. Overall, only a few investors such as insurance companies or pension funds are capable of making investments with such characteristics and only recently have these investments become more popular with them (Inderst 2009, p. 3). There are special forms of direct infrastructure investments, the most prominent being those using Public Private Partnerships (PPPs) or project finance structures (see Välilä 2005 and Esty 2003 and 2010, respectively, for overviews of these forms of investment).

The disadvantage of a high capital requirement can be eliminated to a large extent by investing in direct and indirect **listed securities** of companies that operate in sectors relevant to infrastructure. This makes portfolio diversification easier, reducing exposure to single-country political and regulatory risk. Moreover, the use of listed securities reduces liquidity risk. Listed securities also allow a shorter investment time horizon. Indexes of listed infrastructure securities and listed infrastructure funds provide well diversified infrastructure exposure.

**Unlisted infrastructure funds** also provide diversified exposure and enable smaller investors to participate in unlisted infrastructure assets through smaller minimum capital requirements than unlisted direct investments. Starting with the launch of the first fund of this kind in 1993, this has become one of the most specialized and rapidly growing forms of infrastructure investment, comprising of over 70 funds with an average fund size of USD 3.3 billion in 2008 (Preqin 2008; Orr 2007; and Inderst 2009, p. 11).

Like typical private equity funds, such funds are usually structured as Limited Partnerships. The fund manager – called General Partner – collects money from investors, the Limited Partners, and invests it in portfolio companies on their behalf over a specified period of time. When the portfolio companies are sold the committed capital is returned to the investor in the form of distributions (cash outflows from the point of view of the fund manager). In this paper, we refer to a "deal" as a single investment by the fund through which the fund participates in the underlying portfolio company. Thereby the deal size can range between 0 percent and 100 percent of the asset value.

In our analysis, we concentrate on single deals by such funds and on the cash flow between the portfolio company and the fund. To the best of our knowledge, we are the first to provide empirical evidence on this form of investment from an academic point of view.

Almost all of the previously mentioned forms of investment can be carried out using **debt or equity** financing. Our sample of infrastructure fund investments contains only equity investments since equity funds dominate the market.

From a theoretical perspective, however, infrastructure projects are expected to be debt-financed to a significant extent as ceteris paribus, the agency cost of debt is lower compared to non-infrastructure projects. According to the Free Cash Flow Hypothesis, a high level of debt has a disciplinary effect on managers and prevents them from investing in negative net-present-value (NPV) projects (Jensen 1986). Sawant (2010b, pp. 73-81) argues that this mechanism is particularly relevant for infrastructure assets. First, they allegedly provide stable cash flows that can be used to cover a higher level of debt obligations. Second, infrastructure assets have fewer growth options. This further hinders management from over-investing in negative NPV projects, as investment decisions can be monitored more easily by external claimholders.
In the next section we propose eight hypotheses on commonly held infrastructure-specific characteristics that we will test with our data of equity fund investments in Section 5.

## 3. Hypotheses

Infrastructure is often referred to as a new asset class in the context of asset allocation . However, this is not a universally held belief. In fact, there is no academic consensus on the exact definition of an "asset class". However, most publications on infrastructure investments agree that such investments exhibit special investment characteristics. We do not address the question of whether infrastructure investment is an asset class in this paper. Instead, we analyse equity infrastructure fund investments to determine whether this form of investment offers unique investment characteristics by analysing whether the most commonly postulated characteristics can be observed empirically at the deal level.

Infrastructure companies often operate in monopolistic markets or show properties of natural monopolies. It is intuitive that such companies also exhibit specific financing and investment characteristics based on their special economic characteristics. We group our eight infrastructure-specific hypotheses (H1, H2, …, H8) into three classes: asset characteristics, risk-return profile, and performance drivers

### 3.1 Asset characteristics

*H1: Infrastructure investments have a longer time horizon than non-infrastructure investments.*
This intuitive hypothesis is based on the aforementioned long life spans of the underlying infrastructure assets (see Section 2.2). Thus we expect that on average, investors hold infrastructure investments for longer than non-infrastructure investments to mimic the long-term asset characteristic.

*H2: Infrastructure investments require more capital than non-infrastructure investments.*
Infrastructure assets are large and require a high amount of capital when being acquired (Sawant 2010b). Therefore one would expect that on average, investments in such assets require a high amount of capital, too. Specifically, we expect that investors commit more capital per infrastructure deal than per non-infrastructure deal.





### 3.2 Risk-return profile

*H3: Infrastructure investments provide stable cash flows.*
The special economic characteristics result in inelastic and stable demand for infrastructure services (Sawant 2010b, p. 35). This intuitively supports the claim that infrastructure assets are bond-like investments with stable and thus predictable cash flows. We would like to stress that the economic characteristics of infrastructure assets also imply special regulatory and legal characteristics. For example, a regulated natural monopoly with rate-of-return regulation may provide stable cash flows and returns by law (Helm and Tindall 2009, p. 414). A similar case is that of a contract-led project, for example for a power plant, whereby a long-term power purchase agreement enables the operator of the plant to forecast output and cash flows far into the future (Haas 2005, p. 8). Of course, this stability only holds if the contract partner does not default and if legal or regulatory conditions do not change.

*H4: Infrastructure investments are low-risk and low-return investments.*
Despite high political risk, it is often stated that infrastructure investments have low risk from an investor's point of view and thus low default rates (Inderst 2009, p. 7). Due to low risk, investors require a low return in compensation. We measure risk by historical default frequency. The multiple and total internal rates of return (IRR) are applied as measures of return. Therefore, we expect lower default frequencies and lower multiples and IRRs for infrastructure deals than for non-infrastructure deals.

*H5: Within infrastructure investments there is a different risk-return profile between greenfield and brownfield investments.*
This is because greenfield investment assets face a relatively high level of business risk, including construction risk, uncertain demand, and specific risks in the early years after privatizations. For development projects or projects in emerging markets, total return consists mostly of capital growth with a premium for associated risk factors. Investment in the construction phase of a toll road is one example of a development stage infrastructure asset, with initial investors taking construction and, possibly, traffic demand risk.

In contrast, brownfield investments – referring to infrastructure assets that are established businesses with a history of consistent and predictable cash flows – are perceived to be the lowest-return and lowest-risk sector of infrastructure investing. Demand patterns, regulatory conditions and industry dynamics are well understood or at least predictable. An existing toll road is a good example of this kind of infrastructure investments. Once it has been in operation for two or three years, it is likely to have an established, steady traffic profile (Buchner et al. 2008, p. 46). Therefore we expect brownfield investments to offer lower default frequencies as well as lower returns on average.

### 3.3 Performance drivers

*H6: Overinvestment has lowered returns on infrastructure investments.*
There is empirical evidence for an effect called "money chasing deals" in private-equity investments at the deal level (Gompers and Lerner, 2000) as well as at the fund level (Diller and Kaserer, 2009). This means that private equity can be subject to overinvestment, so that asset prices go up and performance goes down. Since the infrastructure deals in our data are made by private-equity funds, we expect that overinvestment in the broader private equity market entails overinvestment for infrastructure deals. We therefore expect that capital inflows into the private equity market lower the subsequent returns not only of non-infrastructure deals but also of infrastructure deals.

*H7: Infrastructure investments provide inflation-linked returns.*

Owners or operators of infrastructure assets often implement ex ante an inflation-linked revenue component. This enables them to quickly pass through cost increases to the users of the infrastructure assets and thus maintain profit margins and levels of returns. If non-infrastructure companies do so less quickly, we expect infrastructure deals to be more positively influenced by the level of inflation. In the case of natural monopolies, pricing power can also be a source of inflation-linked returns (Martin 2010, p. 23). However, due to regulation it is not totally clear to what extent infrastructure providers are allowed to adjust prices for inflation or exert market power.

*H8: Infrastructure investments provide returns uncorrelated with the macroeconomic environment.*

Due to the stable demand for infrastructure services outlined in H3 above, revenues from infrastructure services are not correlated to fluctuations in economic growth. Therefore we expect infrastructure investments to provide returns that are less correlated with macroeconomic developments than non-infrastructure investments. As a corollary, we expect infrastructure investments to be uncorrelated to the performance of other asset classes such as public equity markets. The latter correlation also gives an indication of the market risk of the investment. The sensitivity of returns to a market index as a proxy for the overall investable market is an important parameter in the choice of financial portfolios. Once again, regulation can influence both relationships, though it is not clear in what direction.

### 3.4 Other performance drivers

Apart from infrastructure-specific hypotheses we also examine differences in regions of investment and industry sectors. Within the infrastructure sector, these variables can, for example, show the differing regional characteristics of the infrastructure market or show how homogenous the sector is across infrastructure assets. Since infrastructure assets have special economic characteristics, we also expect that these and other factors show different impacts on performance compared to non-infrastructure assets.

## 4. Data

Before testing our hypotheses as well as regional and sector-related characteristics, we give a comprehensive overview of the underlying data.

### 4.1 Data source

The dataset used for the empirical analysis is provided by the Center for Private Equity Research (CEPRES), a private consulting firm established in 2001 as a spin-off from the University of Frankfurt. Today it is supported by Technische Universität München and Deutsche Bank Group. A unique feature of CEPRES is the collection of information on the monthly cash flows generated by private equity deals.

CEPRES obtains data from private-equity firms that make use of a service called "The Private Equity Analyzer". Participating firms sign a contract that stipulates that they are giving the correct cash flows (before fees) generated for each investment they have made in the past. In return, the firm receives statistics such as risk-adjusted performance measures. These statistics are used by the firm internally for various purposes like bonus payments or strengths/weaknesses analysis. Importantly, and unlike other data collectors, CEPRES does not benchmark private equity firms to peer groups. This improves data accuracy and representativeness as it eliminates incentives to manipulate cash flows or cherry-pick past investments. In 2010, this programme has reached coverage of around 1,200 private-equity funds including more than 25,000 equity and mezzanine deals worldwide. Earlier versions of this dataset have been utilized in previous studies. For this paper, CEPRES granted us access to all liquidated investments in their database as of September 2009. We thus have access to a comprehensive and accurate





panel of total cash flow streams generated by infrastructure and non-infrastructure private-equity investments. This unique feature enables us to construct precise measures of the investment performance, which is essential for comparing the risk, return and cash flow characteristics of infrastructure and non-infrastructure investments.

### 4.2 Sample selection

We eliminate mezzanine deals and all deals that are not fully realized yet. By doing this we can concentrate on cash flows of pure equity deals that actually occurred and do not have to question the validity of valuations for deals that have not had their exit. Our data contain deals that have had their initial investment and final exit between January 1971 and September 2009. We split the remaining sample into infrastructure and non-infrastructure deals according to an infrastructure definition following Bitsch et al. (2010). Hereby, infrastructure deals are defined as investments in physical networks within the following sectors: Transport (including aviation,

Table 1: Split of infrastructure sample into industry sectors and stages of investment

| **Sector** (sub-sector) | **Region / stage of investment** | **Percentage of total within infrastructure sample** (broken down by region/stage) |
|---|---|---|
| **Alternative energy** (renewable electricity) | | **3.6** |
| | Asia | 7.7 |
| | Europe | 46.2 |
| | North America | 30.8 |
| | Rest of World/Unspecified | 15.4 |
| | | 100.0 |
| | Venture capital | 23.1 |
| | Private equity | 76.9 |
| | | |
| **Transport** (aviation, railway, road- and marine Systems) | | **12.9** |
| | Asia | 23.4 |
| | Europe | 48.9 |
| | North America | 23.4 |
| | Rest of World/Unspecified | 4.3 |
| | | 100.0 |
| | VC | 17.0 |
| | PE | 83.0 |
| | | |
| **Natural resources & energy** (oil, gas, tele-heating, electricity) | | **24.8** |
| | Asia | 6.7 |
| | Europe | 53.3 |
| | North America | 23.3 |
| | Rest of World/Unspecified | 16.7 |
| | | 100.0 |
| | VC | 46.7 |
| | PE | 53.3 |
| | | |
| **Telecommunication** (data transmission, navigation systems) | | **58.7** |
| | Asia | 4.7 |
| | Europe | 37.1 |
| | North America | 56.3 |
| | Rest of World/Unspecified | 1.9 |
| | | 100.0 |
| | VC | 65.3 |
| | PE | 34.7 |
| | | |

railway, road and marine systems), Telecommunication (including data transmission and navigation systems), Natural resources and energy (including oil, gas, tele-heating and electricity) and Renewable energy (renewable electricity). Social infrastructure such as schools, hospitals etc. are not included in our definition.

### 4.3 Descriptive statistics

After the sample selection process, the final sample contains 363 infrastructure and 11,223 non-infrastructure deals. As Franzoni et al. (2010) point out, the total CEPRES database can be considered representative for the global private-equity market. Differences between the infrastructure and non-infrastructure sample could thus reveal specifics of the infrastructure market.

Table 1 and Table 2 provide details on industry sectors, stages of investment and regions of investment. Table 1 shows that within the infrastructure sub-sample, the sector Telecommunication dominates (58.7 percent) followed by Natural resources & energy (24.8 percent), Transport (12.9 percent), whereas the number of Alternative energy deals is rather marginal (3.6 percent).

Table 2 shows a slight majority of venture capital (VC)over private equity (PE) deals (52.9 percent versus 47.1 percent) in the infrastructure sample. The dominance of venture capital is stronger in the non-infrastructure sectors (58.1 percent versus 41.9 percent). From Table 2 we also see that for the infrastructure market, European deals are as frequent as North American deals in our sample, whereas North-American deals clearly outnumber European deals in the non-infrastructure sub-sample. For comparison, the most comprehensive publicly-available private equity datasets Thomson Venture Expert and Capital IQ show that the overall private-equity market is largely dominated by North American deals (Lopez de Silanes et al. 2009, p. 9). Compared to that, European deals occur relatively more frequently in the infrastructure market as shown in Table 2, which reflects that the European market for infrastructure is more mature than the US market (OECD 2007, p. 32).

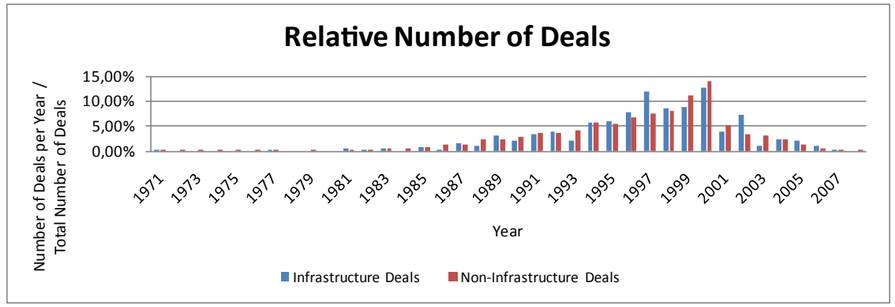
Table 2: Split of samples into regions and stages of investment (percent of total)

| **Region of investment** | **Percentage of deals within infrastructure sample** (broken down by stage) | **Percentage of deals within non-infrastructure sample** (broken down by stage) |
|---|---|---|
| **All regions** | **100.0** | **100.0** |
| … Venture capital | 52.9 | 58.1 |
| … Private equity | 47.1 | 41.9 |
| **Asia** | **7.7** | **6.1** |
| VC | 39.3 | 57.2 |
| PE | 60.7 | 42.8 |
| **Europe** | **43.0** | **34.3** |
| VC | 50.6 | 33.9 |
| PE | 49.4 | 66.1 |
| **North America** | **43.0** | **57.8** |
| VC | 61.5 | 73.4 |
| PE | 38.5 | 26.6 |
| **Rest of World/Unspecified** | **6.3** | **1.8** |
| VC | 26.1 | 30.4 |
| PE | 73.9 | 69.6 |





Figure 2. Distribution of deals over the sample period




Notes: The figure shows the number of deals per year of initial investment relative to the total number of deals in the whole sample period, for each sub-sample (infrastructure and non-infrastructure deals).

Table 3a. Duration of deals (in months)

| Measure | Infra deals | Non-infra deals | Significance |
|---|---|---|---|
| Average | 48.90 | 50.83 | — |
| Median | 41.00 | 46.00 | * |
| Standard deviation | 33.67 | 33.72 | |
| Minimum | 1.00 | 1.00 | |
| Maximum | 187.10 | 339.00 | |

Notes: Column "Significance" indicates whether the difference between the infrastructure and the non-infrastructure sample is significant, as measured by the test for difference in mean as well as on the non-parametric test for the equality of medians. *, **, *** denote significance at the 10-, 5- and 1-percent levels, respectively; — denotes non-significance.

Finally, Figure 2 shows the frequencies of deals per year as a percentage of the total number of deals, thereby distinguishing between infrastructure and non-infrastructure deals.

## 5. Empirical results

We now turn to the empirical results. We use the data described above to test the hypotheses outlined in Section 3.

### 5.1 Asset characteristics

*H1:* In order to test the hypothesis that infrastructure investments have longer time horizons, we look at the differences in duration of the deals. We expect that infrastructure deals have longer average durations compared to the non-infrastructure deals. The results in Table 3a show, however, that this is not the case, so we reject the hypothesis. We even find a shorter average duration for infrastructure deals (48.90 months) than for non-infrastructure deals (50.83 months) but the difference is not statistically significant. The finding that the time horizon of infrastructure deals is generally no longer than that of non-infrastructure deals also holds for the median. It also holds across stages of investment as illustrated in Table 3b.

Table 3b. Duration of deals by stage (in months)

| | Venture capital | | | Private equity | | |
|---|---|---|---|---|---|---|
| Measure | Infra | Non-infra | Significance | Infra | Non-infra | Significance |
| Average | 45.85 | 48.04 | — | 52.46 | 54.70 | — |
| Median | 37.00 | 43.00 | — | 45.00 | 49.00 | — |
| Standard deviation | 33.30 | 33.24 | | 33.85 | 34.00 | |
| Minimum | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Maximum | 187.00 | 219.00 | | 150.00 | 339.00 | |

Notes: See Table 3a.

Table 4b. Size of deals by stage of investment (in million USD)

| | Venture capital | | | Private equity | | |
|---|---|---|---|---|---|---|
| Measure | Infra | Non-infra | Significance | Infra | Non-infra | Significance |
| Average | 11.9 | 5.7 | *** | 33.9 | 16.7 | — |
| Median | 4.7 | 2.9 | ** | 9.6 | 6.1 | *** |
| Standard Deviation | 18.3 | 9.4 | | 114.2 | 35.9 | |
| Minimum | 0.0 | 0.0 | | 0.03 | 0.0 | |
| Maximum | 146.0 | 148.0 | | 1,401.9 | 952.0 | |

Notes: See Table 4a.

Table 4a. Size of deals (in million USD)

**Table 4a. Size of deals (in million USD)**

| Measure | Infra deals | Non-infra deals | Significance |
|---|---|---|---|
| Average | 22.2 | 10.3 | *** |
| Median | 6.9 | 3.9 | *** |
| Standard Deviation | 80.1 | 24.9 | |
| Minimum | 0.0 | 0.0 | |
| Maximum | 1,401.9 | 952.0 | |

Notes: Column "Significance" indicates whether the difference between the infrastructure and the non-infrastructure sub-sample is significant, as measured by the test for difference in mean as well as on the non-parametric test for the equality of medians. A minimum deal size of 0.0 represents a deal size of less than 100,000 USD. *, **, *** denote significance at the 10-, 5- and 1-percent levels, respectively; — denotes non-significance.

This finding is surprising, considering the long average life span of infrastructure assets (Rickards 2008). In this regard, it is worth pointing out that our sample contains deals done by private-equity-type funds which typically have a duration of 10 to 12 years (Metrick and Yasuda 2010, p. 2305), constraining the time horizon of the investment. Typically, the life of an infrastructure asset will continue after the exit of the fund and thus can be much longer. Nevertheless, our finding is important. As most infrastructure funds raised nowadays have a typical private equity-type construction, the average duration of infrastructure deals of around four years shows that these funds do not typically incorporate the longevity of infrastructure assets.

*H2*: As frequently stated, infrastructure assets require large and often up-front investments (Sawant 2010b, p. 32). As we do not have information on the total size of the infrastructure assets in our data,

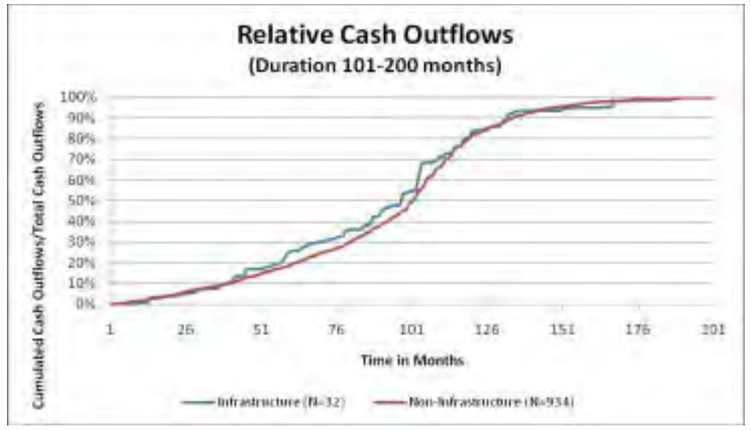




Figure 3a. Time profile of cash outflows from infrastructure and non- infrastructure deals: Shorter deals (1-100 months)


Notes: The figure shows the structure of the average cumulated capital outflows of the infrastructure and non-infrastructure deals over time.

Figure 3b. Time profile of cash outflows from infrastructure and non- infrastructure deals: Longer deals (101-200 months)




Notes: See Figure 3a.

we approximate capital requirement by deal size of the investments. Thereby, deal size measures the sum of all cash injections of a fund into the portfolio company between the initial investment and the exit. This is not equal to the size of the whole infrastructure asset. It just measures the size of the stake a single fund takes in the asset. Deal size provides a good indication for capital requirement assuming that on average, deal size increases with the size of an asset.

The results in Tables 4a and 4b show that infrastructure deals are, on average, more than twice the size of non-infrastructure deals. The larger size of infrastructure deals holds individually in each sub-sample, i.e. for venture capital and private equity deals. We therefore do not reject the hypothesis that infrastructure deals are larger than non-infrastructure deals.

### 5.2 Risk-return profile

*H3*: We now turn to the analysis of the variability of the infrastructure and non-infrastructure deal cash flows. In general, it is argued that infrastructure assets are bond-like investments that provide stable and predictable cash flows. Therefore, we would expect the sub-sample of infrastructure deals to exhibit lower cash flow variability than the non-infrastructure deals.

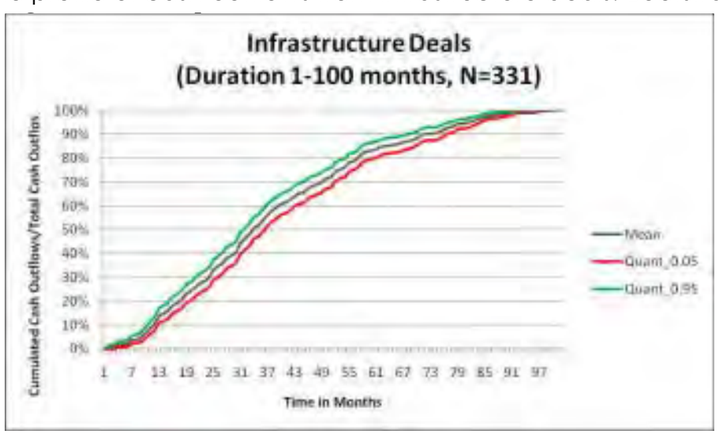
In order to analyze this hypothesis, we first need to construct an appropriate measure of cash flow variability. A very simple approach would be to measure cash flow variability by the volatility of cash outflows of an investment (see e.g. Cumming and Walz, 2009). However, this simple approach would neglect the fact that cash outflows of infrastructure and non-infrastructure deals are typically not identically distributed over time.

This is illustrated in Figures 3a and 3b by the S-shaped structure of the average cumulated capital outflows of the infrastructure and non-infrastructure deals over time. This S-shaped structure implies that average capital outflows

Figure 4a. Time profile of cash outflows from non-infrastructure deals: Bootstrapping results


Notes: The figure shows the simulation results for the structure of the cumulated capital outflows over time applying a bootstrap simulation with 50,000 draws. The figure depicts the mean, the 5th percentile and 95th percentile for the sub-sample with duration of 1-100 months. The confidence bounds suggest that the average structures can be measured with high precision and hence, that the structures shown in Figures 3a and 3b are representative for the sample deals.

Figure 4b. Time profile of cash outflows from infrastructure deals: Bootstrapping results




Notes: See Figure 4a.





Table 5. Variability of infrastructure and non-infrastructure cash outflows (in percent), by duration of deals

| | Full sample | | | Duration 1-100 months | | | Duration 101-200 months | | |
|---|---|---|---|---|---|---|---|---|---|
| Measure | Infra | Non-infra | Sign. | Infra | Non-infra | Sign. | Infra | Non-infra | Sign. |
| Average | 13.21 | 12.96 | — | 13.44 | 13.25 | — | 11.63 | 10.95 | — |
| Median | 8.60 | 9.07 | — | 8.71 | 9.44 | — | 7.95 | 7.04 | — |
| Standard Deviation | 11.15 | 10.67 | | 11.37 | 10.77 | | 8.82 | 10.09 | |
| Minimum | 0.26 | 0.22 | | 0.26 | 0.22 | | 1.41 | 0.38 | |
| Maximum | 81.93 | 75.10 | | 81.93 | 75.10 | | 37.71 | 63.14 | |

Notes: The table displays the variability of cash outflows (in percent) for the full sample as well as separately for the sub-samples of shorter deals and longer-lasting deals. Column "Sign." indicates whether the difference between the infrastructure and non-infrastructure samples is significant, as measured by the test for difference in mean as well as on the non-parametric test for the equality of medians. *, **, *** denote significance at the 10-, 5- and 1-percent levels, respectively; — denotes non-significance.

Table 6a. Historical default frequencies (in percent)

| Measure | Infra | Non-infra | Sign. | VC | PE | Sign. |
|---|---|---|---|---|---|---|
| Multiple = 0 | 14.60 | 18.84 | *** | 25.85 | 8.87 | *** |
| Multiple < 1 | 33.06 | 46.74 | *** | 58.60 | 29.82 | *** |

Notes: "Multiple = 0" is the percentage of deals that were complete write-offs. "Multiple < 0" is the percentage of all loss-making deals. Column "Sign." displays the significance of the Chi-square test for independence between the infrastructure and the non-infrastructure sub-sample and between the VC and the PE sub-sample, respectively. *, **, *** denote significance at the 10-, 5- and 1-percent levels, respectively.

Table 6b. Historical default rates (in percent), by sector and investment stage

| Investment stage | Venture Capital | | | Private Equity | | | Significance VC *versus* PE | |
|---|---|---|---|---|---|---|---|---|
| Sector | Infra | Non-infra | Sign. | Infra | Non-infra | Sign. | Infrastructure | Non-infrastructure |
| Multiple = 0 | 22.92 | 25.93 | *** | 5.26 | 9.00 | *** | *** | *** |
| Multiple < 1 | 45.31 | 58.95 | *** | 19.30 | 30.20 | *** | *** | *** |

Notes: See Table 6a. The last two columns display, separately for infrastructure and non-infrastructure deals, the significance of the Chi-Square test for independence between the VC and the PE sub-samples.

are not stable over time; otherwise the function would be linear. Therefore, the dispersion around a constant mean is not an appropriate measure of cash flow variability.

A more appropriate measure of variability must account for the time-dependent means. We do this by measuring the cash flow volatility by the dispersion of the deal cash flows around the average structures given in Figures 3a and 3b. We use the infrastructure-specific average structure for calculating the variability of cash flows of infrastructure deals and use the non-infrastructure-specific average structure for non-infrastructure deals. This approach is only valid if the average structures shown in Figures 3a and 3b are representative of the sample deals. We verify this by a bootstrap simulation. The simulation results show that the mean structures can be measured with high precision, as indicated by the confidence bounds in Figures 4a and 4b.

Table 5 shows the empirical results. To account for the different durations of our sample deals, we construct two different cases: 1-100 denotes sample deals that have a duration between 1 and 100 months; 101-200 denotes

sample deals with a duration between 101 and 200 months. Using our measure of cash flow variability introduced above, we calculate the cash flow volatility for each of the deals in our samples. The cross-sectional means reported in Table 5 do not indicate that infrastructure investments offer more stable (in the sense of predictable) cash (out-) flows than non-infrastructure investments. In fact, the average and median variability of the infrastructure deals is even slightly higher for most sub-samples. But these differences are not statistically significant. Also, in a regression with the measure of variability as the dependent variable, we could not find evidence for a statistically significant difference between infrastructure and non-infrastructure deals. Therefore, we reject the hypothesis that infrastructure fund investments offer more stable cash flows than non-infrastructure fund investments.

H4: Infrastructure assets are generally regarded as investments that exhibit low levels of risk. We analyze this hypothesis by comparing the default frequencies of infrastructure investments with those of non-infrastructure investments. We measure default frequencies by the fraction of sample deals with a multiple equal to zero and by the fraction of deals with a multiple smaller than one. The first variable gives the proportion of complete write-off deals in the samples. The second variable indicates the proportion of deals where money was lost, i.e., the cash return from the investment was smaller than the cash the fund had injected into the portfolio company.

Overall, our results suggest that infrastructure deals show lower default frequencies. Table 6a reveals that there is a significant difference in default rates between infrastructure and non-infrastructure deals for both measures applied. In addition, Table 6b shows that this is also the case for sub-samples of venture capital and private equity deals. These findings support the hypothesis that infrastructure investments show relatively low default rates (Inderst 2009, p. 7).

As infrastructure deals show relatively low levels of risk compared to non-infrastructure deals, the traditional view

Table 7a. Returns on investment

| **IRR (percent)** | **Infra** | **Non-infra** | **Sign.** | **VC** | **PE** | **Sign.** |
|---|---|---|---|---|---|---|
| Average | 66.88 | 20.15 | *** | 7.41 | 41.36 | *** |
| Median | 18.74 | 6.02 | *** | -20.01 | 25.47 | *** |
| Standard Deviation | 299.71 | 197.21 | | 224.34 | 162.33 | |
| Minimum | -100.00 | -100.00 | | -100.00 | -100.00 | |
| Maximum | 3,503.80 | 4,870.08 | | 4,870.00 | 4,533.97 | |
| **Multiple** | | | | | | |
| Average | 2.69 | 2.46 | — | 2.13 | 2.93 | *** |
| Median | 1.69 | 1.13 | *** | 0.40 | 1.98 | *** |
| Standard Deviation | 3.71 | 4.55 | | 4.73 | 4.18 | |
| Minimum | 0.00 | 0.00 | | 0.00 | 0.00 | |
| Maximum | 40.26 | 50.00 | | 49.92 | 50.00 | |

Notes: Descriptive statistics on IRR and multiple of infrastructure (infra) versus non-infrastructure (non-infra) deals and venture capital (VC) versus private equity (PE) deals. Column "Sign." displays the significance of the test for difference in mean as well as of the non-parametric test for the equality of medians between the infrastructure and the non-infrastructure sub-sample and between the VC and the PE sub-sample, respectively. *, **, *** denote significance at the 10-, 5- and 1-percent levels, respectively; — denotes insignificance.

Table 7b. Returns on investment by sector and investment stage

| | **Venture capital** | | | **Private equity** | | | **Significance VC *versus* PE** | |
|---|---|---|---|---|---|---|---|---|
| **IRR (percent)** | Infra | Non-Infra | Sign. | Infra | Non-Infra | Sign. | Infrastructure | Non-infrastructure |
| Average | 45.73 | 6.27 | * | 90.68 | 39.54 | ** | * | *** |
| Median | 5.00 | -21.94 | *** | 36.06 | 25.16 | *** | *** | *** |
| Standard Deviation | 305.93 | 221.39 | | 291.64 | 155.28 | | | |
| Minimum | -100.00 | -100.00 | | -100.00 | -100.00 | | | |
| Maximum | 2,224.88 | 4,870.08 | | 3,503.79 | 4,533.97 | | | |
| **Multiple** | | | | | | | | |
| Average | 2.17 | 2.13 | — | 3.27 | 2.92 | * | *** | *** |
| Median | 1.15 | 0.38 | *** | 2.47 | 1.96 | ** | *** | *** |
| Standard Deviation | 4.14 | 4.75 | | 3.03 | 4.21 | | | |
| Minimum | 0.00 | 0.00 | | 0.00 | 0.00 | | | |
| Maximum | 40.26 | 49.92 | | 22.78 | 50.00 | | | |

Notes: See Table 7a. The last two columns display, separately for infrastructure and non-infrastructure deals, the significance of the tests for difference in mean and for the equality of medians between the VC and the PE sub-sample.

Table 8. Regression results: All deals

| **Model 1: OLS (all deals)** | | | **Model 2: Probit (all deals)** | | |
|---|---|---|---|---|---|
| Dependent variable: IRR | | | Dependent variable: DEFAULT | | |
| Variable | Coefficient (t-statistic) | | Variable | Coefficient (z-statistic) | |
| LN_GENERATION | 0.67 | | LN_GENERATION | 0.02 | |
| | (0.91) | | | (0.93) | |
| LN_FUNDSIZE | -1.64 | ** | LN_FUNDSIZE | -0.06 | ** |
| | (-2.47) | | | (-2.49) | |
| PE | 22.27 | *** | PE | -0.42 | *** |
| | (14.30) | | | (-7.73) | |
| LN_NUMBER | -31.58 | *** | LN_NUMBER | 1.22 | *** |
| | (-35.35) | | | (32.92) | |
| LN_DURATION | 26.74 | *** | LN_DURATION | -1.23 | *** |
| | (52.25) | | | (-38.90) | |
| LN_SIZE | 2.85 | *** | LN_SIZE | 0.01 | |
| | (4.91) | | | (0.77) | |
| ASIA | 4.86 | * | ASIA | -0.19 | ** |
| | (1.87) | | | (-2.15) | |
| EUROPE | 20.77 | *** | EUROPE | -0.45 | *** |
| | (10.17) | | | (-6.48) | |
| INFRA | 12.15 | *** | INFRA | -0.36 | *** |
| | (3.76) | | | (-6.48) | |
| INFLATION | -1.89 | | INFLATION | 0.01 | |
| | (-1.42) | | | (0.16) | |
| GDP | 2.00 | *** | GDP | 0.080 | *** |
| | (3.14) | | | (3.21) | |
| PUBL_MKT_PERF | -0.001 | | PUBL_MKT_PERF | -0.002 | *** |
| | (-0.20) | | | (-4.16) | |
| RISKFREERATE | -3.98 | *** | RISKFREERATE | 0.09 | *** |
| | (-10.72) | | | (32.92) | |
| LN_COMMITTED_CAP | -13.00 | *** | LN_COMMITTED_CAP | 0.05 | * |
| | (-12.70) | | | (1.66) | |
| INVEST00 | -0.91 | | INVEST00 | 0.23 | *** |
| | (-0.49) | | | (3.67) | |
| CONSTANT | 40.05 | *** | CONSTANT | 0.90 | * |
| | (2.72) | | | (1.82) | |
| # observations | 8,607 | | # observations | 9,329 | |
| F(16, 8,591) | 513.15 | *** | LR chi2(15) | 4,627.09 | *** |
| Max. VIF | 3.31 | | Max. VIF | 3.21 | |
| R2 | 34.70% | | Pseudo R2 | 48.95% | |

Notes: Results of the regressions for the full sample (infrastructure and non-infrastructure deals). Model 1 is an OLS regression with the IRR as dependent variable using White's heteroscedasticity-consistent estimators. Model 2 is a Probit regression with the dummy variable DEFAULT as dependent variable. DEFAULT equals 1 for deals with a multiple of zero; and 0 otherwise. The independent variables are listed in the first column. The second column shows the non-standardized coefficients of each exogenous variable and the associated t-/z-statistics. The asterisks in the third column indicate the level of significance (*, **, *** significant at the 10-, 5- and 1-precent levels, respectively).

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is that their returns tend to be lower, too. Interestingly, the descriptive statistics in Tables 7a and 7b show higher average and median returns for the infrastructure deals, as measured by the investment multiples and internal rates of return (IRR). This result also holds for each of the VC and PE sub-samples, and most differences are statistically highly significant.

To further scrutinize these findings on differences in risk and return, we perform a regression of the IRR (Table 8, Model 1) and of the dummy variable DEFAULT (Table 8, Model 2) on several fund- and deal-specific variables as well as macroeconomic factors. For this purpose we eliminate deals at and above the 95th percentile of the IRR due to the high dispersion as can be seen in Tables 7a and 7b. The reasoning is that these outliers might be subject to data errors. Both regressions meet the standard OLS conditions and have high explanatory power with an R-squared of 34.70 percent and a Pseudo R-squared of 48.95 percent, respectively.

Model 1 confirms that infrastructure deals significantly outperform non-infrastructure deals, as can be seen in the positive coefficient of variable INFRA. In turn, Model 2 confirms that the likelihood of default is significantly smaller for infrastructure deals than for non-infrastructure deals (negative coefficient of variable INFRA).

One reason why we find higher return and lower risk might be that, in our analyses, we apply total cash flows and not operating cash flows and thus, we measure equity and not asset risk. As we will show later, there is evidence that infrastructure assets have higher leverage than non-infrastructure assets. Higher leverage, in turn, implies increased market risk and thus requires higher equity returns. However, as we do not know deal-specific leverage levels, we cannot infer whether the higher returns observed for infrastructure deals are just a fair compensation for higher market risk or whether they indicate true out-performance. It is nevertheless striking that we find higher returns and lower stand-alone risk for infrastructure investments.

*H5*: After having seen significant differences in risk and return between infrastructure and non-infrastructure deals, we now test whether greenfield and brownfield investments within the infrastructure universe exhibit different risk and return profiles. Our data do not contain the explicit information whether a portfolio company is a greenfield or brownfield investment. We approximate this by using the information whether a deal is a venture capital or private equity deal. Venture capital typically refers to deals involving portfolio companies at an early development stage. In contrast, private equity refers to deals involving portfolio companies at a later development stage. This approximation matches the typical descriptions of greenfield and brownfield investments (see Section 3 above). Beeferman (2008, p. 6) even defines greenfield and brownfield investments as early and late-stage investments, which makes the analogy to venture capital and private equity even more obvious. Therefore, taking VC and PE as an approximation for greenfield and brownfield seems to be a reasonable assumption.

We find that brownfield investments are less risky than greenfield investments. This is expressed by consistently and significantly lower default frequencies across sub-samples in Tables 8a and 8b. In addition, it is interesting to observe the significant difference in performance between greenfield and brownfield investments, as shown in Tables 7a and 7b. Brownfield investments show higher average and median performance, regardless whether measured by IRR or the multiple. The differences are statistically significant across sub-samples, too. These findings are consistent with other studies on private equity (e.g. the studies at fund level by Kaplan and Schoar 2005 and Ljungqvist and Richardson 2003). Similar to the comparison between infrastructure and non-infrastructure deals above, we find higher returns for the assets with lower risk.

The regression analysis in Table 8 enables us to check whether these significant differences remain when controlling

Table 9. Regression results: Infrastructure versus non-infrastructure deals

| **Model 3: OLS (infrastructure deals)** | | | **Model 4: OLS (non-Infrastructure deals)** | | |
|---|---|---|---|---|---|
| Dependent variable: IRR | | | Dependent variable: IRR | | |
| Variable | Coefficient (t-statistic) | | Variable | Coefficient (t-statistic) | |
| LN_GENERATION | 3.35 | | LN_GENERATION | 0.93 | |
| | (0.77) | | | (1.24) | |
| LN_FUNDSIZE | -1.73 | | LN_FUNDSIZE | -1.71 | ** |
| | (-0.47) | | | (-2.55) | |
| PE | 27.14 | *** | PE | 20.92 | *** |
| | (3.79) | | | (12.75) | |
| LN_NUMBER | -29.81 | *** | LN_NUMBER | -31.57 | *** |
| | (-7.37) | | | (-34.20) | |
| LN_DURATION | 26.50 | *** | LN_DURATION | 26.68 | *** |
| | (9.02) | | | (51.20) | |
| LN_SIZE | 2.24 | | LN_SIZE | 2.81 | *** |
| | (0.61) | | | (4.84) | |
| ASIA | 0.37 | | ASIA | 4.95 | * |
| | (0.04) | | | (1.84) | |
| EUROPE | 35.40 | *** | EUROPE | 19.57 | *** |
| | (3.07) | | | (9.28) | |
| INFRA_NAT_RES_ENERGY | 1.55 | | ___ | ___ | |
| | (0.19) | | | | |
| INFRA_TRANSPORT | 24.32 | ** | ___ | ___ | |
| | (2.18) | | | | |
| ___ | ___ | | NAT_RES_ENERGY | 8.21 | |
| | | | | (1.01) | |
| ___ | ___ | | INDUSTRIAL | 5.06 | *** |
| | | | | (3.20) | |
| ___ | ___ | | HEALTHCARE | 3.17 | |
| | | | | (1.05) | |
| ___ | ___ | | TELECOM | 0.82 | |
| | | | | (0.33) | |
| INFLATION | 3.29 | | INFLATION | -1.73 | |
| | (0.42) | | | (-1.28) | |
| GDP | 1.74 | | GDP | 2.09 | *** |
| | (0.66) | | | (3.22) | |
| PUBL_MKT_PERF | 0.13 | *** | PUBL_MKT_PERF | -0.005 | |
| | (3.74) | | | (-0.75) | |
| RISKFREERATE | -4.92 | ** | RISKFREERATE | -3.96 | *** |
| | (-2.60) | | | (-10.52) | |
| LN_COMMITTED_CAP | 3.82 | | LN_COMMITTED_C | -13.30 | *** |
| | | | AP | | |
| | (0.74) | | | (-12.67) | |
| INVEST00 | -19.01 | * | INVEST00 | 0.26 | |
| | (-1.67) | | | (0.14) | |
| CONSTANT | -152.13 | | CONSTANT | 42.17 | *** |
| | (-1.55) | | | (2.82) | |
| Number of observations | 269 | | Number of observations | 8,338 | |
| F(16, 252) | 23.05 | *** | F(18, 8,319) | 415.85 | *** |
| Max. VIF | 4.66 | | Max. VIF | 3.32 | |
| $R^2$ | 0.462 | | $R^2$ | 0.346 | |

Notes: Results of the OLS regressions for the infrastructure (Model 3) and the non-infrastructure sample (Model 4) with the IRR as dependent variable. Both use White's heteroscedasticity-consistent estimators. The independent variables are listed in the first column. The second column shows the non-standardized coefficients of each exogenous variable and the associated t-/z-statistics. The asterisks in the third column indicate the level of significance (*, **, *** significant at the 10-, 5- and 1-percent levels, respectively).

for a number of deal, fund and macroeconomic characteristics. Model 1 confirms that PE deals significantly outperform VC deals, as reflected by the positive coefficient of variable PE. Likewise, Model 2 confirms that the likelihood of default is significantly smaller for PE deals than for VC deals (negative coefficient of variable PE).

### 5.3 Performance drivers

As shown in Sub-section 5.2, we find significant differences in the performance of infrastructure and non-infrastructure deals. We now turn to the question which variables drive these results and how the drivers of performance differ between the infrastructure and non-infrastructure sub-samples. In order to address these questions, we again eliminate deals at the 95th percentile of the IRR and regress the IRR on several fund- and deal-specific variables as well as macroeconomic factors. However, we now perform separate regressions for the infrastructure and non-infrastructure sub-samples. For each sub-sample we include infrastructure- and non-infrastructure-specific dummy variables that control for the sector. The results of this exercise are shown in Models 3 and 4 in Table 9. Both regressions meet the standard OLS conditions and have high explanatory power with an R-squared of 46.2 percent and 34.6 percent, respectively.

*H6*: It has been shown in the literature that a high inflow of capital into the market for private equity at the time of investment drives up asset prices because of the increased competition for attractive deals. This, in turn, results in a poor performance of the deals, an effect that is often referred to as the "money chasing deals" phenomenon (Gompers and Lerner 2000; Diller and Kaserer 2009). In our regressions, capital inflows are measured by the variable LN_COMMITTED_CAP. Interestingly, the regression results indicate a clear difference between the two sub-samples. In particular, the coefficient for non-infrastructure deals (-13.30) is highly significant and negative, whereas the coefficient for infrastructure deals (3.82) is not significantly different from zero. This confirms that the capital inflows into private equity markets at the time of initial investment have a strong adverse influence on the performance of non-infrastructure deals. Since the same does not hold for infrastructure deals, we do not observe overinvestment in infrastructure fund investments caused by capital inflows into the private-equity market.

*H7*: It is commonly argued that infrastructure investments provide inflation-linked returns. The coefficient of the variable INFLATION is positive for the infrastructure sample (3.29) whereas it is negative for the non-infrastructure sample (-1.73). This would indicate evidence in favour of the hypothesis that infrastructure fund investments would provide a better inflation-linkage of returns than non-infrastructure investments. However, neither coefficient is statistically significant. This is in line with Sawant (2010b) who does not find a significant correlation between inflation and return for listed infrastructure stocks either. By contrast, Martin (2010), p. 24, finds that infrastructure can provide a long-term hedge against inflation for an investor provided the ongoing cash flows are at least partially linked to the price level.

*H8*: We can clearly reject the hypothesis that returns on infrastructure fund investments are uncorrelated to the performance of public equity markets. Models 3 and 4 in Table 9 show that the coefficient of the variable PUBL_MKT_PERF is positive (0.13) and statistically significant for the infrastructure sub-sample, whereas it is negative and not statistically significant for the non-infrastructure sub-sample. Therefore, the hypothesis of returns uncorrelated to equity markets holds for non-infrastructure deals but not for infrastructure deals. A special diversification benefit of infrastructure fund investments in the context of financial portfolio choice can thus not be confirmed.

On the other hand, the coefficient of the variable GDP is not statistically significant (albeit positive at 1.74) for the infrastructure sub-sample (Model 3) while it is positive (2.09) and statistically significant for the non-infrastructure sample (Model 4). This supports the hypothesis that infrastructure fund investments offer returns that are uncorrelated to the macroeconomic development.





### 5.4 Other performance drivers

Having tested all our infrastructure-specific hypotheses stated in Section 3, we now outline several other interesting findings from our regressions in Table 9.

**Interest rate sensitivity**. We find a negative influence of the short-term interest rate at the date of investment on performance. The coefficients for the variable RISKFREERATE are negative and statistically highly significant for both samples. This negative relationship has also been pointed out in earlier studies (e.g. Ljungqvist and Richardson 2003). In addition, we find that the coefficient for the infrastructure sample (-4.92) is more negative compared with that of the non-infrastructure sample (-3.96). That is, the performance of infrastructure deals is more sensitive to interest rate changes.

A possible explanation for this is that infrastructure investments have higher leverage ratios than non-infrastructure investments. This is intuitive since the cost of debt is usually directly related to the risk-free rate while this may not necessarily be true for the cost of equity. A higher cost of debt implies a higher cost of capital for a levered portfolio company, which implies a lower return, expressed by a lower IRR in our regression. Unfortunately, we do not have explicit information on leverage ratios in our data. However, the view that the higher regression coefficient for infrastructure deals reflects higher leverage ratios is supported by several other studies. For example, Bucks (2003) reports an average leverage of up to 83 percent in the water and energy sectors compared with 57 percent in other sectors in 2003. Ramamurti and Doh (2004, p. 161) report leverage of up to 75 percent in the infrastructure sector in general and Beeferman (2008, p. 9) lists average leverage ranging from 50 percent for toll roads and airports to 65 percent for utilities and even 90 percent for social infrastructure, all of which refer to the level of individual assets. Orr (2007, p. 7) reports an additional leverage of up to 80 percent at fund level whereby the source of returns comes, to a large proportion, from financial structuring. Helm and Tindall (2009, p. 415) identify the late 1990s as a time where the scale of leverage and financial engineering peaked, especially in the utilities sector. The following time of historically low interest rates combined with the benefit of tax shield effects and thus, a lower weighted average cost of capital also benefited the use of debt.

**Fund manager experience.** At fund level, the variable LN_GENERATION measures the number of funds the investment manager has operated prior to the current fund that invests in the specific deal. It may be seen as a proxy for the experience of the investment manager, which may be an important performance driver as several studies on private equity suggest (Achleitner et al. 2010). In contrast, our regression results reveal that the experience of the investment manager has no significant influence on either of the sub-samples in Models 3 and 4 in Table 9.

**Duration of deals.** At deal level, we can see that the duration of deals has a significant effect on returns in both sub-samples. The coefficients of the variable LN_DURATION are significant, positive and similarly large in value. The economic rationale behind this result is that badly-performing deals are typically exited more quickly than well-performing deals, such that deals with a longer duration also show a higher IRR (Buchner et al. 2010; Krohmer et al. 2009).

**Number of financing rounds.** A similar result is found for the variable LN_NUMBER. This variable measures the total number of cash injections a portfolio company has received from the fund and may be seen as a proxy for

the number of financing rounds. In our regression, the number of financing rounds has a significantly negative influence on performance in both sub-samples, i.e., the more often the fund manager invests additional equity into a deal, the lower the IRR. This is referred to as "staging" and is extensively discussed in the literature (Sahlmann 1990; Krohmer et al. 2009). Consistent with our results, Krohmer et al. (2009) argue that badly-performing companies need to "gamble for resurrection" more often in order to get additional cash injections from fund managers. Therefore, there is a negative relationship between number of financing rounds and performance.

**Deal size.** Models 3 and 4 in Table 9 show that the size of a non-infrastructure deal has a significant positive influence on its IRR, despite controlling for the fund size, whereas this is not the case for infrastructure deals. This is shown by a highly significant coefficient for LN_SIZE of 2.81 for the non-infrastructure and by an insignificant coefficient of 2.24 for the infrastructure sub-sample. Also Franzoni et al. (2010) find a positive influence of deal size on performance. They explain this effect with an illiquidity premium that is increasing in deal size. From a theoretical perspective, it is unclear why deal size should have an impact on performance. In this paper we cannot control for the illiquidity premium hypothesis mentioned by Franzoni et al. (2010). Furthermore, we cannot control to what extent deal size is a proxy for other performance-related variables such as deal risk or management experience. Hence, we can hardly explain this finding. Still, it is noteworthy that the size effect is not present in infrastructure deals.

**Regional differences.** In terms of regional influences, we observe that deals made in Europe – one of the most mature infrastructure markets besides Australia and Canada (OECD 2007, p. 32) – significantly outperform deals in other regions. Infrastructure deals show an even larger spread, with European infrastructure deals, on average, having an IRR that is 35.40 percentage points higher than in other regions as indicated by the dummy variable EUROPE. This effect is much smaller for European non-infrastructure deals with 19.57 percentage points. Lopez de Silanes et al. (2009) also report a higher performance for private-equity deals in Europe excluding the UK.

A rationale for this difference might be that Europe has seen the largest volume in privatizations, especially in the infrastructure sectors (e.g. Brune et al. 2004; Clifton et al. 2006, pp. 745-751). Therefore, the proportion of deals involving privatization is likely to be much higher in the sub-sample of European infrastructure deals than in the other sub-samples. Three explanations why such sales of assets from the public to private investors could have delivered higher returns include that i) a government or municipality might not have the objective to maximize the sale price of an asset, but instead tries to make the sale succeed in the first place; ii) management of newly privatized companies often negotiated large capital and operational expenditures with regulators before privatization but cut these expenditures back afterwards (Helm and Tindall 2009, pp. 420-421); and iii) after the formerly state-owned companies with low leverage were privatized, the new owners increased the leverage to lower the weighted average cost of capital and thus the return on the asset instead of using it for real capital investments (Helm 2009, p. 319).

Privatizations usually take place via private placements, tenders or fixed-price sales. Regarding the latter, there is empirical evidence that under-pricing is larger at privatizations than at private-company IPOs and larger in regulated than in unregulated industries (Dewenter and Malatesta 1997). These empirical and theoretical findings support the idea that there are higher returns for privatizations of infrastructure assets in Europe in general.

The same line of argument might also hold for our empirical finding of high returns of private equity-type infrastructure deals. Hall (2006, p. 8) points out the increasing importance of private equity and infrastructure funds as buyers of privatized companies in Europe, strengthening the link between our empirical findings and the mechanisms of privatization mentioned above.





**Differences in returns within the infrastructure sector.** The highly significant and positive coefficient of the variable TRANSPORT in Model 3 reveals that transport infrastructure assets (e.g. airports, marine ports or toll roads) exhibit IRRs above the average – and by a wide margin – while assets in Natural resources and energy do not. On average, deals in the transportion sector yield an IRR that is 24.32 percentage points higher than other infrastructure deals. The reason for this might be that the transportation sector is subject to a high degree of government intervention and thus, discretionary power (Yarrow et al. 1986, p. 340), while at the same time being less subject to independent regulation than other infrastructure sectors such as utilities. Indeed, Égert et al. (2009, p. 70) show in a survey that independent regulators are far less common in the transportation sector than in the electricity, gas, water or even telecommunication sectors. Less stability and credibility given by a regulatory framework, in turn, leads to higher investment uncertainty – including higher price and quantity risk – for which an investor requires a higher rate of return (Égert et al. 2009, pp. 31-32). The latter is in line with our empirical finding.

Within the non-infrastructure sample, we can see that a wider range of industries have a significantly higher IRR as shown by the variable INDUSTRIAL in Model 4. However, the coefficient is economically rather small.

## 6. Summary

We have scrutinized the risk- and return profile of unlisted infrastructure investments and have compared them to non-infrastructure investments. It is widely believed that infrastructure investments offer some typical financial characteristics such as long-term, stable and predictable, inflation-linked returns with low correlation to other assets. To some extent, our findings corroborate this view. However, we also document some results that are not in accordance with this perception.

By using a unique dataset of infrastructure and non-infrastructure deals made by private-equity-like investment funds, we have come up with the following results. First, in terms of risk differences between infrastructure and non-infrastructure deals, results are a bit mixed. We do not find any evidence supporting the hypothesis that infrastructure investments offer more stable cash (out-) flows than non-infrastructure investments. It appears to be true, however, that default risk – or downside risk more generally – is significantly lower in infrastructure investments than in non-infrastructure investments.

Second, as far as returns are concerned, we do find higher average and median returns for infrastructure deals, as measured by the investment multiples and internal rates of return. This result also holds when separating the sample into venture capital and private-equity deals, and most differences are statistically significant. This is an interesting finding as it contradicts the traditional view that infrastructure investments exhibit low levels of risk and, consequently, provide only moderate returns.

Third, there is some evidence that the higher average returns reflect higher market risk. For one thing, our sample contains only equity investments, and leverage ratios of infrastructure portfolio companies are higher than for their non-infrastructure counterparts. For another, returns to infrastructure fund investments are more strongly correlated with the performance of public-equity markets than returns to non-infrastructure fund investments.

Fourth, European infrastructure investments are found to have consistently higher returns than their non-European counterparts. We hypothesize that this might be related to the fact that Europe has seen the largest volume of privatizations, especially in the infrastructure sectors. It could well be that the ex ante return expectation in privatization transactions is higher, either because of defective privatization mechanisms or because of higher political risk. Concerning the latter, we find some evidence that the regulatory environment has an

impact on returns. Specifically, deals in the transportation sector have significantly higher returns than those in other infrastructure sectors, probably reflecting less independent regulation and hence, higher political risk in transportation as compared to the utilities or energy sectors.

Fifth, our empirical results do not support some other claims made in the literature. In particular, returns to infrastructure funds are not linked to inflation and do not depend on management experience, and their cash flow durations are not any different from those of non-infrastructure deals. It is also interesting to see that, unlike other venture capital and private-equity transactions, infrastructure investments do not appear to be subject to the so-called "money chasing deals" phenomenon.

Thus, the allegedly bond-like characteristics of infrastructure deals have not been confirmed. This is shown by the fact that infrastructure investments do not offer longer-term or more stable cash flows than non-infrastructure investments. The returns showing a positive correlation to public-equity markets and no inflation linkage also point to equity-like rather than bond-like characteristics.

Summing up, our paper supports the perception that infrastructure investments do have special characteristics that are of interest for institutional investors. Lower downside risk is certainly an important feature in this context. However, it is unlikely that the infrastructure market offers a free lunch. Even though it is true that returns have been attractive in the past, it cannot be ruled out that these returns are driven by higher market risk. Our results, offer some evidence in favour of this hypothesis. But a more general picture of the infrastructure market is still needed. Especially the influence of regulatory and political risk needs to be better understood. In this regard, our paper offers some limited evidence that can be used as a starting point for future research.

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# Investing in Distressed Debt

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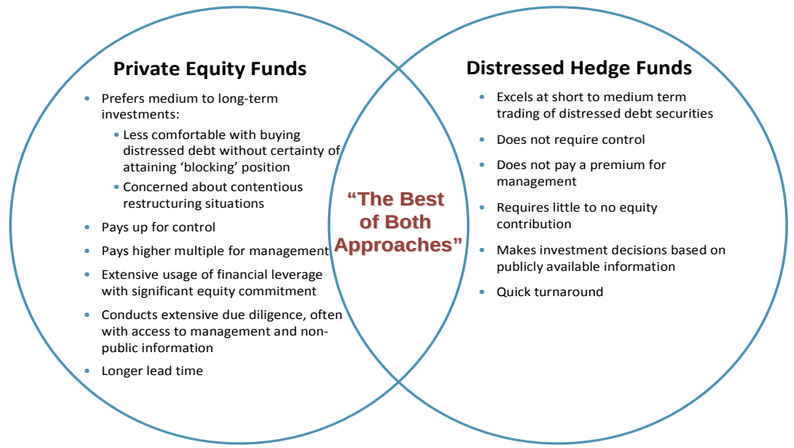



## An Increasingly Popular Sub-Asset Class

Over the past 20 years, distressed debt investing has become increasingly popular. The distressed debt market has increased in size – private equity firms and hedge funds have become key players. There are around 170 U.S. based, and 20-30 Europe based credit managers who invest in distressed debt. They manage $120-$150 billion of private capital (hedge funds and private equity – often they overlap). These funds are generally engaged in the business of originating, underwriting, syndicating, acquiring and trading, debt securities and loans in corporate borrowers.

Distressed managers have wide latitude to trade across the capital structure. Such securities may include bonds, debentures, notes, mortgage or other asset-backed instruments, equipment lease and trust certificates and commercial paper. They may also acquire positions in equity and equity-related securities, including preferred stock, convertible preferred stock, common stock and warrants. Very often securities in which distressed managers invest in may be publicly traded or privately placed. They may also purchase bank debt and trade claims or be invested in non-liquid securities or assets of distressed companies, which can frequently be purchased at a substantial discount to fundamental value.

We estimate that over the past few years, over $50 to $70 billion has been raised by dedicated distressed opportunity funds – the bulk of which was in 2008. At the end of 2010 around 38 funds were actively seeking around $30-$35 billion of private capital in the U.S. Consistent with investment activity, public and corporate pension plans, endowments and foundations, as well as fund of funds have been large

investors in the distressed sector. Many of these funds tend to have fairly broad mandates. They may trade in:

- Distressed and out of favor credits, including commercial and corporate loans and asset-backed securities,
- Residential sub-performing or non-performing loans and securities,
- Corporate and commercial loans, mezzanine loans and other investments in subordinate levels of the capital structure of issuers; such loans and investments may also include related warrants, options or other securities with equity characteristics,
- Publicly traded or privately negotiated equity securities (such as preferred stock, common stock and warrants) of stressed and distressed firms.

Opportunistic distressed debt is about making investments in situations in which companies are undergoing, or likely to undergo bankruptcies, or other extraordinary situations such as debt restructurings, reorganizations and liquidations outside of formal bankruptcy proceedings. Funds investing in distressed debt often become a major creditor of the underlying company through the purchase of low-priced bonds or other financial instruments. Similarly, they are, in many circumstances, able to exercise a certain degree of control in an underlying company through the acquisition of significantly discounted securities in order to enhance the value of such underlying company. In turn, during and after such underlying company's reorganization or restructuring, these funds are in a position to realize attractive gains through sales of restructured debt obligations, newly-issued securities and/or sale of its currently-held securities.

Traditional investors, who mainly seek to generate capital gains and investment returns through exposure to distressed debt investments, have been joined by strategic investors undertaking distressed M&A. The recent credit bubble with easy access to cheap credit and excessive debt leverage produced a robust seller's M&A market with seller-friendly M&A agreements and premium prices for target companies. These market conditions fueled the M&A market to historically lofty levels in terms of volume and number of transactions and peaked in Q3 '07. The credit crunch (which began in Q3 '07) and the global economic downturn have altered the M&A landscape dramatically and set the stage for distressed M&A. In 2008, volume of worldwide M&A activity decreased dramatically from 2007 levels. Highlighting the difficult deal making environment was a spike in the number of withdrawn M&A transactions, which hit an all-time record in 2008. Volume of financial sponsor-backed transactions reached its lowest level since 2003 and in the period following 2009 due to tightened credit markets ( for lower and middle market deals), deal and negotiating leverage has shifted from sellers to buyers (with excess equity capital). Looking forward in the next few years ahead, unprecedented opportunities for distressed M&A transactions may exist provided sellers and buyers alike recognize that historical M&A "market" and deal structure models may require modification in light of the unprecedented economic climate.

As corporate, legal and capital structures have grown more complex, the level of expertise and differentiation in 'style' of investment has kept pace. There are a variety of investor groups participating in the overall distressed market, including hedge funds, banks, investment banks, broker / dealers, mutual funds, credit corporations and strategic investors. However, the private corporate, distressed-securities asset class is populated by just a dozen participants with capital of at least $1 billion.

## Market Conditions

### Favorable Market Conditions in 2012

Until the onset of the credit crisis in 2007, the high yield markets were characterized by tightening spreads, low volatility, increasing leverage, reduced covenants, a growing collateralized debt obligations (CDO) market and an abundance of liquidity available to provide rescue financing. Spreads widened, defaults and default expectations increased as high yield issuers faced a number of challenges, including substantially declining revenue due to severe economic weakness, a lack of available funding, slowing consumer demand and generally over-leveraged balance sheets. Furthermore, due to financial market de-leveraging, credit spreads were driven as much by technicals as by deteriorating fundamentals.

Defaults and credit problems increase during cyclical downturns. When default rates increase, such as they had in 2009, there are likely to be more defaulted bonds available for sale. Of course, the high yield and distressed investing landscape has since changed rapidly with the market recovery of 2010. However, the demand for this paper is relatively inelastic, since large institution buyers are restricted from investing in them; the space largely remains the preserve of hedge funds and private equity funds. This provides opportunities for distressed debt investors to acquire paper at cheaper prices. The success of such investment activities depends to a significant degree on the fund manager's ability to identify and exploit inefficiencies in the markets for a wide range of opportunistic investments; corporate loan originations including mezzanine loans and other investments in subordinate levels of the capital structure, other stressed, distressed and out of favor credits.

### Supply of Distressed Investment Opportunities

Apart from occasional influxes from the investment grade and municipal bond markets, distressed investment opportunities typically include public and private high yield bonds, leveraged loans, second lien debt, mezzanine debt, convertible debt, trade claims, preferred stock and common equity of high yield companies that; (i) are likely to engage in a reorganization due to poor financial performance, (ii) are in a Chapter 11 or some other form of reorganization or (iii) have recently emerged from a reorganization proceeding.

The supply of distressed opportunities has traditionally been represented to the broader investment community as the recent history of, and near-term expectation for, defaulted high yield bonds. This thesis captures only a subset of the distressed marketplace and therefore greatly understates the true universe of opportunities available. Private placements, bank debt, second lien debt, mezzanine debt, other debt-like public and private securities, preferred stock and trade claims (collectively larger in size than the high yield market) are incremental to the high yield bond market. Furthermore, the life cycle of a distressed company, and therefore the investment opportunity, usually spans four to eight years, creating investment timing opportunities that substantially exceeds the initial default period.

### Distressed Debt Opportunities are Counter Cyclical and Sticky

As economies deteriorate, default rates tend to rise. Yet, even after default rates stabilize and then decline, the outstanding volume of defaulted or otherwise distressed debt remains elevated for some time because work outs take time. Currently, even though default rates have declined to low levels, the cumulated number of defaulted securities over the past three years is considerable, suggesting that opportunities in distressed debt investing still abound.

## Regulatory Conditions

The U.S. Insolvency Regime is supportive of distressed investors. Chapter 11 of the U.S. Bankruptcy Code is a law which was created to advance many goals, but in particular to (i) rehabilitate financially viable businesses, (ii) provide new capital including Debtor in Possession (DIP) loans to debtors; and, (iii) provide time and ability for the debtor company to reorganize its business.

The primary goals of the chapter 11 process are the rehabilitation of the debtor and the maximization of returns to all of the debtor's creditors. These dual goals guide a debtor's restructuring efforts and encourage the debtor to maximize the value of its bankruptcy estate through the financial and perhaps operational reorganization of its business. A debtor cannot always satisfy both goals, and in those instances, a liquidation of the debtor focusing solely on maximizing returns to creditors follows.

Importantly, Chapter 11 also provides very significant and important rights to creditors including the formation of Creditors Committees (and the hiring of advisers) to represent the interests of creditors, a formal plan process which requires affirmative acceptance by creditors and a requirement for equality of recovery among similarly situated creditors. It also requires maximization of business value, provides for proper distributions to creditors, as well as enhances transparency and disclosure on the business affairs of the debtor company to all creditors.

Chapter 11 provides relief, if agreed, from creditor claims for companies in financial distress. Large tax loss carry forwards, strict disclosure rules and clear debt restructuring rules further help in reorganizing distressed companies. In most other insolvency regimes, such as those of countries in Europe and Asia, there is no similar codified bankruptcy law – creditors often have significantly fewer legal rights along with non-timely information access. In Europe, bankruptcy is often intended to end rather than prolong the life of a company. In France, for instance, if a distressed company cannot find funding in 45 days, it is often forced to liquidate; there is no concept of Debtor in Possession (DIP) financing and companies can often take action without creditor support. Since insolvency law differs in other countries, some investors tend to prefer to invest in U.S. distressed situations.

The majority of corporate control transactions are conducted through the Chapter 11 bankruptcy process. This provides advantages to the buyer of distressed assets, for the bankruptcy process can potentially eliminate unfavorable contracts and other liabilities, which might otherwise limit the appeal of a transaction. Acquiring corporations, by utilizing the bankruptcy process to affect a relatively quick and inexpensive operational restructuring simultaneously with financial restructuring, are able to purchase valuable operating assets at attractive valuations. Additionally, the U.S. Bankruptcy Code allows an investor (strategic or otherwise) to purchase assets through several mechanisms, including a "Section 363 sale", which allows the purchaser to acquire specific assets free of any liens or liabilities, and without regard to creditor objections. Section 363 of the Bankruptcy Code provides a tool for distressed companies seeking to sell their assets and for buyers looking to purchase assets at potentially bargain prices.

### Distressed Securities Characteristics

Distressed securities are "below investment grade" obligations of issuers in weak financial condition, experiencing poor operating results, having substantial capital needs or negative net worth. Such securities are therefore considered speculative. They often face special competitive or product obsolescence problems and may be involved in bankruptcy or other reorganization and liquidation proceedings. These securities are often risky investments although they may offer the potential for correspondingly high returns. Often, it is difficult to obtain information as to the true condition of such issuers. Such investments may also be adversely affected by laws relating to, among other things, fraudulent transfers and other voidable transfers or payments, lender liability and the bankruptcy court's power to disallow, reduce, subordinate or disenfranchise particular claims.

A distressed debt investor purchases the debt of a financially troubled company at a discount against the face value of the debt. The investor seeks to make a profit on its investment primarily by reselling the debt, through recoveries in the restructuring process or by converting the debt into an equity position in the reorganized





debtor. The traditional intuitive definition of "distress" often refers simply to a company with too much debt and insufficient cash flow to service the debt.

However, more broadly speaking, financial distress may result from one or more of the following causes:

- Excessive leverage due to a variety of causes.
- Declining profitability.
- Loss of competitive position.
- Changing business climate, whether in an industry, region or specific market.
- Regional or global economic disruptions, such as during the recent financial crisis.
- Lack of access to funding markets.
- Litigation or regulatory difficulties, including

accounting improprieties, toxic torts or pollution control liabilities.

## Trading in Loan-to-Own Securities

- Loan-to-own transactions typically involve a secured loan accompanied by equity stake and various rights associated with equity ownership (e.g., board representation, registration rights) but not voting control.

- Goal is to enable investor to exert influence but avoid "controlling shareholder" or insider claims

- Documentation may contemplate subsequent chapter 11 or refinancing and provide investor significant rights in such circumstances.

- Potential issues with Loan-to-Own investments.

- Discharge of fiduciary duties by board of directors or management.

- Equitable subordination of investor's debt.

Does the transaction evidence investor's and borrower's intent that investor ultimately will be owner?
Were other creditors harmed by the transaction?

- Recharacterization of investor's debt as equity.

- Depends on nature of transaction and actions of parties.
- Generally not permitted where debt is held by true third party.

- Avoidance actions based on payments received by or collateral given to investor.

- Valuation - were other transactions sought and pursued?

## Trading by making a Tender Offer

- Acquirer may purchase debt securities of a target, and a target may purchase its own debt securities, pursuant to privately negotiated transactions, open market purchases or a tender offer.

- No clear definition of a "tender offer," but courts have identified the following characteristics in determining whether an open market purchase or series of purchases constitutes a tender offer subject to the Securities Exchange Act.

- Active and widespread solicitation of public security holders
- Solicitations for a substantial percentage of a class of securities
- Offers made at a premium to market price
- Firm, rather than negotiated, terms
- Purchases contingent upon the acquisition of a fixed number of securities
- Offer open for a limited period of time
- Pressure from acquirer on security holders to sell their stock
- Public announcement of an intent to gain control of the target, followed by a rapid accumulation of securities

- With care and planning, generally able to conduct a significant open market repurchase program and even substantial privately negotiated repurchases without triggering tender offer rules.

- Each negotiation independent of any other.
- Each seller sophisticated
- No attempt made to impose same terms on all sellers or to set any fixed deadline for responding
- Limited percentage of the securities purchased
- Limited advance public disclosure

- Compliance with anti-fraud and anti-manipulation restrictions requires that
- Acquirer may not purchase securities of a target (whether in privately negotiated transactions or pursuant to a tender offer) while in possession of material non-public information relating to such securities
- Company may not purchase its own securities while in possession of material non-public information relating to such securities

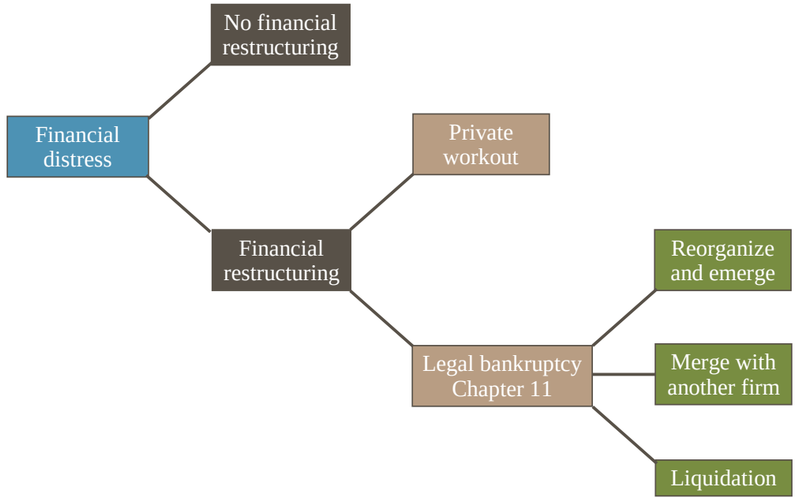
Meaningful opportunities in the distressed debt space tend to share one or more of the following characteristics (i) a capital structure and / or legal posture which suggests that any reorganization will be unusually contentious and protracted; (ii) obligations whose junior position in the capital structure suggest the possibility of total loss; (iii) dramatic events that place the entire enterprise value at risk; and (iv) complex problems with numerous critical variables and incomplete and / or unreliable information.

**Left Tail Characteristics**

Another point to note is the left tail characteristics of distressed investing. Distressed debt is characterized by heightened risk due to uncertainties surrounding businesses emerging from a bankruptcy process. In liquidation and other forms of corporate reorganization, there exists the risk that the reorganization either will be unsuccessful (due to, for example, failure to obtain requisite approvals), will be delayed (for example, until various liabilities, actual or contingent, have been satisfied) or will result in a distribution of cash or a new security the value of which will be less than the purchase price.

These risks can often be compounded by the illiquidity of distressed assets. Indeed, investors can face unexpectedly high bid-ask spreads when trying to liquidate distressed positions. Key risk measures such as the likelihood of insolvency, value at risk, and expected tail loss of bid-ask spreads tend to widen just when positions must be liquidated - thus triggering additional losses.

## What Happens in Financial Distress?




**Source:** Karen H. Wruck, "Financial Distress: Reorganization and Organizational Efficiency," Journal of Financial Economics, 27 (1990), Figure 2.





## Liquidation

- Liquidation is a distressed firm's most drastic alternative, and it is usually pursued only when voluntary agreement and reorganization cannot be successfully implemented.
- In liquidation, the company's assets are sold and the proceeds are used to satisfy claims.
- The priority of satisfaction of claims is as follows:
  - Secured creditors
  - Bankruptcy administrative costs
  - Post petition bankruptcy expenses
  - Wages of workers owed
  - Employee benefit plan contributions owed
  - Unsecured customer deposits
  - Federal, state, and local taxes
  - Unfunded pension liabilities (Limit is 30% book value of preferred and common equity; the remainder becomes an unsecured claim)
  - Unsecured claims
  - Preferred stockholders (up to the par value of their stock)
  - Common shareholders

**Value generation and distribution**

The basic problem of a firm in distress is that the claims on the company by creditors, equity holders, suppliers and employees, are greater than the value of the firm. The other problem facing firms in distress is that they are running against time – as firms at this stage typically have negative cash flow. When a distressed firm looks at its situation, it usually has to decide between two courses of action (i) Liquidate or (ii) Restructure.

The decision is taken based on the value of the reorganized firm compared to the liquidation value. Reorganization may be achieved through financial reorganization, aimed at reducing the value of outstanding claims on the company, or through operational reorganization, aimed at increasing the value of the firm's assets. If the valuation for the restructured firm is greater than the liquidation value, then the firm should restructure so that the claimholders recover more out of their claims on the firm. If the ongoing concern value is less than the liquidation value, then the firm should be liquidated, as it is this course of action that will provides the greatest coverage to the claims of the claimholders - the liquidation or restructuring can be done inside or outside of bankruptcy court. Valuations, therefore, are strongly biased based on specific interests of the different claimholders and subject to fierce negotiation

The impact of financial distress on enterprise value is significantly different depending on whether a firm restructures in Chapter 11 or out of court. On average, claimholders recover 80 cents on the dollar when they restructure out of court, and around 51 cents on the dollar if they restructure in court. The difference is mainly because firms that go into Chapter 11 are typically much more in distress, for they have typically waited longer to address their problems. Naturally, business risks may be more significant in issuers that are embarking on a build-up or operating a turnaround strategy.

If the company liquidates under the supervision of the courts, then the amount which goes to each claimholder depends on the seniority of the claim they have. In this respect, the rule of 'Absolute Priority' plays an important role. According to this rule, all claims have different priorities, whereby each claim must be made complete before the claims with the next highest priority (seniority) can receive anything. Therefore, the highest priority claim could very well come out complete (receive 100% of claim) while the next lower priority might only receive a small fraction of claim, while the next lowest claim yet, may receive nothing.

If the value of the ongoing concern is greater than the liquidation value, then the difference between the two is

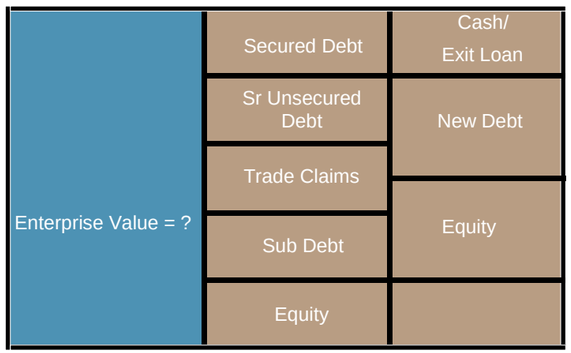
## Out of Court Transactions

| Advantages | Disadvantages |
|---|---|
| • Generally less time consuming than in-court, which can lead to reduced costs.<br>• Court approval not required and uncertainties associated with chapter 11 are avoided.<br>• Eliminates potential bankruptcy cross-defaults under debt instruments of non-debtor entities<br>• Reduces negative press and related effects on trade relationships that tend to be associated with a chapter 11 filing | • Increases risk of transaction failure or deterioration of business prior to closing.<br>• Negotiations are lengthy and complex at a time when the target likely has deteriorating liquidity.<br>• Third party approvals, consents or waivers may be required.<br>• Liens on assets and debt covenants.<br>• Requisite consents may be difficult to obtain due to divergent interests of multiple constituents.<br>• May require unanimous consent to amend key provisions.<br>• Fraudulent conveyance risk.<br>• Successor liability.<br>• Tax implications –inability to use net operating loss.<br>• Limited ability to restructure legacy employee liabilities. |

negotiated amongst the different claimholders. The law is not clear on how this difference in value is distributed. The only rule is that each claimholder cannot receive less than they would have if the firm were liquidated. This invariably gives rise to lengthy negotiations and 'games' which claimholders play, whether they are in court or out of court. In out of court restructurings typically banks and senior creditors give up part of their claim to the benefit of junior creditors and equity holders.

Given these dynamics and the relatively high administrative and capital costs required for non performing assets, institutional lenders often end up selling their claims to specialized investors such as hedge funds and private equity firms. These investors are able to extract value out of distressed claims in a different way than, for example, a commercial bank can.

## Distressed Investing Paradigm: How Much is There—Who Gets It—What Do They Get



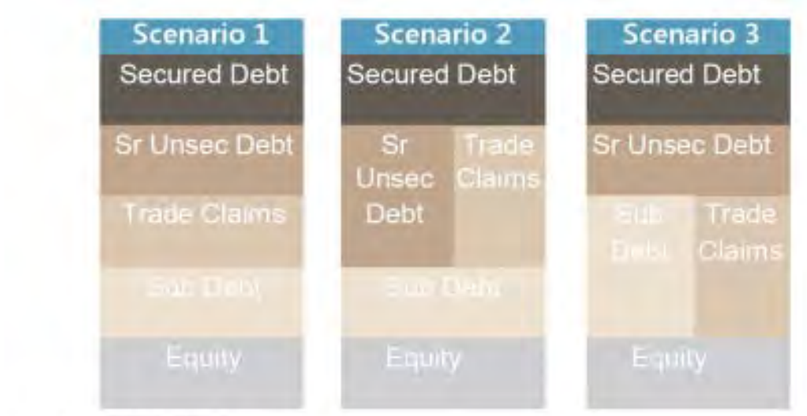

**Source:** Tennenbaum Capital Partners, LLC





## Determining Claim Status

General Rule:
All Claims equal unless:
Secured
Statutory Priority
Legally Subordinated
Structurally Subordinated




Source: Tennenbaum Capital Partners, LLC

**Return Drivers**

Investments in distressed securities are frequently undervalued by the marketplace, providing the prospect of greater appreciation in value than the securities of more financially stable companies. Market undervaluation in relation to fundamental value may be the result of several factors, including: (i) difficulties in conducting thorough financial analysis on a troubled company; (ii) the presence of complex legal difficulties or other business situations; and (iii) the general lack of reliable external sources of information, such as research reports or market quotations, on many companies. Market undervaluation can also occur as a result of market overreaction to geopolitical news, corporate accounting scandals and sector disfavor. Some distressed investors therefore primarily focus on companies experiencing operational difficulties, but with adequate historic revenues, which suggest a need for capital and management improvement, and on financially troubled or undervalued companies. They generally seek to create value by increasing a company's operational efficiency as opposed to relying on revenue growth or industry multiple expansions.

Distressed debt managers in effect create value through active management and deal sourcing:

**Active Management:** This type of value-add is usually achieved through (i) actively participating in restructuring and reorganization processes, through blocking positions, majority bondholder positions and creditors' committee memberships; (ii) serving on boards of directors to provide strategic direction to portfolio companies; (iii) capitalizing on their status as a significant debt holder or shareholder by establishing a relationship with management in order to guide the creation of a prudent business plan and to advise on and facilitate mergers and acquisitions ("M&A") and corporate finance activities; (iv) structuring add-on investments to assist portfolio company growth and enhance returns; and (v) leveraging negotiating skills to maximize value upon exit.

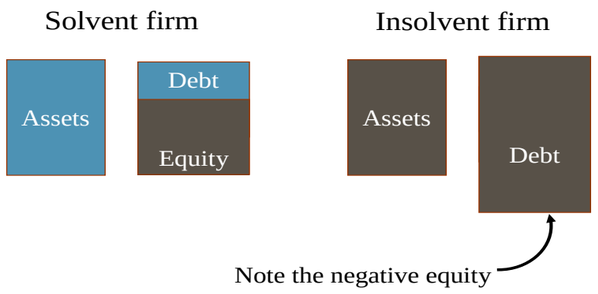
## Bankruptcy

The rise in corporate bankruptcies that may occur and the pressure felt by companies not in bankruptcy to rid themselves of non-core assets are expected to result in an increase in private equity opportunities for investment in bankruptcy sales and corporate divestitures. Because management and operational problems typically accompany the financial difficulties experienced by such companies, investments in these companies are difficult to analyze.

- Federal bankruptcy laws govern how companies go out of business or recover from crippling debt. A bankrupt company, the "debtor," might use Chapter 11 of the Bankruptcy Code to reorganize its business and try to become profitable again. Management continues to run the day-to-day business operations but all significant business decisions must be approved by a bankruptcy court.
- Under Chapter 7, the company stops all operations and goes completely out of business. A trustee is appointed to liquidate (sell) the company's assets and the money is used to pay off the debt, which may include debts to creditors and investors.
- The investors who take the least risk are paid first. For example, secured creditors take less risk because the credit that they extend is usually backed by collateral, such as a mortgage or other assets of the company. They know they will get paid first if the company declares bankruptcy.
- Bondholders have a greater potential for recovering their losses than stockholders, because bonds represent the debt of the company and the company has agreed to pay bondholders interest and to return their principal. Stockholders own the company, and take greater risk. They could make more money if the company does well, but they could lose money if the company does poorly. The owners are last in line to be repaid if the company fails. Bankruptcy laws determine the order of payment.
- The bankruptcy court may determine that stockholders don't get anything because the debtor is insolvent. (A debtor's solvency is determined by the difference between the value of its assets and its liabilities.)
- Most publicly-held companies will file under Chapter 11 rather than Chapter 7 because they can still run their business and control the bankruptcy process. Chapter 11 provides a process for rehabilitating the company's faltering business. Sometimes the company successfully works out a plan to return to profitability; sometimes, in the end, it liquidates. Under Chapter 11 reorganization, a company usually keeps doing business and its stock and bonds may continue to trade in securities markets.
- The U.S. Trustee, the bankruptcy arm of the Justice Department, will appoint one or more committees to represent the interests of creditors and stockholders in working with the company to develop a plan of reorganization to get out of debt. The plan must be accepted by the creditors, bondholders, and stockholders, and confirmed by the court. However, even if creditors or stockholders vote to reject the plan, the court can disregard the vote and still confirm the plan if it finds that the plan treats creditors and stockholders fairly.

### Stock-Base Insolvency

Stock-base insolvency: the value of the firm's assets is less than the value of the debt.




**Source:** Saeid Samiei, Portsmouth Business School





**Deal Sourcing:** Fund sponsors tend to have wide-ranging networks, composed of lower middle and middle market intermediaries, workout officers at national, regional and local banks, mezzanine and nonprime lenders, lawyers and accountants. The sources within this network do not, by and large, offer exclusivity. They do, however, ensure that a sponsor gets one of the first looks at transactions, and importantly, will likely give the sponsor a clear picture of the state of play. Good sponsors have the ability to (i) quickly make a go / no-go decisions; (ii) manage the transaction in a professional manner; and, (iii) close the transaction.

A sponsor's investors too may offer an extensive deal network. Firms typically create an "advisory board" composed of high-profile individuals. Limited Partners and Advisory Board members can provide significant value in sourcing transactions as well. A number of deals also come as a result of previously "busted" deals, failed auctions and transactions suffering from deal fatigue. Often, it is exactly these sorts of transactions – ones that have legacy issues that are proving too hard for the traditional private equity investor to assess – that may offer the metrics to creating investment alpha.

When both middle-market and larger companies do not have large amounts of debt to purchase at a discount from face value, transactions can often be structured and priced to provide returns due to the urgency of distressed companies' liquidity needs. These kinds of investments are structured in the form of private subordinated debt or private equity transactions in which hedge/ private equity fund managers would provide financing in the form of newly issued subordinated debt with attached warrants or stock options, newly issued convertible preferred stock or common stock. Privately negotiated transactions are also less cyclical than traditional secondary market distressed trading.

Privately negotiated transactions generally include the following: (i) the purchase of a distressed subsidiary needing an operating turnaround from a healthy parent; (ii) the purchase of a distressed subsidiary from a distressed parent; (iii) the purchase of a healthy subsidiary from a distressed parent; (iv) the purchase of an entire distressed parent or (v) the purchase of a company that a distressed investor can benefit from by improving operational focus even when the market generally does not view such company as operationally challenged or distressed.

Recently, many privately negotiated investment opportunities have been in the form of divisions or subsidiaries of larger companies that have been poorly managed, over-leveraged or not otherwise central to the operations of the parent company. Some opportunities have also occurred when the parent company itself is distressed while a division or subsidiary is healthy.

### Investor Types

**Types of Distressed Securities Managers**

Demand for distressed investment opportunities comes from a variety of sectors, including (i) distressed private equity managers, (ii) dedicated distressed hedge funds, (iii) multi-strategy hedge funds, (iv) "cross-over" special situations, arbitrage and value funds, (v) investment banks' proprietary capital, and (vi) "one-off" opportunistic fund managers.

There are many ways to participate in the distressed debt space. These include:

i. Investing in relatively liquid short term trading strategies such as those favored by hedge funds.

ii. Investing in longer term acquisitions such as purchasing undervalued debt securities from the secondary market and holding them until value restores.

iii. Investing in relatively illiquid (often private equity type) fund vehicles; these funds acquire significant stake of loans (and equity) to control or influence a restructuring, make asset acquisition and disposition decisions or make operational execution decisions.

There are many strategies within distressed debt investing. These strategies include traditional passive buy-and-hold and arbitrage plays, direct lending to distressed companies, trades with active-control elements, foreign investing, emerging equity purchases, and debt and equity plays while the firms are going through reorganization in bankruptcy.

Stylistically distressed strategies can be divided into either Non Control /Trading oriented or Control oriented.

## Trading Strategies

### Non Control / Trading Oriented Investing

These managers invest in the senior levels of a company's capital structure. Through secured bank debt or senior notes, they assume a lower risk / reward profile by investing relatively late in the reorganization process or at times when credit risk can be minimized. They usually do not need or seek control. These managers are relatively passive in their investing style. Passive investing has a more opportunistic profile, often with substantial liquidity (except in private equity type fund vehicles). This liquidity affords an investor the ability to be nimble in entering and exiting passive investments, interestingly with very little a priori information. Occasionally, a passive investment may be a stepping stone to a control implementation approach, with the discovery of new information. Non control strategies derive returns from passively holding securities - where the value of securities is enhanced through negotiations during the bankruptcy process.

Types of securities traded include:

- Senior Secured Corporate Debt: Opportunities to purchase high quality, low leveraged companies, at low purchase prices.

- Stressed (but still performing) Corporate Debt: Opportunities to purchase debt of companies experiencing stress from industry, operational or liquidity challenges.

- Distressed Corporate Debt: Opportunities to purchase debt of companies with features that allow for upside potential in the event of a turnaround.

Often Trading oriented strategies are largely the preserve of hedge funds. These funds generate returns by buying undervalued debt where the investor purchases distressed debt and seeks to profit as the underlying company recovers and its debt appreciates. This approach hinges on the investor's ability to identify companies that are currently in financial distress, but look likely to recover in the near future. This strategy is predicated on a weak economy which usually leads to increased corporate default rates, thus creating opportunities for acquiring distressed debt cheap with a view to sell it when price appreciates. This approach is largely practiced by proprietary trading desks and hedge funds. Hedge funds tend to invest in both public and private securities, including leveraged loans, secured bank debt (first and second lien), subordinated bank debt, investment grade and high yield bonds, funded and unfunded bridge loans, convertible securities and a variety of distressed securities such as bankruptcy claims. Many managers employ a disciplined and value-oriented approach to





intensive credit research – they typically seek to purchase securities at a price which, when considered with the claims of other securities holders, allow them to acquire the underlying investment at an attractive valuation compared to private market, public market or merger comparables.

### Control Investing

The strategy is to invest in the debt of undervalued companies with respect to enterprise value or liquidation value. These investments may be subsequently converted to equity interests through financial restructurings or reorganizations under the bankruptcy process. In other words these funds enter an investment with the intent of taking control of a company.

These managers are very active in their investing style. They have a higher risk / reward profile, accepting credit risk by investing in more junior securities and tend to take on activist approaches. Control oriented investing is largely practiced by private equity funds that generate returns by accumulating large distressed debt positions that allow them to acquire a position of control in bankruptcy proceedings – they make active operational and managerial interventions. Restructuring funds invest in financial distress companies, but they do so by investing new equity in companies in order to take control. They are, for the most part, equity investors and not debt investors. Control investments provide the flexibility to invest in all forms of debt and equity securities including: common stock, preferred stock, subordinated debt, senior debt, distressed debt, convertibles etc. They typically acquire positions in distressed issuers without regard to capital structure seniority, under circumstances in which material credit risk remains and few other distressed securities investors are willing to participate. They are thus often able to obtain control at a discount to fair value and to use such control to guide or arbitrage the reorganization process.

This strategy creates the potential to not only realize normalized valuations but also to capture a control premium upon exit. An active management approach often enables a fund to positively affect the value of securities meeting screening criteria. Active management requires a major time commitment by a fund's investment team and involves monitoring and analyzing the dynamics of each restructuring, interacting with a wide range of stakeholders with conflicting interests, participating on creditors' and shareholders' committees and judiciously enforcing legal rights. Successfully implementing a control strategy in reorganizations also requires the willingness to undertake measures to create value, including such things as (i) structuring, negotiating, sponsoring and implementing a complete plan of reorganization; (ii) assuming board control and / or through such board or other effective control appointing management either during or after the restructuring; and (iii) providing alternative sources of capital such as debtor-in-possession financings, plan funding and rights offerings.

Here an investor seeks to gain control of a company through a bankruptcy or reorganization process.

Typically, investors first become a major creditor of the target company by buying a company's bonds or senior bank debt at steeply discounted prices. Their status as creditor gives them the leverage needed to make or influence important decisions during the reorganization process. Subsequently, distressed debt firms exchange the debt obligations of a company in return for newly issued equity in the reorganized company, often at very attractive valuations. This is often utilized as a relatively inexpensive means of taking control of companies that have good assets, but are improperly capitalized. Often, they also participate in the workout process outside the bankruptcy process.

This approach attempts to accumulate deeply discounted securities and other obligations of distressed companies

as an initial step towards acquiring an influential or controlling interest, generally through a conversion of debt to equity. It strives to influence the reorganization process and the new capital structure. The strategy profits from revaluation of a distressed investment upon completion of restructuring, a return to normalized profitability as well, as mentioned earlier, realization of a control premium upon exit.
Often, these funds make initial toe-hold investments in a significant number of situations as a first step towards making core investments in certain companies. Occasionally, control may be acquired in a single transaction, but in some cases a fund may build increasing positions in stages. Very often the process of acquiring, restructuring, controlling and exiting certain core positions may require three to four years or even longer.

Control can be aimed at controlling (i) the target during and / or post-bankruptcy or (ii) a particular class of security. In the event of a control investment strategy, a thorough analysis of the company's capital structure determines what is known as the First Impaired Class or that senior-most tranche of claims wherein full satisfaction of amounts due cannot be satisfied in cash or market value. Such tranches have the highest voting authority in bankruptcy proceedings and therefore control the target's reorganization.

Ownership of the First Impaired Class becomes the most effective means of gaining control in the target company, and thus is, frequently the preferred strategy when ultimate control of the target post-bankruptcy is the goal. Value is created by actions such as the conversion of all, or a portion of debt holdings to other classes of debt or equity, the development of innovative structures for the repayment of interest and principal, injections

## Reorganization

Traditional buy-out investment funds typically hesitate to make investments in companies requiring substantial turnarounds, including reorganizations subject to the complicated regulations of the bankruptcy process and involving the numerous constituencies that have to be satisfied before a Plan of Reorganization can move forward. Uncertainty about the ability ultimately to acquire a control position and, thus, the ability to select management and control the investment from the outset, can serve as a further deterrent to the participation of buy-out funds in such opportunities. Distressed investors however specialize in this form of investing.

- Committees of creditors and stockholders negotiate a plan with the company to relieve the company from repaying part of its debt so that the company can try to get back on its feet.

- The debtor does NOT need to be insolvent in order to file for chapter 11 protection

- Principal constituents
- Debtor (board of directors remains in control, subject to Bankruptcy Court oversight/approval)
- Debtor In Possession lender
- Secured creditors
- Official committees (unsecured creditors and sometimes equity holder committees)
- United States trustee
- Labor unions

- Filing chapter 11 automatically provides the debtor with the protections afforded under the Bankruptcy Code

- Immediately upon the commencement of a chapter 11 case, third parties automatically are "stayed" or prohibited from taking any action to obtain possession of property of the estate.

- Automatic stay remains in effect throughout the bankruptcy proceeding

- Prohibits parties to contracts with bankruptcy default provisions from terminating those contracts

- Creditors holding liquidated, unliquidated, contingent or disputed claims against the debtor at the time it files its chapter 11 case hold "prepetition" claims; in contrast, creditors whose claims arise after the debtor files its chapter 11 case hold "post petition" claims.

- Debtor must pay post petition claims in full in cash in order to emerge from chapter 11

- In order to reorganize under chapter 11, the debtor must pay prepetition creditors at least as much as those creditors would be paid if the debtor liquidated its business under chapter 7

- Secured creditors entitled to adequate protection (likely to be significant (& potentially litigious) issue in cases with 2nd & 3rd lien debt)

- Not entitled to adequate protection on unsecured portion of claim





of fresh capital and the issuance of new equity to existing or new shareholders. We now stress the importance of control and exit as a differentiator in investing.

There are a variety of means to control the reorganization process and, ultimately, a distressed debtor. Bankruptcy laws provide creditors with complex approval rights over restructurings that impair their claims. Generally, the U.S. Bankruptcy Code requires at a minimum, that each class of creditors receiving less than their claimed amount in a plan of reorganization (an "impaired class") cast a two-thirds vote in favor of that plan. This provision permits the holder of two-thirds of an impaired class (and similar supermajorities under the bankruptcy laws of most other countries) a great deal of negotiating leverage over the reorganization process. Similarly, a one-third position in an impaired class generally gives an investor a blocking position with the ability to veto a plan of reorganization. The investors controlling these percentages have a pivotal role in determining the allocation of value and the type of distributions to each class of creditors. Equity is frequently distributed to claimholders in reorganization. It is of critical importance that a control distressed investor be positioned to receive these distributions, which can confer outright or effective corporate control or substantial influence, of a corporation post-reorganization. There are generally no reporting requirements for the transfer of debt – such control of a corporation can often pass unnoticed during secondary market trading of securities. Hedge funds actively look for opportunities to obtain control of attractive distressed situations through secondary market purchases.

Securities and obligations of companies in financial distress tend to be excessively discounted in the marketplace because reorganizations are complex, resource intensive, tedious, contentious and uncertain. In the non-distressed marketplace, and in efficient markets, over-discounted debt or equity securities attract large corporations and institutional buyers seeking to make acquisitions at an attractive price. In inefficient markets these buyers are rationally reluctant to assume the risk of acquiring a distressed company without relying on the independent due diligence and transaction packaging of an outside investment bank. The resulting absence of well-capitalized investors leads to situations in which control positions, which sell at premiums in traditional markets, can be obtained at discounts to fair value.

The majority of the value creation from such transactions typically is achieved in the first two years – typically through a combination of operating improvements, restructuring resulting from the transaction (elimination or resolution of environmental liabilities for example) and an up-tick in exit multiples as the company moves from "distressed" to "going concern." Unless a compelling reason can be found, sponsors look to exit each investment soon after this.

## Workouts

- A workout refers to a negotiated agreement between the debtors and their creditors outside the bankruptcy process.

- The debtor may try to extend the payment terms, which is called extension, or convince creditors to agree to accept a lesser amount than they are owed, which is called composition.

- A workout differs from a prepackaged bankruptcy in that in a workout the debtor either has already violated the terms of the debt agreements or is about to.

- In a workout, the debtor tries to convince creditors than they would be financially better off with the new terms of a workout agreement than with the terms of a formal bankruptcy.

- The main benefits of workouts are cost savings and flexibility.
- Participants in a workout are not burdened by the rules and regulations of Chapter 11 of the bankruptcy code. They are free to create their own rules as long as the parties agree to them

The availability of a range of possible exit strategies is a prerequisite to any prudent distressed securities investment. Exiting from a non-core position usually involves secondary market sales. In the case of a core position, however, the exit can be more complicated and may involve a negotiated transaction such as a merger, block sale, repurchase or refinancing. Active control managers create specialized exit strategies, which may include (i) the sale of all or part of a company to a strategic buyer; (ii) capturing cash flow from operations or liquidations; (iii) a roll-up into a larger entity; (iv) an initial public offering; (v) a recapitalization with existing management / owners; and / or (vi) the sale of post-reorganization securities back into the market.

The various negative catalytic events that coincide with all distressed companies and cause market discounts to true fundamental value, combined with the positive catalytic events that return pricing to appropriate levels, allow an investor to take advantage of a number of strategic entry and exit points. The holding period required to capture the rise in price to fundamental value is generally a function of the expected timing of certain events. As alluded earlier, control oriented investments are generally longer term (a few years) while passive investments are rarely long-term.

Specific exit strategies are based on the class of distressed securities or loans acquired and a matrix of restructuring scenarios. On a regular basis, an investor may choose to reassesses the company's prospects as an independent ongoing entity and its current exit strategy in consideration of the value (i) of breaking up the enterprise into separate functional entities (disposing of some and retaining the balance), (ii) of selling the entire company, (iii) to be realized in a public market offering, (iv) of leveraging the company and distributing cash or (v) of selling a specific security or loan in the capital markets.

At such time that one of these disposition strategies appears feasible and likely to exceed target valuation, an investor may commence exit. This is usually done by way of a plan which may include engaging investment bankers, soliciting potential private buyers and structuring financings or other transactions. The timing of the transaction and the cyclical nature of the companies naturally are important considerations in selecting a particular exit plan.

## Risk Factors & Mitigants in Distressed Investing

The recent crisis in the credit markets, resulting in contraction in the availability of credit accompanied by widespread insolvency, is unprecedented in recent times. Consequently, many of the risks that distressed funds will face operating in this environment are unusually difficult to predict.

### Risks

Distressed securities' return is a combination of the risk premium from holding low-grade securities and the illiquidity premium from holding less liquid securities. The risk comes when underlying investments do not recover and the fund may lose part or even all of the money it invested in the underlying.

Moreover, many events within a bankruptcy case are adversarial and often beyond the control of the creditors. Typical risks – those that General Partners manage and not necessarily those that Limited Partners face - include company specific recovery risks, risks from a general widening of credit spreads, mark-to-market fluctuations and illiquidity. Other risks include plan risk execution risks, negotiation risks that can affect a creditor's ultimate recovery, escalating legal costs during the bankruptcy process as well as litigation from subordinated creditors that may impair senior claims; bankruptcy claims are amounts owed to creditors of companies in financial difficulty. They are illiquid and generally do not pay interest. Sometimes the debtor is never able to satisfy an obligation on the bankruptcy claim. The markets in bankruptcy claims are also not generally regulated by securities laws or the SEC in the U.S. In addition, under certain circumstances, payments and distributions may be reclaimed if any such payment is later determined to have been a fraudulent conveyance or a preferential payment.

Further, below are additional risks and potential mitigants to consider when investing in distressed debt.

### Headline / Reputation Risk

Many high profile institutions, given public scrutiny, attract criticism and acclaim for their investment decisions. This is despite the fact that they, as passive shareholders in commingled fund investment vehicles, have no control over how managers deploy capital. Given inadequate transparency, they may not even know what their managers hold in the first place, and certainly have no right to be consulted before a manager engages in a potential controversial strategy. Despite the lack of control, they are forced to spend substantial resources in managing their reputations, media coverage and relationships with their many stakeholders. They are therefore rightfully concerned with investing in strategies that have "reputation" risk.

Reputation Risk Mitigants:

• Invest with managers who practice active non control strategies, favor negotiated outcomes and avoid taking adversarial positions during deals.

• Invest with managers who work in consensual formal and ad hoc committees of investors.

• Make investments via a nominee where the beneficiary investor name is not disclosed.

### Process Risk

Investments in distressed event-driven situations are characterized by complexity. Process risk is inherent in restructurings, for reorganization is a complex legal and financial process. It is important to identify and act on credit issues early. This provides opportunities to monetize portfolio holdings and improve the general investment risk profile.

Process Risk Mitigants:

• Invest with managers who work with financial advisors, legal experts, industry experts and who conduct in depth valuation analysis, including detailed liquidation analysis. During liquidation the aim is to realize as much value as possible from the sale of the security that has been offered as collateral for the loan. Transactions costs of this strategy may be significant; the cost of bankruptcy proceedings, as well as reduced proceeds from distressed sale. Such an exit strategy may nevertheless be attractive if the fund has entered the market during a recession and is exiting via liquidation during a strong upswing. The appreciation of the collateral during a cyclical upswing offers the chance of improving the recovery rate and therefore adding value for the fund's investors. Here the timing and selection skills of a trading specialist and the search skills of a broker are decisive.

• Invest with managers who understand and leverage the U.S. bankruptcy law which provides substantial creditor protection; historically debtors were able to drag out the process for many years; the Bankruptcy Code amendment of 2005 limits debtor exclusivity to 20 months.

Market Liquidity Risk:

These funds tend to invest in securities, loans or other assets for which only a limited liquid market exists. Interest rates, the price of securities and participation by other investors in the financial markets often affect the value

of securities purchased by distressed fund managers. Often they are subject to legal or other restrictions on transfer. The market prices for such assets tend to be volatile, and may fluctuate. Accordingly, these managers are sometimes not able to sell assets at what the fund may perceive to be the fair value of their assets in the event of a sale. Also the sale of illiquid assets and restricted securities often requires more time and results in higher brokerage charges or dealer discounts. This is why most funds investing in distressed credit tend to have long lockup structures.

Illiquidity Risk Mitigants:

- There is a robust over-the-counter market in distressed debt. Invest with managers who provide targeted segmented exposure to underlying relatively liquid asset types.
- Choose managers who prefer deals where situations and outcomes are not controlled by external single majority holder.
- Diversify distressed credit portfolio, both by security and industry to meet liquidity needs.
- Prefer managers who do mark to market valuations on a monthly basis, with pricing provided by third parties that better reflects supply / demand and takes into account illiquidity premium.

## Conclusion

In the last few years a large and dynamic market for distressed debt has evolved. Numerous prospective buyers are competing in auctions for portfolios, baskets and single names. This means that sellers – despite the pressure they are under to sell – have the chance to achieve an attractive price. On the other hand, prospective buyers in inefficient middle market transactions have opportunities to acquire assets with significant upside at cheap prices.

Distressed investing has become main-stream. The investor base in distressed investing is considerably wider now than it was a decade ago in the face of a long-anticipated acceleration in corporate default rates and the return to more attractive risk-adjusted returns. It has also emerged as an important tool of corporate finance for middle market deals. Distressed M&A, by virtue of necessity and opportunistic capital, may yet continue to be an attractive proposition.

The economic and financial crisis has had a negative effect on the cost and availability of credit. This has further increased opportunities. The level of analytical sophistication, both financial and legal, necessary for successful investment in the space is unusually high, creating entry barriers for participants. Special situational investments are expected to be attractive segments for distressed investing.

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# The Wisdom of the Right Crowd: Service Provider Choice

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Many researchers have examined the sources of hedge fund performance over time. Building on the asset class factor model presented by Sharpe [1992], Fung and Hsieh [1997a] identified five dominant hedge fund investment styles, proposed a framework for analysis of trading strategies and elaborated further on this framework in a subsequent series of papers [Fung and Hsieh 1997b, 2000, 2001, 2002a, 2002b and 2003].

There is also substantial literature on the use of factor analysis in predicting hedge fund performance, stemming originally from the seminal work by Fama and French [1993]. Recently, for example, Avramov, Barras and Kosowski [2010] examined the predictability of hedge fund performance with reference to the default spread on bonds rated by Moody's, the equity market dividend yield, the VIX index and net aggregate flows into the hedge fund industry.

Separately, a number of papers have investigated the question of short- and long-term hedge fund performance persistence; although the evidence of this appears to be mixed, most recently, Ammann, Huber and Schmid [2010] found evidence of significant performance persistence and the ability to improve it through strategy distinctiveness.

In parallel, there have been efforts to analyze and predict hedge fund performance with reference to qualitative factors. Liang [1998] compared the performance of hedge funds to mutual funds and, among other things, traced the relationship of hedge fund returns to certain characteristics of the funds, e.g., the existence of a high water mark, incentive fees, fund size and lock-up period.

This line of analysis was extended to focus on operational risk by Liang [2000] and Brown, Goetzmann, Liang and Schwarz [2008], among others. The latter paper, for example, used information filed by hedge fund managers with the Securities and Exchange Commission (SEC) on Form ADV to create an "ω score" for hedge fund operational risk, based on identified conflict of interest issues, concentrated ownership and reduced leverage. More recently, Brown, Goetzmann, Liang & Schwarz [2010] studied a sample of due diligence reports produced by a major hedge fund due diligence firm to derive a measure of operational risk based on inadequate or failed internal processes, misrepresentations and inconsistencies, among other things (parenthetically, they determined that operational risk as defined thereby did not affect investors' propensity to invest based on high past returns).

A major differentiating characteristic among hedge funds is their choice of key service providers, specifically a fund's designated prime broker(s), administrator, auditor and domestic law firm. These key service providers (hereafter, "KSPs") are generally set forth in the fund's subscription documents and marketing materials, and databases that compile and disseminate fund performance often also provide the names of a fund's KSPs.

Due diligence on funds generally includes consideration and verification of the fund's KSPs and the services provided by them (for example, the illustrative due diligence questionnaire produced by the Alternative Investment Management Association, a global trade association of the hedge fund industry, requests detailed information on a fund's KSPs and the nature of the fund's relationships with them, including

the length of the relationship and the specific services provided). KSPs provide essential services to a fund, and, although these services are relatively straightforward, the firms that comprise each of the four groups of KSPs vary significantly in market presence, experience and resources. Accordingly, the most respected service providers are able to be highly selective in their choice of clients, and there is some evidence that certain firms can and do charge relatively higher prices for their services.

Liang [2002] noted that larger funds tend to be audited, and funds that are audited have fewer discrepancies in returns reported to multiple places. Additionally, Brown, Fraser & Liang [2008] found that larger funds tended to use better-known service providers. Apart from the above, though, relatively little consideration has been given to service provider choice as an indicator of fund performance. This paper asserts that a fund that currently reports employing the largest, best-known service providers is likely also to have reported superior absolute and risk-adjusted returns over a five- and ten-year time horizon relative to its peer group and that, conversely, funds that report lesser-known service providers or no KSPs at all are likely to have reported underperformance over these periods.

The functions and characteristics of the four key service provider groups are described below:

**(a) Prime Broker**

Prime brokers offer a package of services focused around processing of trades, provision of leverage and operational support. Prime brokers locate and lend securities to hedge funds, enabling them to establish short positions. Prime brokers also provide leverage and cash management services. The prime broker serves as a custodian and clearinghouse for many (if not all) of the fund's trades, and enables the fund to net its aggregate collateral requirements for any leverage the prime broker provides for these trades.

Prime brokers also provide a range of support services that may be important to establishing, building and maintaining the fund's business. Normally, the prime broker will provide at least daily, and sometimes real-time, position and portfolio reporting, often customized to the requirements of the fund. Services provided in the start-up phase may include consulting and assistance with recruiting, low-cost premises and on-site technology services. On an ongoing basis, a "capital introduction" team within the prime broker seeks to introduce the fund to potential suitable hedge fund investors, often via conferences and other events that the capital introduction team sponsors.

Typically, the fund pays the prime broker by way of financing spreads (including on the lending of securities), commissions from trading and by the fees that the prime broker earns from hypothecating securities in the fund's portfolio to other clients of the prime broker who wish to borrow them.

Over the past several decades, the prime brokerage business consolidated around the largest brokerage firms, including firms such as Bear Stearns, Goldman Sachs, Lehman Brothers, Merrill Lynch and Morgan Stanley. During the recent financial crisis, in March 2008, the parent company of Bear Stearns came close to failing, resulting in it being acquired by JP Morgan. Later in the year, Lehman Brothers filed for bankruptcy and was acquired piecemeal by Barclays Bank and Nomura Securities, and Merrill Lynch was acquired by Bank of America.

As a result of Lehman's bankruptcy, many prime brokerage clients to which it had extended leverage were unable to withdraw their collateral. This caused many hedge funds to seek to diversify their counterparty risk by establishing relationships with additional prime brokers, typically with those perceived as the most creditworthy entities, including large foreign firms such as Credit Suisse and Deutsche Bank. As a result, many more hedge funds now have relationships with more than one prime broker, and a group of fewer than ten prime brokers accounts for the vast majority of prime brokerage relationships. Consequently, it appears that a far higher percentage of hedge funds with long track records have relationships with at least one leading prime broker than was the case prior to the Lehman bankruptcy, and such a relationship is less of a differentiating factor than it once was.

**(b) Administrator**

The principal task of the fund administrator is to calculate the net asset value of the fund and the accounts of the partners, at specified intervals, in order to create financial statements for the fund. This generally entails reconciling statements from the fund's counterparties, obtaining valuations of fund assets from various sources, and processing subscriptions and withdrawals. These tasks may be highly complex for funds which trade actively, have many limited partners and frequent subscriptions and withdrawals, and hold significant amounts of difficult-to-value securities.

In the wake of various frauds – particularly the Madoff fraud of 2008 – many investors have become increasingly reluctant to invest in funds that do not have consistent and well-documented valuation policies and do not employ a respected unaffiliated administrator or custodian to produce net asset values.

220 firms are reported as the administrator by one or more funds in our dataset. Slightly under half of the funds, however, use one of a group of 25 administrators. Approximately a third of the population either do not report an administrator or report that they are self-administered.

**(c) Auditor**

The auditor's principal role is to review the fund's accounting practices and financial statements. The auditor will also do tax preparation work. Among the key accounting practices are the fund's valuation methodology. Typically, it will be straightforward for the administrator to price liquid securities, or securities priced in accordance with standard models. For other types of assets, however, the auditor may critique a set of "agreed upon procedures" developed by the investment manager.

As with administrators, investors have placed increasing emphasis on a fund's having a well-known, respected auditor, particularly in the wake of the Madoff scandal, where the auditor was a reportedly a one-man operation located in a strip mall. The wind-down of Arthur Andersen following its conviction for obstruction of justice in connection with the Enron affair has also motivated auditors to reduce reputational and business risk by taking steps to improve the quality of their procedures and clientele.

Almost 60% of the funds in our data set report an auditor that is either one of the "Big Four" accounting firms (Deloitte & Touche, Ernst & Young, KPMG and Pricewaterhouse Coopers) or Rothstein Kass, a firm with a very large funds practice.

**(d) Legal counsel**

Typically, a fund will retain legal counsel to prepare and update offering documentation, opine on certain regulatory and compliance matters and assist in the negotiation of agreements with counterparties (e.g., credit support agreements in connection with swaps transactions). Often multiple law firms will be required when, for example, a hedge fund has feeder funds with different domiciles, e.g., an "onshore" feeder fund in the United States and an "offshore" feeder fund in the Cayman Islands, Bermuda or other such jurisdiction.
It would be very difficult for a fund to come into existence without the use of a law firm, but many funds do not



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choose to report them to databases. Additionally, we have differentiated between "offshore" legal advisors, who assist the fund in a narrow way in selected jurisdictions in which a few firms generally have an oligopoly, and the "onshore" law firms that are more easily differentiable by their client lists.

Funds use a broad variety of law firms, ranging from large New York and London firms, smaller firms with large funds practices (the two funds with the largest reported numbers of clients in our data set, Seward & Kissel and Schulte, Roth & Zabel, fall into this category), major firms in regional cities and smaller boutiques. The funds in our data set reported 315 law firms, including numerous "offshore" ones, and the market is relatively fragmented; the ten "onshore" firms with the largest numbers of clients account for less than a third of the funds in the data set, and more than half of the firms were reported as the legal adviser by two or fewer funds.

**Fund Performance Data**

We combined information from two databases, HFN (provided through Pertrac) and that of a large, well-known hedge fund consultant. The two databases have substantial overlap but are very different. HFN has a low subscription cost and comprises any funds that choose to report to it. The consultant's database is provided to clients in connection with its hedge fund research offering, and contains many funds on which its clients have requested research. Accordingly, such funds are likely to have better past performance, having attracted the interest of the consultant's clientele. There is, however, substantial overlap between the two databases.

It would be impracticable to accumulate data for all defunct funds and attempt to determine who their key service providers were, and if these had changed over time, or to determine when and if extant funds had changed their key service providers in the past; we chose instead to assess key service provider data for funds extant as of December 31, 2010. Although this necessarily introduces survivorship bias, we limited our dataset to funds that had reported at least five full years of monthly returns to one or both of these databases through December 2010 and had therefore all "survived" the period. We collected the monthly performance data for this period, as well as for the previous five years for those funds that had reported it. In order to eliminate duplicates and separate classes of the same fund, we used only one of any pair of funds with monthly return correlations exceeding 0.95. The resulting dataset comprised 1,972 funds with five years of data and a subset of 716 funds with ten-year data.

Generally, where there was overlap, we used the consultant's data, although we did not find examples of significant differences in the returns data provided by HFN and the consultant for the same fund. Each database enables funds to report their prime brokers, auditors, administrators and legal advisors; we collected this data as well.

The data relating to KSPs was collected in the early months of 2011 and therefore reflects the service providers that the funds were reporting at that time. It cannot be determined from the databases if a fund has added or changed KSPs in the past. As noted previously, various funds added prime brokers in the wake of the financial crisis of 2008 – 2009; similarly, under pressure from investors, some formerly self-administered funds have hired third-party administrators or changed their auditors to better-known firms. Addition of a prime broker is relatively straightforward, but replacing one of the other types of KSP entails time, effort and expense, and it seems reasonable to assume that a relatively small percentage of the funds in the dataset have chosen to do this.

**Methodology and Results**

We calculated annualized returns and annualized standard deviations of the monthly reported returns over





**Exhibit 1: Summary Statistics - All Funds**

| Time Period | Annual Return | Annualized Standard Deviation | Sharpe Ratio | Sortino Ratio | Number of Funds |
|---|---|---|---|---|---|
| 2006 – 2010 | 8.05% | 14.99% | 0.52 | 1.31 | 1,972 |
| 2001 – 2010 | 9.50% | 14.29% | 0.62 | 1.16 | 716 |

**Exhibit 2: Summary Statistics - HFRX Global Hedge Fund Index**

| Time Period | Annual Return | Annualized Standard Deviation | Sharpe Ratio | Sortino Ratio |
|---|---|---|---|---|
| 2006 – 2010 | 0.84% | 7.51% | (0.19) | (0.23) |
| 2001 – 2010 | 3.56% | 5.86% | 0.22 | 0.27 |

the five-year and ten-year (where available) periods for all the funds in the dataset. We annualized the 30-day Treasury total returns over these periods to calculate the Sharpe and Sortino ratios for each fund during the periods. The returns for the full dataset were as follows:

These results compare favorably with those of the HFRX Global Hedge Fund Index for the same periods, although survivorship bias is clearly relevant here:

This is to be expected, given that the dataset comprises only funds that have reported results continuously for five or ten years, and therefore have performed well enough to remain in business. Funds that were casualties of the recent financial crisis and stopped reporting performance were excluded by construction from the dataset, but poor performance late in their lives may be reflected in the HFRX index. Additionally, the HFRX is asset-weighted by strategy clusters, rebalanced quarterly, and only uses returns from funds with at least a two-year track record and $50 million in assets under management, further limiting its comparability to the dataset.

It is worth noting that the distributions of the performance and annualized standard deviation of the funds in our dataset showed substantial skewness over both time periods. Specifically, there were relatively numerous outliers with very high performance and low volatility (particularly downside volatility). This is to be expected, given that funds with very low performance and/or high volatility would not have been expected to have survived for the five or ten years necessary for them to be incorporated into our dataset.

Furthermore, the Sharpe and Sortino ratios, as measures of risk-adjusted performance, are calculated by dividing annualized performance in excess of the risk-free return by annualized volatility or annualized downside deviation, respectively. Accordingly, the distributions of the Sharpe and Sortino ratios of the funds in the dataset are even more skewed than the distributions of performance and volatility, since they represent the quotients of samples with "fat tails" of high-performing funds and funds with low volatility.

As a next step, we developed lists of "preferred" KSPs, defined as follows:*

(a) Prime brokers: the top nine by numbers of reported relationships, accounting for more than 85% of the prime brokerage relationships reported in the dataset.

(b) Administrators: the top 25 by numbers of reported relationships, accounting for 930 (or just under 50%) of the funds in the dataset.

* A full list of the preferred Key Service Providers used in this study are available from the author.

(c) Auditors: the "Big 4" auditors plus Rothstein Kass, representing 1,165 funds, or just under 60% of the funds in the dataset.
(d) Legal counsel: the top 12 "onshore" firms by numbers of reported relationships, representing 624 (or just under a third) of the funds in the dataset, but approximately half of the funds that reported an "onshore" law firm.

We compared the reported performance of funds with a preferred KSP in each category against the reported performance of the dataset as a whole. We found that, on average, funds that reported a preferred KSP also reported superior risk-adjusted performance relative to that of the full dataset (and, often, superior absolute performance as well).

Over the five-year period, the clearest indicator of superior reported performance seems to be the reported use of a preferred administrator, and in the ten-year period, the reported use of a preferred administrator and legal counsel. There are at least two possible explanations for this: (i) the relatively high market share of the preferred prime brokers and auditors, which causes their clientele's performance to approximate the mean more closely; and (ii) the possibility that the use of a top-tier administrator and legal counsel is an indicator of superior operational processes and a reduced likelihood of material misstatements of net asset value that could lead to fluctuations in valuation and increases in volatility.

We then considered whether the reporting of multiple preferred KSPs might have an additive effect on performance or, conversely, whether failure to report service providers, or reporting multiple non-preferred KSPs, could be linked to inferior performance:

**.Exhibit 3: Five-Year Performance of Funds Reporting a Preferred KSP**

| Preferred KSP Reported | Annual Return | Annualized Standard Deviation | Sharpe Ratio | Sortino Ratio | Number of Funds |
|---|---|---|---|---|---|
| Prime Broker | 8.29% | 13.67% | 0.55 | 1.09 | 1,058 |
| Administrator | 8.61% | 13.56% | 0.59 | 1.27 | 930 |
| Auditor | 8.19% | 14.19% | 0.55 | 1.14 | 1,165 |
| Legal Counsel | 8.39% | 13.85% | 0.59 | 1.16 | 624 |
| ***Full Dataset:*** | 8.05% | 14.99% | 0.52 | 1.31 | 1,972 |

**Exhibit 4: Ten-Year Performance of Funds Reporting a Preferred KSP**

| Preferred KSP Reported | Annual Return | Annualized Standard Deviation | Sharpe Ratio | Sortino Ratio | Number of Funds |
|---|---|---|---|---|---|
| Prime Broker | 9.40% | 12.82% | 0.67 | 1.19 | 398 |
| Administrator | 9.91% | 12.95% | 0.70 | 1.29 | 337 |
| Auditor | 9.90% | 13.33% | 0.69 | 1.27 | 414 |
| Legal Counsel | 9.73% | 12.50% | 0.73 | 1.37 | 241 |
| ***Full Dataset:*** | 9.50% | 14.29% | 0.62 | 1.16 | 716 |





**Exhibit 5: Five-Year Performance and Reporting of KSPs**

| Fund Reports: | | Annual Return | Annualized Standard Deviation | Sharpe Ratio | Sortino Ratio | Number of Funds |
|---|---|---|---|---|---|---|
| (A) | 4 Preferred KSPs | 8.46% | 12.48% | 0.64 | 1.30 | 330 |
| (B) | ≥2 Preferred KSPs; No Non-Preferred | 8.76% | 13.34% | 0.63 | 1.35 | 523 |
| (C) | ≥1 KSP | 8.79% | 13.77% | 0.62 | 1.33 | 615 |
| (D) | ≥1 Non-Preferred KSP | 7.74% | 15.54% | 0.48 | 1.36 | 1,004 |
| (E) | >1 Non-Preferred KSP | 7.84% | 15.82% | 0.48 | 2.20 | 321 |
| (F) | No KSPs | 7.64% | 15.52% | 0.47 | 1.12 | 353 |
| | ***Full Dataset:*** | 8.05% | 14.99% | 0.52 | 1.31 | 1,972 |

**Exhibit 6: Ten-Year Performance and Reporting of KSPs**

| Fund Reports: | | Annual Return | Annualized Standard Deviation | Sharpe Ratio | Sortino Ratio | Number of Funds |
|---|---|---|---|---|---|---|
| (A) | 4 Preferred KSPs | 9.83% | 11.52% | 0.79 | 1.39 | 119 |
| (B) | ≥2 Preferred KSPs; No Non-Preferred | 9.94% | 12.38% | 0.74 | 1.31 | 179 |
| (C) | ≥1 KSP | 10.16% | 12.82% | 0.72 | 1.27 | 215 |
| (D) | ≥1 Non-Preferred KSP | 9.27% | 14.58% | 0.59 | 1.14 | 386 |
| (E) | >1 Non-Preferred KSP | 10.06% | 14.92% | 0.63 | 1.27 | 122 |
| (F) | No KSPs | 9.07% | 16.04% | 0.51 | 1.04 | 115 |
| | ***Full Dataset:*** | 9.50% | 14.29% | 0.62 | 1.16 | 716 |

It can be seen that during both periods the annualized absolute performance of the group reporting four preferred KSPs significantly exceeded that of the dataset as a whole (by 41 and 33 basis points respectively in the five- and ten-year performance groupings). Additionally, annualized volatility was considerably lower (by 251 and 277 basis points respectively). The combination results in significantly higher risk-adjusted returns.

The groups that report at least two preferred KSPs and do not report any non-preferred ones produced almost as high risk-adjusted returns in both time periods. They are followed, again in both time periods, by the groups that report at least one KSP, preferred or otherwise.

In the five-year period, the groups that reported non-preferred KSPs had lower absolute and risk-adjusted returns than the dataset as a whole. In the ten-year period, however, funds that reported one or more non-preferred KSPs had absolute performance broadly in line with the dataset, but higher volatility that brought their risk-adjusted performance in aggregate generally below that of the peer group.

A possible explanation for this difference could be greater pressure in the past five years for funds to use premium KSPs, leading to increased selectivity on the part of the KSPs with respect to the clients they are willing to accept. Older funds may have had less pressure to use a name-brand lawyer, auditor or administrator when they were formed, and, if they have survived ten years, may not feel compelled to change their KSPs at this stage.

It seems clear that funds which do not report KSPs do significantly worse than their peer group. Within the five-year period, funds that failed to report any KSPs underperformed the full dataset by 41 basis points per annum and reported 53 basis points additional annualized volatility. For the ten-year period, the group underperformed the full dataset by 43 basis points annually and exhibited 175 basis points additional annualized volatility.

It may be that failure to report KSPs is a sign of loose internal processes that give rise to lower returns and higher volatility. It is also possible that funds that do not report KSPs prefer not to publicize the fact that they use less well-known vendors – or that they do not use any at all, which could itself be a sign of internal problems.

To test the robustness of these conclusions, we performed two-tailed hypothesis tests at the .05 significance level on the distributions of the Sharpe ratios of the various samples relative to those of the overall population, and also calculated the relevant p-values. The results were as follows:
For the five-year period, the statistical significance of the benefit of reporting a preferred administrator and legal counsel could be asserted with a high degree of confidence; for the ten-year period, this applied to all categories of KSP (albeit somewhat less for prime brokers).

Additionally, as can be seen in the following two tables, the conclusion that reporting multiple key service providers (particularly preferred ones) is a marker of outperformance can be asserted with a high degree of confidence for both the five- and ten-year periods:

**Exhibit 7: Five-Year Performance of Funds Reporting a Preferred KSP**

| Preferred KSP Reported | Sharpe Ratio | T-Statistic | *P*-Value | Number of Funds |
|---|---|---|---|---|
| Prime Broker | 0.55 | 1.66 | .0964 | 1,058 |
| Administrator | 0.59 | 3.21 | .0014 | 930 |
| Auditor | 0.55 | 1.32 | .1872 | 1,165 |
| Legal Counsel | 0.59 | 2.51 | .0123 | 624 |
| ***Full Dataset:*** | 0.52 | | | 1,972 |

**Exhibit 8: Ten-Year Performance of Funds Reporting a Preferred KSP**

| Preferred KSP Reported | Sharpe Ratio | T-Statistic | *P*-Value | Number of Funds |
|---|---|---|---|---|
| Prime Broker | 0.67 | 2.18 | .0301 | 398 |
| Administrator | 0.70 | 2.87 | .0044 | 337 |
| Auditor | 0.69 | 2.76 | .0060 | 414 |
| Legal Counsel | 0.73 | 3.00 | .0030 | 241 |
| ***Full Dataset:*** | 0.62 | | | 716 |



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**Exhibit 9: Five-Year Performance and Reporting of KSPs**

| Fund Reports: | | Sharpe Ratio | T-Statistic | *P*-Value | Number of Funds |
|---|---|---|---|---|---|
| (A) | 4 Preferred KSPs | 0.64 | 3.32 | .0010 | 330 |
| (B) | ≥2 Preferred KSPs; No Non-Preferred | 0.63 | 3.55 | .0004 | 523 |
| (C) | ≥1 KSP | 0.62 | 3.41 | .0007 | 615 |
| (D) | ≥1 Non-Preferred KSP | 0.48 | -1.80 | .0729 | 1,004 |
| (E) | >1 Non-Preferred KSP | 0.48 | -0.95 | .3451 | 321 |
| (F) | No KSPs | 0.47 | -1.50 | .1338 | 353 |
| | ***Full Dataset:*** | 0.52 | | | 1,972 |

**Exhibit 10: Ten-Year Performance and Reporting of KSPs**

| Fund Reports: | | Sharpe Ratio | T-Statistic | *P*-Value | Number of Funds |
|---|---|---|---|---|---|
| (A) | 4 Preferred KSPs | 0.79 | 3.72 | .0003 | 119 |
| (B) | ≥2 Preferred KSPs; No Non-Preferred | 0.74 | 2.95 | .0036 | 179 |
| (C) | ≥1 KSP | 0.72 | 2.80 | .0055 | 215 |
| (D) | ≥1 Non-Preferred KSP | 0.59 | -0.88 | .3814 | 386 |
| (E) | >1 Non-Preferred KSP | 0.63 | 0.34 | .7362 | 122 |
| (F) | No KSPs | 0.51 | -2.15 | .0333 | 115 |
| | ***Full Dataset:*** | 0.62 | | | 716 |

**Conclusions**

Reporting the use of preferred KSPs appears to be a marker of outperformance over historic five- and ten-year time horizons among funds which have reported complete track records for these periods to at least one of two databases used in this study. Of the four types of KSPs, prime brokers and auditors appear to have de facto oligopolies, while administrators and legal counsel are more fragmented. In the cases of prime brokers and auditors, the members of the oligopoly were designated as the preferred providers, while in the cases of administrators and legal counsel, the largest firms, used by approximately half the dataset in aggregate, were designated as the preferred providers.

It cannot be determined from the databases whether or not a fund's KSPs have changed over time, but for all categories of KSP, funds using the preferred providers had risk-adjusted returns significantly superior to those of the dataset as a whole, in both the five- and ten-year periods. The greatest outperformance was shown by funds using preferred administrators and legal counsel.

Funds reporting a complete set of preferred KSPs outperformed those with some but not all preferred KSPs. Funds reporting non-preferred KSPs tended to underperform the dataset, and the greatest underperformance was shown by funds that did not report KSPs, which may indicate the inadequacy of the KSPs used by these funds or that these funds do not use KSPs, which could in turn be an indicator of underperformance.

It can be conjectured that the most popular KSPs, which have the luxury of being more selective in the clients they accept, may choose to work only with those clients they deem to have the greatest chance of success, whether by virtue of the pedigree and track record of the principals, anticipated ability to raise assets or other factors. The KSPs used by the fund may in turn have a signaling effect for other vendors, counterparties and investors, which may itself increase the fund's prospects for outperformance. This, if true, would be an example of successful collective due diligence by experienced market participants: the wisdom of a crowd, in this case, the crowd best placed to predict a fund's likelihood of superior performance. The views of Groucho Marx notwithstanding, if you are a hedge fund manager, it may be a good idea to belong to this club if they will have you as a member.

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Email the author at **jcrystal@rockco.com**





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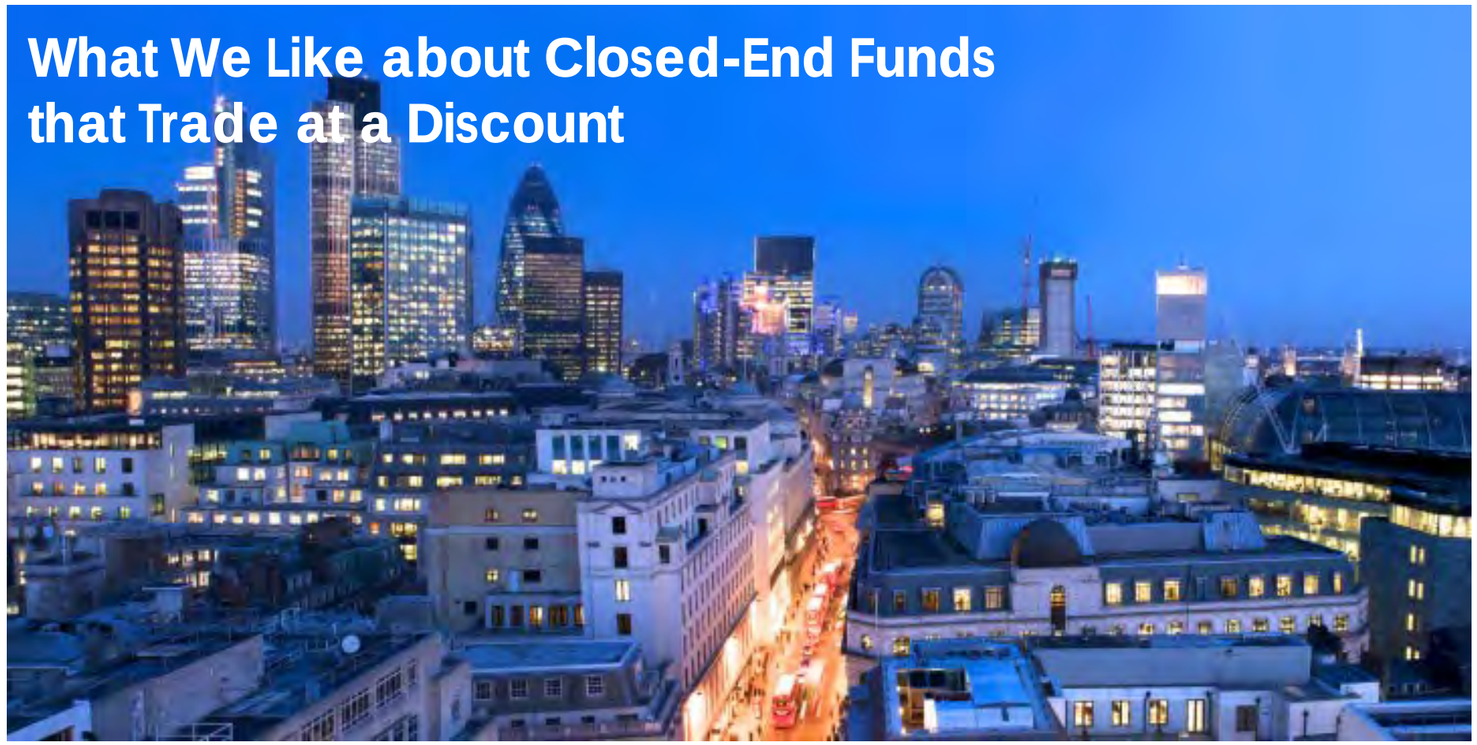
# What We Like about Closed-End Funds that Trade at a Discount



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Closed end fund (CEF) shares usually trade at a discount and less frequently for a premium to their NAVs (net asset values, the total value of all the fund's assets divided by its outstanding shares). While much has been written on why they typically trade for a discount, no consensus explanation has yet emerged.

**Literature Review**

Many researchers have attempted to explain the so called closed end puzzle - why closed end fund shares typically sell at below their net asset value (NAV). Dimson and Minio-Paluello (2002) explored whether the fund's discount results from overestimated or biased NAVs. Malkiel (1977) and other researchers have noted that the dead weight loss of management fees and expenses could account for the discount. Similarly, agency costs could help explain the discount in cases where management charges unjustifiably high fees. Tax timing represents another possibility (Seyhun and Skinner (1994)). Also explored is the relationship between managerial stock ownership and the fund's discount or premium – the greater the stock ownership, the greater is the likely discount (Barone-Adesi and Kim (1999), Barclay (1993), Dimson and Minio-Paluello (2002), Richard and Wiggins (2000) and Malkiel (1995)). The impact of the listing exchange has even been considered. Funds traded on the New York Stock Exchange tend to show a higher persistence of strong NAV and market price performance (Bers and Madura (2000)). Additionally, researchers have found that closed-end fund premiums (discounts) forecast higher (lower) future NAVs ((Chay and Trzcinka (1999) and Thompson (1978))).

Many researchers contend that investor sentiment is a major cause of CEF discounts. Researchers also consider how domestic versus international investor sentiment may impact fund premium/discounts. Some studies find that the existence of "noise" traders helps explain why many CEFs trade at a discount (Chen, Kan and Miller (1993), De Long and Shleifer (1992), Lee, Shlerfer and Thaler (1991), Simpson and Ramchander (2002), Gemmill and Thomas (2000), Garay (2000) and Richard and Wiggins (2000)).

Some scholars have explored the mean-reversion of the discount by utilizing co-integration procedures, that examine bond and equity CEFs which "exhibit stationary time-series properties". They find statistically significant error correction terms that quantify the speed of mean reversion. The results from this observation show that mean reversion is caused by changes in both the market price and NAV (Arora, Ju and Ou-Yang (2002), Gasbarro, Johnson and Zumwalt (2003), and Gasbarro and Zumwalt (2003)). Other studies explore efforts to exploit risk arbitrage as contributing to fund mispricing or the elimination thereof (Pontiff (1996) and Gemmill and Thomas (2000)).

Still other researchers have analyzed the relationship between CEF pricing, and liquidity and liquidity risk. Two main hypothesizes have

been tested: 1. that CEF discounts are related to liquidity differences between the CEF and its underlying portfolio, and 2. That CEF discounts are related to differences in liquidity risk between CEFs and their portfolios (Cherkes, Sagi and Stanton (2005) and Manzler (2005)). Another focus of research is how investors' abilities to access and process relevant information about funds differ. Thus a fund's discount/premium may depend significantly on the quality of private information (Grullon and Wang (2001)).

Several studies using weekly data found that funds with large discounts tend to generate abnormal returns going forward (Thompson (1978), Richards, Fraser and Groth (1980) and Anderson (1986)). A more recent study using daily data, found funds whose discounts had widened substantially would have been profitable to buy (Hughen, Mathew and Ragan (2005)). Several of these studies took account of transactions costs ((Cakici, Tessitore, and Usmen (2000)). One study looked at how those mutual funds which use stale prices to compute their NAVs have created potentially profitable trading opportunities (Boudoukh, Richardson, Subrahmanyam and Whitelaw (2002)).

**Who Cares Why CEF Trade at a Discount?**

For our purposes, it does not really matter why closed end funds tend to trade at a discount. The material fact is that they do and those that do create opportunities for the nimble investor. Buying a portfolio at a discount from its market value sounds like an attractive proposition. And yet such situations do have a downside. The fact that closed end funds generally trade at a discount means not only that they will be bought at a discount but also that they will likely later be sold at a discount. So the discount is not a free lunch. Still in a variety of situations, buying at a discount from the NAV can be attractive. Let's consider the possibilities.

**Large Discounts Tend to Narrow**

As mentioned above, prior research has found that funds sporting a large discount from their NAV tend to see their discounts narrow. Thus one approach to investing in closed end funds would be to seek out otherwise attractive funds that sell at a large discount. If and when the discount narrows or even better turns to a premium, the fund may a candidate for a sale. The investor can then move on to another well run fund with a large discount

**Closed End Funds Sometimes Convert to Open End**

Closed end funds are potential targets for certain large investors who may buy a sufficient stake to influence the fund's management. A typical objective is to cause the fund to convert to open end status. If successful, such a conversion will have the effect of eliminating the discount as the mutual fund will make a market in the shares at their NAV level. In other situations, the large investor may simply liquidate the fund's portfolio and pay out the proceeds to the fund holders.

**Closed End Funds Sometimes Make Large Distributions**

Like mutual funds, closed end funds are required to annually distribute the majority of their realized short and long term capital gains in the form of dividends. In particularly successful years, these dividends can amount to a substantial percentage of the fund's value. These distributions are in par dollars even though the fund typically trades at a discount. As a result the fund owner may receive a significant distribution and still own the fund shares with a discount that has not changed much from its pre-distribution level.

**Closed End Funds Sometimes Self-Tender for their Shares**

Rather than convert to an open end status, closed end funds may seek to narrow their discount by offering to buy in a pre-specified fraction of the outstanding shares. Generally the tender is at a price close to the fund's NAV. For example a fund trading at a 10% discount might self-tender for 10% of the outstanding shares at 98% of the NAV. This offer provides an attractive opportunity for the fund holder. Note that since by no means will all fund holders tender, the actual percentage of tendered stock accepted is almost certain to be above the offer amount. That is, if only half of those holding shares tender, a 10% tender will result in an acceptance rate of 20%. That means that the investor has sold one fifth of his or her shares at 98% of the NAV when the market is only 90% of the NAV. One option is simply to tender and thereby exit a part of the position at a better price than was here to fore available. An investor who wants to maintain his or her position, can simply go back into the market and buy back the shares at the market price which will generally still be trading at a significant discount. Some funds even have a policy of self-tendering on a regular basis. Accordingly, the nimble investor can repeat the process each time the fund announces a tender.

The above described strategy of tendering and then restoring one's position in the immediate after market will generally work as desired. That is, the investor will generally be able to tender at a higher price and replace the sold shares at a lower price. On occasion, however, the stock will move up before the investor is able to restore their position. This complication arises because the investor must commit to the tender before they have complete information. For example, the tender offer may provide that the last day to tender is on day X and the purchase price is to be determined by the NAV on day X + 5 followed by an actual purchase on day X + 10. The investor won't know until day X + 5 how many of his or her shares are to be purchased and at what price and won't have the funds available for the repurchase until day X + 10. Over that time period the stock may have moved up such that even though the stock still trades at a discount, the new price is above the level at which it was tendered. While there is a risk of an adverse movement in the stock price, the opposite price move is about equally likely. That is, the stock could move down before the repurchase can occur, further improving the return to the investor.

**Conclusion**

While closed end funds are not an investment panacea, they do sometimes offer attractive opportunities to the nimble investor. One should begin by identifying funds that are attractive on their own fundamental terms. For example, an investor who seeks exposure to emerging markets could search among the emerging market closed end funds for well managed funds having relatively low expense ratios, low management fees and superior track records. From this set of funds the investor can select one or more which are trading at a substantial discount. Over time the discount may narrow, the fund may self-tender, the fund may make some large distributions and it may even convert to open end status. By no means will every fund do one or more of these things. But a diversified portfolio of such funds is very likely to have at least some funds that do some of these things which add to their returns.

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Research Review

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# Further Readings on Closed End Funds

***"Dividend distributions and closed-end fund discounts."***
Theodore E. Daya, George Z. Lib, and Yexiao Xu
Journal of Financial Economics
100(3). pp. 579–593. June 2011.

**Abstract**

Empirical support for the hypothesis that closed-end fund discounts are related to overhanging tax liabilities has been mixed. We introduce a new approach to testing this hypothesis by examining changes in discount levels following distributions of dividends and capital gains. Since distributions reduce future shareholder tax liabilities, the tax liability hypothesis implies that closed-end fund discounts should decline following distributions. Focusing on changes in discounts isolates this tax effect by eliminating the impact of other fund-specific factors on discount levels. Our results support the tax liability hypothesis, showing that short-run fluctuations in discounts are directly affected by taxable distributions.
(http://papers.ssrn.com/sol3/papers.cfm?abstract_id=970385)

***"Performance persistence of closed-end funds."***
Elyas Elyasiani and Jingyi Jia
Review of Quantitative Finance and Accounting
37(3). pp. 381-408. 2011.

**Abstract**

Studies of performance persistence of closed-end funds (CEFs) use two measures of persistence; autocorrelation and rank correlation of performance. The autocorrelation measure offers limited information because it cannot separate persistence relative to the market and to the industry. The rank correlation measure is generally applied to two periods, disregarding multi-period persistence. We investigate performance persistence of CEFs in terms of both market price return and net asset value return using contingency tables and multiple regression models. Jensen's alpha and the Sharpe ratio are used as measures of risk-adjusted performance. We test three hypotheses: (i) CEFs performing better than the industry median will do so persistently, (ii) CEFs outperform the market persistently; and (iii) performance persistence can be partly explained by dividend yield. The findings are fivefold. First, the number of persistent years varies with the models used to calculate risk-adjusted performance. Second, with 4-index unconditional beta fixed variance model, CEFs persistently beat their industry for six out of 10 years in terms of both market price return and net asset value return. Third, with a 4-index unconditional beta fixed variance model, we find performance persistence relative to market for 6 and 7 years, out of the 10 years considered, in terms of market price return and net asset value return, respectively. Fourth, the disaggregate sample tests show that performance of municipal bond funds is more persistent than equity funds and taxable bond funds. Fifth, dividend patterns can partially explain persistence with liquidity as control.
(http://papers.ssrn.com/sol3/papers.cfm?abstract_id=237793)





***"Activist arbitrage: A study of open-ending attempts of closed-end funds."***
Michael Bradley , Alon Brav , Itay Goldstein , Wei Jiang
Journal of Financial Economics
95(2010). pp. 1–19. 2010.

**Abstract**

This paper documents frequent attempts by activist arbitrageurs to open-end discounted closed-end funds, particularly after the 1992 proxy reform which reduced the costs of communication among shareholders. Open-ending attempts have a substantial effect on discounts, reducing them, on average, to half of their original level. The size of the discount is a major determinant of whether a fund gets attacked. Other important factors include the costs of communication among shareholders and the governance structure of the targeted fund. Our study contributes to the understanding of the actions undertaken by arbitrageurs in financial markets beyond just pure trading.
(http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1947048)

***"Around-the-Clock Performance of Closed-End Funds."***
Ben Branch, Aixin Ma, and Jill Sawyer
Financial Management
pp. 1177 – 1196. Autumn 2010.

**Abstract**

Herein, we find that the market price of closed-end fund shares tends to increase (decrease) in anticipation of a rise (fall) in the net asset value (NAV). Similarly, an increase (decrease) in the reported NAV tends to be followed by a rise (fall) in the price of the fund's shares. Interestingly, we also find a powerful negative autocorrelation between closed-end fund shares' overnight and intraday returns in both univariate and multivariate tests for both the overall sample and a number of subsamples. We believe that this tendency results from the strategies that many specialists employ when they open their assigned shares.
(http://onlinelibrary.wiley.com/doi/10.1111/j.1755-053X.2010.01108.x/abstract)

***"Closed-End Private Equity Funds: A Detailed Overview of Fund Business Terms, Part I."***
Seth Chertok, Addison D. Braendel
The Journal of Private Equity
13(2). pp. 33-54. Spring 2010.

**Abstract**

With the interests of both investors and sponsors in mind, this article discusses business terms that are the subject of frequent negotiation between investors and closed-end private equity funds, with a bias toward closed-end private equity real estate funds. Where applicable, the authors note the background legal and regulatory requirements surrounding these negotiations as well as their broader views on the market. The article also explores fund economics and capital mechanics, including capital calls, fees, and expenses; various concerns faced by specific investors (such as ERISA and tax exempt investors); and confidentiality issues.
(http://www.iijournals.com/doi/abs/10.3905/JPE.2010.13.2.033)

***"Investment barriers and premiums on closed-end country funds."***
Jang-Chul Kim, Kyojik "Roy" Song
International Review of Economics and Finance
19. pp. 615–626. 2010.

**Abstract**

We investigate the cross-sectional relation between investment barriers and premiums on closed-end country funds (CECFs) traded in U.S. markets over the period from 1995 to 2004. We find that funds investing in markets with higher indirect investment barriers as measured by market turnover and country risk have higher premiums. We also document that the relation between the country risk and CECF premium is much stronger after the stock market liberalization. Since investors prefer to invest in emerging markets with high indirect barriers through country funds, they increase the premiums of the funds targeting those countries. In addition, we find that direct investment barriers as measured by the investable weight factor do not explain the large variation in the CECF premiums.
http://www.sciencedirect.com/science/article/pii/S1059056010000080

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***"The dual characteristics of closed-end country funds: the role of risk."***
Chung-Hua Shen, Shyh-Wei Chen and Chien-Fu Chen
Applied Economics
42(8), pp. 1003-1013. 2010.

**Abstract**

This article explores which of two hypotheses, market segmentation or investor sentiment, determines the behaviour of Closed-End Country Funds (CECFs) with the inclusion of risk factors. The risk factors are proxied volatility, as estimated with a Bivariate Markov-switching Autoregressive Conditional Heteroskedasticity (BSWARCH) model, which simultaneously includes foreign and US markets. Our findings are as follows. On average, a positive response is larger than a negative response in terms of absolute value. And, the market segmentation hypothesis with risk factors gains support in Mexico, where CECF returns are related to a market with low volatility but not to one with high volatility. Third, the investor sentiment hypothesis, which argues that CECF returns are not responsive to foreign markets, is weakly supported in Brazil, the Philippines, Indonesia and, to a lesser degree, in Germany.
http://ntur.lib.ntu.edu.tw/retrieve/169186/06.pdf

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***"The Structure of Closed-End Fund Discounts."***
Bruce D. Niendorf and Kristine L. Beck
The Journal of Investing
16(3). pp. 89-95. Fall 2007.

**Abstract**

Closed-end funds represent an ideal vehicle for studying the possibility of mispricing in financial markets. Despite substantial previous research, much remains to be learned about why closed-end funds consistently sell at values other than their net asset value. This study investigates nine potential explanations of the discounts on closed-end equity funds. These explanations include dividend yield, discount volatility, tax-trading opportunities, unrealized capital appreciation, managerial performance, managerial expense ratios, portfolio turnover, volume, and block ownership. Test results show significant support for the theory that the size of the discount may be due to investors seeking compensation for dividend related tax costs. There is also strong support for a positive relationship between the size of the discount and the risk associated with the discount variance. The third significant result concerns the ability of block-holders to either participate in improper trading of fund shares or to protect small investors from improper fund trading.
http://www.iijournals.com/doi/abs/10.3905/joi.2007.694769





***"The Impact of Rights Offerings on the Shares of Closed-End Country Funds: Theory and Evidence."***
Joel S. Sternberg and H. Doug Witte
The Journal of Alternative Investments
9(4). pp. 57-65. Spring 2007.

**Abstract**

Closed-end funds have presented somewhat of an enigma to the finance profession. These funds, which generally can only be purchased or sold in the open market, tend to trade at discounts to the net asset value of their holdings. In recent years several closed-end hedge funds have come into existence as well. This article examines the impact of rights offerings on the shares of closed-end country funds. Closed-end funds frequently announce rights offering that enable their shareholders to buy new shares at a discount. Utilizing a quasi-arbitrage framework, the article theorizes how the rights offering should affect the shares, focusing most specifically on the announcement day and ex-date event windows. The theoretical model presented is then tested against the empirical data. It is found that the rights offerings have a substantial negative impact on the shares of closed-end country funds, but that behavior during the event windows is contrary to the predictions of the theoretical model.
http://www.iijournals.com/doi/abs/10.3905/jai.2007.682736

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***"Close-End Funds, Exchange-Traded Funds, and Hedge Funds – Origins, Functions, and Literature."***
Seth C. Anderson, Jeffery A. Born and Oliver Schnusenberg
ISBN 978-1-4419-0167-5
Springer New York. 2009.

**Excerpt**

"Investment companies provide investment management and bookkeeping services to investors who do not have the time or expertise to manage their own portfolios. In the United States, these companies have proliferated and evolved over the last century; today there are thousands of investment companies with varying characteristics. They are structured as either open-end funds (mutual funds), closed-end funds (CEFs), or investment trusts (UITs).

In the following chapter, we present an overview of the basic characteristics of mutual funds, CEFs, and UITs, as well as exchange traded funds (ETFs) and hedge funds. Chapter 3 presents a short history of the evolution of investment companies in the United States as well as an overview of more recent developments pertinent to CEFs, ETFs, and hedge funds, which are the foci of this volume.

Chapter 4 addresses CEFs, which originated in Europe more than a century ago. These funds differ from ordinary mutual funds in that they do not continuously issue or redeem ownership shares. Initially, there is a public offering of shares, after which the shares trade in the secondary public market.

Chapter 5 involves ETFs, which are investment companies that are typically registered under the investment company act of 1940 as either open-end funds or UITs. The shares of ETFs trade in the secondary public market.

Chapter 6 addresses hedge funds, which are private limited partnerships that accept investors' money and invest in a pool of securities. Hedge funds are essentially unregulated, and their shares do not trade in the secondary markets."

# Attribution Analysis of Bull/Bear Alphas and Betas

## with Applications to Downside Risk Management

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## Asymmetrical Risk and Return

Asymmetries in risk and return characteristics come in various forms: assets with highly non-linear payoff profiles, correlations which increase in times of market turbulence, successful information-driven market timing strategies and data-driven dynamic portfolio insurance strategies lead to gain and loss sensitivities which can be very different in bull and bear markets.

This contrasts strongly with traditional models, which are dominated by symmetric risk measures such as volatility and beta: A return of 15% below the mean has the same impact on volatility as a return of 15% above the mean; the beta of a portfolio is 0.85, independent of whether the benchmark makes -15% or +15%. To be fair, one has to say that research to enhance the traditional concepts with asymmetrical features began as far back as the 1970's. Interestingly asymmetric modeling still enjoys the status of "frontier research" about 40 years later.

In this research note, we will discuss a specific asymmetrical model and build an attribution framework which allows an analysis of the impact of asymmetry on Alpha and Beta to the traditional single-index model with its symmetric Alpha and Beta. Our attribution methodology has some interesting features which differ from traditional attribution analysis of portfolio returns. For example, in a Brinson decomposition we are used to having an interaction effect and the sum of allocation, selection and interaction is typically positive or negative. In contrast, our attribution of asymmetrical alpha and beta will be free of any interaction effects and we will show that the sum of effects on alpha and beta will always equal zero; asymmetry is a zero sum game when evaluated relative to a symmetrical model.

The zero sum property of relative effects does not mean that asymmetric investment strategies or asymmetric models have "zero value". On the contrary, we will illustrate how asymmetrical models can be used in ex post portfolio analysis to detect "false" alphas caused by "hidden" asymmetrical betas. Additionally, asymmetrical betas can be used in ex ante portfolio construction for the purpose of downside risk management.

Attribution Framework for a Dual alpha/dual beta Factor Model

Single-index models are nothing more than a linear regression of portfolio, fund or asset excess return time series on some benchmark excess return time series.

$$r_{P,t} = \alpha + \beta \cdot r_{B,t} + \varepsilon_t$$

Typically, the slope coefficient Beta is calculated as the ratio of covariance between portfolio and benchmark returns and benchmark variance.

$$\beta = \frac{Cov[r_P, r_B]}{\sigma_B^2}$$

The above linear relationship is exact at one

point, namely average portfolio and benchmark return.

$$\bar{r}_P = \alpha + \beta \cdot \bar{r}_B$$

This property can be used to calculate Alpha after we have calculated Beta with the above formula and the average returns.

$$\alpha = \bar{r}_P - \beta \cdot \bar{r}_B$$

We see that Alpha is not calculated directly, but as the residual not explained by the return contribution of Beta. A straight-forward approach to model asymmetry is to partition the time series in the above calculations into two distinct data sets and then compare the Alpha and Beta values. Various criteria to partition the return time series are possible. An obvious choice is to distinguish bear and bull returns. We define bear markets as states of the world in which benchmark returns are negative. Similarly, bull markets are defined as states of the world in which benchmark returns are larger than or equal to zero. Of course, portfolio returns will differ from market returns so not all bear market portfolio returns will necessarily be negative, and not all bull market portfolio returns will be positive.

The bull and bear market alphas and betas can be derived by applying the single-index model calculations to the bear and bull market data sets separately. We run the following regressions.

$$r_{P,Bull,t} = \alpha_{Bull} + \beta_{Bull} \cdot r_{B,Bull,t} + \varepsilon_{Bull,t}$$

$$r_{P,Bear,t} = \alpha_{Bear} + \beta_{Bear} \cdot r_{B,Bear,t} + \varepsilon_{Bear,t}$$

If asymmetric risk and return characteristics are present, the bull parameters will differ from the bear parameters. More formally, we could perform a Chow test, which is usually used to detect structural breaks. In the context of comparing regression parameters across bull and bear markets, we would test whether or not asymmetrical risk and return characteristics are relevant.

It would be very convenient if the parameters are additive. Unfortunately, this is not the case; it can be shown that.

$$\alpha_{Bear} + \alpha_{Bear} \neq \alpha$$

$$\beta_{Bear} + \beta_{Bear} \neq \beta$$

The calculations can be simplified by introducing dummy variables, which are binary indicators of whether the state of the world at time t is a bull or bear market.

$$\mathrm{I}_{Bull,t} = \begin{cases} 0 & r_{B,t} < 0 \\ 1 & r_{B,t} \geq 0 \end{cases}$$

$$\mathrm{I}_{Bear,t} = \begin{cases} 0 & r_{B,t} \geq 0 \\ 1 & r_{B,t} < 0 \end{cases}$$

With the help of these indicators, we estimate bull and bear parameters from a single regression, which we call the dual alpha / dual beta asymmetrical index model.

$$r_{P,t} = \alpha_{Bull} \cdot \mathrm{I}_{Bull,t} + \alpha_{Bear} \cdot \mathrm{I}_{Bear,t} + \beta_{Bull} \cdot r_{B,t} \cdot \mathrm{I}_{Bull,t} + \beta_{Bear} \cdot r_{B,t} \cdot \mathrm{I}_{Bear,t} + \varepsilon_t$$





The statistical properties of the asymmetrical index model would require more detailed discussion than is possible in this paper. For example, note that since bull and bear states are exclusive, the indicator functions are perfectly negatively correlated, something which can cause problems when estimating parameters and judging their significance. It is possible to formulate more suitable models for estimation purposes, from which the parameters of the above dual alpha and dual beta model can be recovered. In order to keep the presentation as clear as possible, we continue using the intuitive dual alpha / dual beta model introduced above.

While the above model is intuitive and convenient to estimate, we are still not able to establish simple additive relationships between the symmetric and asymmetric parameters.

$$r_{P,t} \neq (\alpha_{Bull} + \alpha_{Bear}) + (\beta_{Bull} + \beta_{Bear}) \cdot r_{B,t} + \varepsilon_t$$

Sacrificing the convenience of the one-step estimation procedure, one can derive an additive relationship with a two-step estimation procedure.

First Step: Estimate the symmetric model and calculate the time series of residuals ε.

$$r_{P,t} = \alpha + \beta \cdot r_{B,t} + \varepsilon_t$$

Second Step: Estimate incremental asymmetrical Alphas and Betas by regressing the residuals ε on the dummy variables and benchmark returns.

$$\varepsilon_t = \Delta\alpha_{Bear} \cdot \mathrm{I}_{Bear,t} + \Delta\alpha_{Bull} \cdot \mathrm{I}_{Bull,t} + \Delta\beta_{Bear} \cdot r_{B,t} \cdot \mathrm{I}_{Bear} + \Delta\beta_{Bull} \cdot r_{B,t} \cdot \mathrm{I}_{Bull,t} + \varepsilon_t'$$

The incremental parameters are related to the symmetric parameters as follows.

$$\alpha_{Bear} = \alpha + \Delta\alpha_{Bear}$$
$$\alpha_{Bull} = \alpha + \Delta\alpha_{Bull}$$
$$\beta_{Bull} = \beta + \Delta\beta_{Bull}$$
$$\beta_{Bear} = \beta + \Delta\beta_{Bear}$$

Inserting the definition of the incremental effects into the equation in the second step, and then substituting ε in step one, we get.

$$r_{P,t} = \alpha + \beta \cdot r_{B,t} + (\alpha_{Bear} - \alpha) \cdot \mathrm{I}_{Bear,t} + (\alpha_{Bull} - \alpha) \cdot \mathrm{I}_{Bull,t} + \ldots$$
$$\ldots(\beta_{Bear} - \beta) \cdot r_{B,t} \cdot \mathrm{I}_{Bear,t} + (\beta_{Bull} - \beta) \cdot r_{B,t} \cdot \mathrm{I}_{Bull,t} + \varepsilon_t$$

This simplifies to.

$$r_{P,t} = \alpha_{Bear} \cdot \mathrm{I}_{Bear,t} + \alpha_{Bull} \cdot \mathrm{I}_{Bull,t} + \beta_{Bear} \cdot r_{B,t} \cdot \mathrm{I}_{Bear,t} + \beta_{Bull} \cdot r_{B,t} \cdot \mathrm{I}_{Bull,t} + \varepsilon_t$$

Regressing the residuals of the symmetric index model on the explanatory variables of the asymmetric dual Alpha / dual Beta model, results in incremental bull and bear Alphas and Betas that establish a simple additive relationship between the parameters of the two models.
We now define an Alpha effect a, which measures the return contribution of the incremental alphas.

$$a = p_{Bear} \cdot \Delta\alpha_{Bear} + p_{Bull} \cdot \Delta\alpha_{Bull}$$

The variable p represents the state probability. By substituting the definitions of the incremental Alphas, it is possible to express the Alpha effect in terms of symmetric and asymmetric Alphas.

$$a = p_{Bear} \cdot \alpha_{Bear} + p_{Bull} \cdot \alpha_{Bull} - \alpha$$

Beta is a sensitivity measure. In order to measure its contribution to return, it needs to be multiplied with the expected bull and bear benchmark returns.

$$b = \Delta\beta_{Bear} \cdot \overline{r_B \cdot \mathrm{I}}_{Bear} + \Delta\beta_{Bull} \cdot \overline{r_B \cdot \mathrm{I}}_{Bull}$$

$$b = \beta_{Bear} \cdot \overline{r_B \cdot \mathrm{I}}_{Bear} + \beta_{Bull} \cdot \overline{r_B \cdot \mathrm{I}}_{Bull} - \beta \cdot \bar{r}_B$$

Both the single-index model and the bull/bear model analyze the same portfolio.

$$\bar{r}_P = \alpha + \beta \cdot \bar{r}_B = \bar{\mathrm{I}}_{Bear} \cdot \alpha_{Bear} + \bar{\mathrm{I}}_{Bull} \cdot \alpha_{Bull} + \beta_{Bear} \cdot \overline{r_B \cdot \mathrm{I}}_{Bull} + \beta_{Bull} \cdot \overline{r_B \cdot \mathrm{I}}_{Bull}$$

From the above, it follows that.

$$\bar{r}_{P,SingleIndexModel} - \bar{r}_{P,DualAlphaDualBetaModel} = a + b = 0$$

This is the proof that relative to the single-index model, asymmetries measured in an asymmetrical model are a "zero sum game": The sum of return contributions from asymmetric Alphas must be offset by the return contribution from asymmetric Betas.

Note what the above does not imply.

$$\Delta\alpha_{Bear} \cdot \bar{\mathrm{I}}_{Bear} + \Delta\alpha_{Bull} \cdot \bar{\mathrm{I}}_{Bull} \neq 0$$

The redistribution of Alpha to bull and bear Alphas is not zero sum, neither is the redistribution of Beta to bull and bear Betas.

$$\overline{r_B \cdot \mathrm{I}}_{Bear} \cdot \Delta\beta_{Bear} + \overline{r_B \cdot \mathrm{I}}_{Bull} \cdot \Delta\beta_{Bull} \neq 0$$

The sum of the return contribution from bull and bear Alphas and Betas add up to what we call the overall "contribution from asymmetry".

$$p_{Bear} \cdot \alpha_{Bear} + p_{Bull} \cdot \alpha_{Bull} - \alpha = ContrAsymmetry$$

$$ContrAsymmetry = \beta \cdot \bar{r}_B - \beta_{Bear} \cdot \overline{r_B \cdot \mathrm{I}}_{Bear} - \beta_{Bull} \cdot \overline{r_B \cdot \mathrm{I}}_{Bull}$$

The contribution from asymmetry consists of redistribution from Alpha to Beta contributions when the portfolio's investment strategy, relative to its benchmark, is convex. For concave dependencies, the redistribution takes place in the other direction.

This means that assessing convex investment strategies with the single-index model will always result in overestimated Alphas: The single-index model indicates "false Alphas due to the existence of "hidden asymmetrical betas". The Alphas of concave strategies will have a downward bias. The purpose of our bull/bear attribution approach is to identify the sign and the magnitude of the bias.

It is also possible to measure the contribution of individual positions to total contribution from asymmetry. This is straight-forward, because the disaggregation of portfolio Alphas and Betas into contributions from portfolio constituents is linear.

Exhibit 1:

| | Constituents | | Single-Index Model | | Dual Alpha Dual Beta Model | | | |
|---|---|---|---|---|---|---|---|---|
| | Weight | Avg Return | Alpha | Beta | Bear Alpha | Bull Alpha | Bear Beta | Bull Beta |
| A | - | 0.0086% | 0.1920% | 0.7563 | 3.2176% | 0.0931% | 1.1935 | 0.5137 |
| B | - | -0.2038% | 0.1119% | 1.3021 | 0.5056% | -1.7307% | 1.3004 | 1.7122 |
| C | - | 0.0869% | 0.1592% | 0.2981 | 0.7397% | 1.2192% | 0.4166 | -0.0089 |
| D | - | 0.8719% | 0.9777% | 0.4364 | 0.1021% | -0.8212% | 0.2513 | 0.9477 |
| E | - | 0.1757% | 0.3461% | 0.7026 | 0.3101% | 0.0428% | 0.6877 | 0.7790 |
| F | - | 0.3390% | 0.4834% | 0.5955 | -0.0246% | -0.7862% | 0.4809 | 0.9467 |
| G | - | 0.4976% | 0.3259% | -0.7083 | 1.9599% | 3.7552% | -0.3607 | -1.6800 |
| H | - | -0.2307% | 0.0109% | 0.9963 | -0.0185% | 0.1185% | 0.9955 | 0.9729 |
| I | - | 0.8607% | 0.9900% | 0.5330 | 1.0269% | 0.2144% | 0.5135 | 0.7170 |
| J | - | 0.3100% | 0.2804% | -0.1222 | -0.3340% | 1.7606% | -0.1642 | -0.4254 |
| K | 20.00% | -0.0707% | 0.2887% | 1.4824 | -1.1216% | -1.3506% | 1.2247 | 2.0023 |
| L | 20.00% | 0.3961% | 0.4063% | 0.0809 | -1.4317% | 0.1192% | -0.1958 | 0.3121 |
| M | 20.00% | 0.4531% | 0.4672% | 0.0583 | 0.4820% | 0.4811% | 0.0609 | 0.0537 |
| N | 20.00% | 0.5552% | 0.6213% | 0.2724 | -0.9751% | 1.2998% | 0.0618 | 0.2492 |
| O | 20.00% | 0.9074% | 1.1619% | 1.0495 | 0.3047% | 0.3456% | 0.8986 | 1.3220 |
| P | - | 0.9974% | 1.0242% | 0.1105 | 0.3438% | 2.1648% | 0.0480 | -0.1049 |
| **Portfolio** | | **0.4482%** | **0.5891%** | **0.5887** | **-0.5483%** | **0.1790%** | **0.4100** | **0.7879** |
| **Benchmark** | | **-0.2425%** | | | | | | |

Exhibit 2:

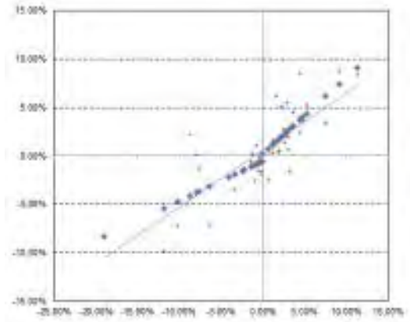

Exhibit 3:

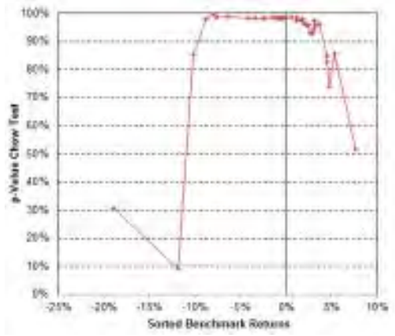


Exhibit 5:

| | Constituent Contributions | Single-Index Model | | | Incremental Dual Alpha Dual Beta Model | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Alpha | Beta | Total | Bear Alpha | Bull Alpha | Beat Beta | Bull Beta | Total Alpha | Total Beta |
| A | - | - | - | - | - | - | - | - | - | - |
| B | - | - | - | - | - | - | - | - | - | - |
| C | - | - | - | - | - | - | - | - | - | - |
| D | - | - | - | - | - | - | - | - | - | - |
| E | - | - | - | - | - | - | - | - | - | - |
| F | - | - | - | - | - | - | - | - | - | - |
| G | - | - | - | - | - | - | - | - | - | - |
| H | - | - | - | - | - | - | - | - | - | - |
| I | - | - | - | - | - | - | - | - | - | - |
| J | - | - | - | - | - | - | - | - | - | - |
| K | -0.0141% | 0.0577% | -0.0719% | **-0.0141%** | -0.1343% | -0.1717% | 0.1098% | 0.1963% | **-0.3061%** | **0.3061%** |
| L | 0.0792% | 0.0813% | -0.0039% | **0.0773%** | -0.1750% | -0.0301% | 0.1179% | 0.0873% | **-0.2051%** | **0.2051%** |
| M | 0.0906% | 0.0934% | -0.0028% | **0.0906%** | 0.0014% | 0.0015% | -0.0011% | -0.0018% | **0.0029%** | **-0.0029%** |
| N | 0.1110% | 0.1243% | -0.0132% | **0.1110%** | -0.1520% | 0.0711% | 0.0897% | -0.0088% | **-0.0810%** | **0.0810%** |
| O | 0.1815% | 0.2324% | -0.0509% | **0.1815%** | -0.0816% | -0.0855% | 0.0643% | 0.1029% | **-0.1671%** | **0.1671%** |
| P | - | - | - | - | - | - | - | - | - | - |
| **Portfolio** | **0.4482%** | **0.5891%** | **-0.1428%** | **0.4463%** | **-0.5416%** | **-0.2148%** | **0.3805%** | **0.3759%** | **-0.7564%** | **0.7564%** |
| **Benchmark** | **-0.2425%** | | | | | | | | | |

$$\alpha_P = \sum_{i=1}^{n} w_i \cdot \alpha_i \qquad \beta_P = \sum_{i=1}^{n} w_i \cdot \beta_i$$

where w represents the percentage weight of a constituent in the portfolio.

**Ex Post Attribution for a Sample Fund of Hedge Funds**

We will now apply the framework to a sample portfolio, which is a fund of hedge funds consisting of 16 single-hedge funds. The table below shows the parameters of the single-index and dual alpha/dual beta model for a particular portfolio.

As we can see, the portfolio outperforms the benchmark. The portfolio seems to exhibit significant Alpha (0.59%) and is positioned rather defensive relative to the benchmark (Beta value of 0.589). The asymmetric model shows that Alpha is distributed very unevenly across bull and bear markets. In fact, the portfolio exhibits a rather significant negative bear Alpha (-0.55%) and only a slightly positive bull Alpha (0.18%). The risk positioning is defensive in both bull and bear markets, but exposure in bull markets is much higher than exposure in bear markets (0.788 versus 0.410). The asymmetric Betas imply that the investment strategy is convex. This can be seen graphically, when plotting actual and fitted portfolio returns against benchmark returns.

The model assumes that the break between the bull/bear regimes occurs at a benchmark return of zero. A Chow test at 95% significance indicates that the use of a dual alpha/dual beta model is indeed justified by the data. Calculating Chow test p-values for all benchmark returns, we see that asymmetry is relevant for breakpoints ranging from -10% to 4%.An important input in the calculation of the attribution effects is the expected factor returns.

Exhibit 6:

| | Constituents | | Single-Index Model | | Dual Alpha Dual Beta Model | | | |
|---|---|---|---|---|---|---|---|---|
| | Weight | Avg Return | Alpha | Beta | Bear Alpha | Bull Alpha | Bear Beta | Bull Beta |
| A | - | 0.0086% | 0.1920% | 0.7563 | 3.2176% | 0.0931% | 1.1935 | 0.5137 |
| B | - | -0.2038% | 0.1119% | 1.3021 | 0.5056% | -1.7307% | 1.3004 | 1.7122 |
| C | - | 0.0869% | 0.1592% | 0.2981 | 0.7397% | 1.2192% | 0.4166 | -0.0089 |
| D | - | 0.8719% | 0.9777% | 0.4364 | 0.1021% | -0.8212% | 0.2513 | 0.9477 |
| E | - | 0.1757% | 0.3461% | 0.7026 | 0.3101% | 0.0428% | 0.6877 | 0.7790 |
| F | - | 0.3390% | 0.4834% | 0.5955 | -0.0246% | -0.7862% | 0.4809 | 0.9467 |
| G | - | 0.4976% | 0.3259% | -0.7083 | 1.9599% | 3.7552% | -0.3607 | -1.6800 |
| H | - | -0.2307% | 0.0109% | 0.9963 | -0.0185% | 0.1185% | 0.9955 | 0.9729 |
| I | - | 0.8607% | 0.9900% | 0.5330 | 1.0269% | 0.2144% | 0.5135 | 0.7170 |
| J | - | 0.3100% | 0.2804% | -0.1222 | -0.3340% | 1.7606% | -0.1642 | -0.4254 |
| K | - | -0.0707% | 0.2887% | 1.4824 | -1.1216% | -1.3506% | 1.2247 | 2.0023 |
| L | - | 0.3961% | 0.4063% | 0.0809 | -1.4317% | 0.1192% | -0.1958 | 0.3121 |
| M | - | 0.4531% | 0.4672% | 0.0583 | 0.4820% | 0.4811% | 0.0609 | 0.0537 |
| N | - | 0.5552% | 0.6213% | 0.2724 | -0.9751% | 1.2998% | 0.0618 | 0.2492 |
| O | - | 0.9074% | 1.1619% | 1.0495 | 0.3047% | 0.3456% | 0.8986 | 1.3220 |
| P | 100.00% | 0.9974% | 1.0242% | 0.1105 | 0.3438% | 2.1648% | 0.0480 | -0.1049 |
| **Portfolio** | | **0.9974%** | **1.0242%** | **0.1105** | **0.3438%** | **2.1648%** | **0.0480** | **-0.1049** |
| **Benchmark** | | **-0.2425%** | | | | | | |



Exhibit 7:

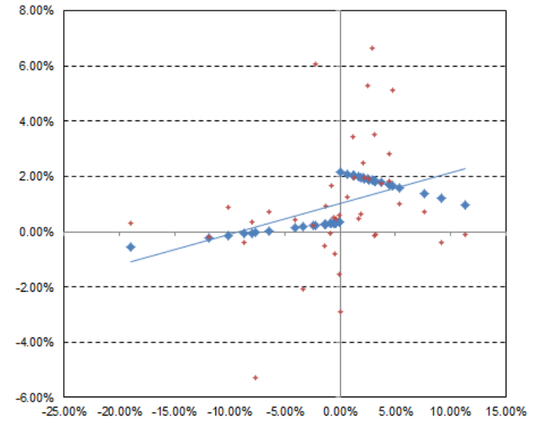




Exhibit 4:

| Single-Index Model | | Dual Alpha Dual Beta Model | | | |
|---|---|---|---|---|---|
| Alpha | Beta | Bear Alpha | Bull Alpha | Bear Beta | Bull Beta |
| **1.0000** | **-0.2425%** | **47.6190%** | **52.3810%** | **-2.1298%** | **1.8874%** |

The expected value of the dummy variables can be interpreted as probabilities: the probability of a bear market is 47.6%, the probability of a bull market 1 - 47.6% = 52.4%.

The attribution analysis is summarized in the table below. We see that due to the convexity of the strategy, the return contribution of Alpha was overstated by 0.756%, the largest driver being fund K (due to its bull Beta higher than 2).

The total Alpha effect of -0.756% is the negative of the total Beta effect 0.756%. This reflects the zero sum characteristics of the differences between the symmetrical single-index model and the asymmetrical Dual Alpha / Dual Beta model. The signs of the total effects are indicators for the direction of the redistribution and should not be misinterpreted as "benefits of asymmetric

Exhibit 8:

| | Constituents | | Single-Index Model | | Dual Alpha Dual Beta Model | | | |
|---|---|---|---|---|---|---|---|---|
| | Weight | Avg Return | Alpha | Beta | Bear Alpha | Bull Alpha | Bear Beta | Bull Beta |
| A | - | 0.0086% | 0.1920% | 0.7563 | 3.2176% | 0.0931% | 1.1935 | 0.5137 |
| B | - | -0.2038% | 0.1119% | 1.3021 | 0.5056% | -1.7307% | 1.3004 | 1.7122 |
| C | - | 0.0869% | 0.1592% | 0.2981 | 0.7397% | 1.2192% | 0.4166 | -0.0089 |
| D | 17.89% | 0.8719% | 0.9777% | 0.4364 | 0.1021% | -0.8212% | 0.2513 | 0.9477 |
| E | - | 0.1757% | 0.3461% | 0.7026 | 0.3101% | 0.0428% | 0.6877 | 0.7790 |
| F | - | 0.3390% | 0.4834% | 0.5955 | -0.0246% | -0.7862% | 0.4809 | 0.9467 |
| G | - | 0.4976% | 0.3259% | -0.7083 | 1.9599% | 3.7552% | -0.3607 | -1.6800 |
| H | - | -0.2307% | 0.0109% | 0.9963 | -0.0185% | 0.1185% | 0.9955 | 0.9729 |
| I | - | 0.8607% | 0.9900% | 0.5330 | 1.0269% | 0.2144% | 0.5135 | 0.7170 |
| J | - | 0.3100% | 0.2804% | -0.1222 | -0.3340% | 1.7606% | -0.1642 | -0.4254 |
| K | - | -0.0707% | 0.2887% | 1.4824 | -1.1216% | -1.3506% | 1.2247 | 2.0023 |
| L | - | 0.3961% | 0.4063% | 0.0809 | -1.4317% | 0.1192% | -0.1958 | 0.3121 |
| M | - | 0.4531% | 0.4672% | 0.0583 | 0.4820% | 0.4811% | 0.0609 | 0.0537 |
| N | - | 0.5552% | 0.6213% | 0.2724 | -0.9751% | 1.2998% | 0.0618 | 0.2492 |
| O | 78.25% | 0.9074% | 1.1619% | 1.0495 | 0.3047% | 0.3456% | 0.8986 | 1.3220 |
| P | 3.86% | 0.9974% | 1.0242% | 0.1105 | 0.3438% | 2.1648% | 0.0480 | -0.1049 |
| **Portfolio** | | **0.9045%** | **1.1236%** | **0.9036** | **0.2700%** | **0.2072%** | **0.7500** | **1.2000** |
| **Benchmark** | | **-0.2425%** | | | | | | |

Exhibit 9:

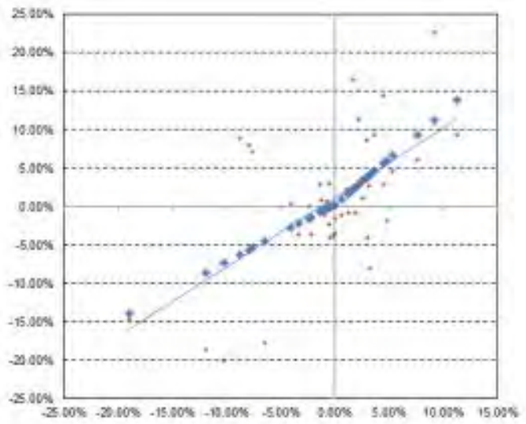


Exhibit 11:

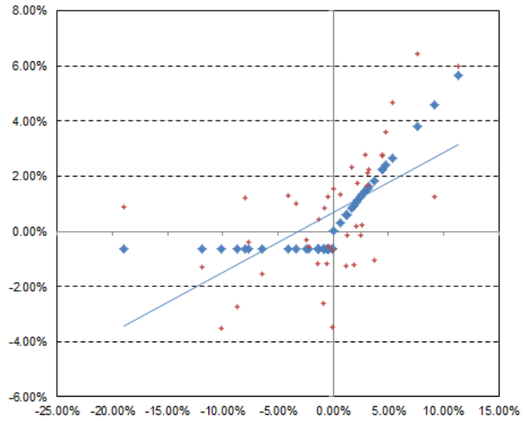


Exhibit 10:

| | Constituent Contributions | Single-Index Model | | | Incremental Dual Alpha Dual Beta Model | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Alpha | Beta | Total | Bear Alpha | Bull Alpha | Beat Beta | Bull Beta | Total Alpha |
| A | - | - | - | - | - | - | - | - | - |
| B | - | - | - | - | - | - | - | - | - |
| C | - | - | - | - | - | - | - | - | - |
| D | 0.3255% | 0.3650% | -0.0395% | **0.3255%** | -0.1557% | -0.3518% | 0.1471% | 0.3603% | **-0.5074%** |
| E | - | - | - | - | - | - | - | - | - |
| F | - | - | - | - | - | - | - | - | - |
| G | - | - | - | - | - | - | - | - | - |
| H | - | - | - | - | - | - | - | - | - |
| I | - | - | - | - | - | - | - | - | - |
| J | - | - | - | - | - | - | - | - | - |
| K | - | - | - | - | - | - | - | - | - |
| L | 0.2013% | 0.2065% | -0.0100% | **0.1965%** | -0.4448% | -0.0764% | 0.2995% | 0.2218% | **-0.5213%** |
| M | - | - | - | - | - | - | - | - | - |
| N | - | - | - | - | - | - | - | - | - |
| O | - | - | - | - | - | - | - | - | - |
| P | 0.1181% | 0.1213% | -0.0032% | **0.1181%** | -0.0384% | 0.0708% | 0.0158% | -0.0482% | **0.0324%** |
| **Portfolio** | **0.6449%** | **0.6928%** | **-0.0526%** | **0.6401%** | **-0.6389%** | **-0.3575%** | **0.4624%** | **0.5339%** | **-0.9963%** |
| **Benchmark** | **-0.2425%** | | | | | | | | |

over symmetrical strategies" in absolute terms.

**Fund of Hedge Funds Portfolio Construction**

The previous analysis was backward looking, explaining realized portfolio results in the context of two factor models and attributing the differences to position-level contributions.

We now would like to illustrate the use of the dual alpha/dual beta model in an ex ante context, in the construction of fund of hedge funds. Assuming that we have all the necessary inputs and that they are representative of future realized values, we can define target overall portfolio characteristics and then solve for consistent weights which result in portfolios which are best aligned with the targets (portfolio optimization). In addition to the targets, we can specify portfolio properties that need to be fulfilled (restrictions).

Let us consider an optimization which aims to maximize the portfolio's return. As restrictions, we define that the portfolio shall not be leveraged (total risk exposure = 100%) and prohibit position-level leverage (each constituent weight <= 100%) as well as short positions (each constituent weight >=0%).





The bull/bear alpha and beta attribution of the resulting portfolio looks like this.

We see that the return of this portfolio would be solely invested in fund P. The reason fund P is chosen is that it has a very large Alpha next to a very small Beta. Remember, the expected benchmark return is negative (-0.242%), therefore small market exposures (low Beta) and large Alphas are highly desirable.

The maximum return portfolio is presented graphically in Exhibit 7.

The portfolio is not concave and even has a negative bull market beta. Such a portfolio only makes sense for extremely pessimistic expectations, if at all. If we would like to continue working with such pessimistic expectations, but would like to construct portfolios with less extreme features, we can introduce constraints. For example:

- The bull Beta of the portfolio should be at least 1.2
- The bear Beta of the portfolio should be smaller than 0.75

So we are effectively forcing the portfolio to be a convex strategy. Such a portfolio would obviously not perform as well in a scenario with negative expected market returns. On the other hand, it would be a portfolio that performs much better if an "unexpected recovery" takes place and future market returns are positive. The results for such an optimized portfolio are provided in Exhibits 8 and 9.

As we can see from the chart, the strategy is convex, as we required. Interestingly, the return of the portfolio is virtually the same (it is slightly lower) as the return of the optimized portfolio without beta restrictions. Hence, we have constructed a portfolio which performs almost identically to the previous pessimistic portfolio if our return expectations materialize in the future, but which also performs well in a scenario with positive market returns.

Another example would be the construction of a low risk "absolute return product", in the sense of a portfolio with bear beta equal to zero and a bull beta equal to 0.5. We present the results for the optimal absolute return product in Exhibits 10 and 11, leaving the interpretation to the reader.

**Summary and Outlook**

We have shown how the difference between bull/bear and single-index parameters can be explained in an additive sense in ex post portfolio analysis. We have also illustrated potential uses of asymmetric factor models in portfolio construction for downside risk management purposes.

In order to analyze the potential of a dual alpha/dual beta model to produce superior risk-adjusted returns, empirical work is required which, for example, examines the out-of-sample performance of optimized bull/bear portfolios.

Asymmetries can be interpreted as hidden risk factors. In the presence of asymmetries, single-index Alphas calculated relative to a portfolio benchmark will be distorted performance measures.

An operational version of the dual alpha/dual beta model presented would require refinements to address obvious estimation issues. It would be straight-forward to further generalize the model, for example, by considering asymmetric non-linearities. It would also be interesting to use other regime indicators than the portfolio benchmark (e.g. VIX) or other threshold values than zero. For example, we could distinguish an "extreme bear market" from "normal markets" by setting the threshold to a value much lower than zero.

*Our thanks go to Peter Urbani, this article benefited from conversations we had with him on various topics mentioned in this article.*

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The four CAIA members who received the 2012 Rising Star of Public Funds Award at the IMN Annual Alternative Investments Summit. Left to Right: Bryan Hedrick, Christopher Schelling, Sam Gallo, and Derek Drummond.

# Rising Stars of Public Funds

**Keith Black, PhD, CAIA**
Associate Director of Curriculum
CAIA Association

At the March 25, 2012 gala dinner of Money Management Intelligence's 11th Annual Public Pension Fund Awards in Carlsbad, California, Institutional Investor awarded the title of "Rising Stars of Public Funds" to fourteen members of the pension fund industry. Each of the winners, who are recognized for their professional accomplishments and are predicted to be the future leaders of the pension fund industry, was nominated by industry practitioners. The Chartered Alternative Investment Analyst (CAIA) Association is pleased to announce that four of the fourteen winners are CAIA Charter Holders: **Derek Drummond** of the State of Wisconsin Investment Board (SWIB), **Samuel Gallo** of the University System of Maryland Foundation, **Bryan Hedrick** of Fort Worth Employees' Retirement Fund and **Chris Schelling** of Kentucky Retirement Systems (KRS).

As public pension plans continue to increase their allocation to alternative investments, the demand for analysts skilled in alternative investments is experiencing rapid growth. Derek Drummond of SWIB believes that the CAIA program is successful at preparing candidates for roles of increasing responsibility in the public pension plan community. Drummond stated "As pensions diversify into new and different asset classes and strategies, CAIA members can help the plan to better understand risk and appropriately allocate to those new investments. This is particularly important as pensions bring more diligence and allocation functions in-house. The CAIA program appropriately balances the qualitative and quantitative aspects of alternative investing. " Drummond also believes that the CAIA program has contributed to his career success: "The CAIA program has helped me to thrive in SWIB's collaborative and supportive culture. CAIA is the first accreditation that I truly feel has helped me to generate alpha. I have leveraged the test materials and member resources that CAIA provides to make better and more informed decisions as an analyst at SWIB. I keep going back to the curriculum materials on construction methods for alternative investment portfolios."

Samuel Gallo was recently named the Chief Investment Officer (CIO) of the $949 million University System of Maryland Foundation. Gallo sees a direct benefit of the CAIA curriculum to public funds, as it gives investors "a very broad and practical understanding of each of the alternative investment strategies. Additionally, the curriculum explains tail risks, what they look like, and which strategies tend to be most prone to those outlier risks. This is particularly useful information, as it can better assist CIOs, portfolio managers , and analysts in understanding how to most effectively structure allocations so that alternatives are accretive and not destructive" to the portfolio. He believes that his "CAIA Charter has opened many doors in [his] career advancement, as well as in attaining professional credibility with clients, employers and peers. To earn the respect as a subject matter specialist in alternative investments, I needed a credential that is perceived as the industry gold standard. The CAIA Charter has provided me with knowledge required in my job and has far exceeded my expectations, providing opportunities for career advancement, public speaking roles and increased client trust. The CAIA Charter has demonstrated its worth and Gallo expects its "value to continue to rise."

Chris Schelling explains that the Kentucky Retirement System allocates approximately 35% to alternative investments, with about 10% in private equity and

absolute return and 15% in real assets. Schelling is one of two directors who oversee this $4 billion alternative investment portfolio. With such a broad investment mandate, Schelling believes that the CAIA program is the "most appropriate designation for those allocating assets to alternative investments." The program has allowed Schelling to enhance his career trajectory. Schelling appreciates the value that CAIA provides to members after passing through the two levels of exams. "The Journal of Alternative Investments is a great member benefit, and networking within the CAIA member community has been quite valuable." Schelling predicts that the future of pension plan investing will be a convergence between traditional and alternative investments, where activist hedge funds will be housed in the equity allocation while fixed income hedge funds may be held in a plan's fixed income allocation. As pensions focus more on systematic exposures than fund styles, a broad education in alternative investments will increasingly become a requirement of pension plan staff.

Bryan Hedrick, Investment Officer of the Fort Worth Employees' Retirement Fund, is one of CAIA's newest members, earning the Charter in November 2011. As a member of a four person team responsible for investing a $1.7 billion pension portfolio, Hedrick has significant responsibilities across asset classes. In recent years, Fort Worth has increased alternative investments from 28% to 39% of the plan's assets, with real assets and hedge funds earning larger allocations than private equity. Hedrick credits the CFA program for enhancing his skills in traditional investments and the CAIA program for improving his knowledge of alternative investments. This background helped Hedrick "to become more comfortable in alternative investments, putting [him] on an even footing with even the most experienced alternative investment managers." Hedrick recommends the CAIA program for new analysts in public pension funds "as a great way to build a knowledge base in alternative investments."

The strong showing of CAIA members at the event reflects the ever growing relevance and value of the CAIA charter in the marketplace as well as the quality of our current membership. Please join us in congratulating these members for this well deserved recognition of their achievements.

To give feedback on this article and suggestions email **AIAR@CAIA.org**
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