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Leverage Decisions in Portfolio Management

Tom Nohel,
Loyola University of Chicago, USA.
Email: tnohel@luc.edu
Steven Todd,
Loyola University of Chicago, USA.
stodd@luc.edu
Z. Jay Wang,
University of Oregon, USA.
zhiwang@illinois.edu

Abstract

We study the leverage decisions of portfolio managers by focusing on domestic closed-end equity funds. Over forty percent of funds in our sample employ leverage by borrowing from banks and/or issuing preferred stock. We examine how portfolio fundamentals and managerial characteristics affect the use of leverage. We find that funds investing in ILLIQUID securities tend to use more leverage. These ILLIQUID and LEVERED funds also tend to have WORSE (or less shareholder friendly) governance structure. Further analysis on risk-adjusted returns suggests that these worse-governed levered funds do not outperform their unlevered peers. In contrast, it is the better-governed levered funds that significantly outperform both their worse-governed peers and unlevered peers. Hence, investors should be cautious that some fund managers are willing to lever up illiquid positions, merely to boost compensation.

1. Introduction

Leverage is used extensively by many portfolio managers. Yet we know surprisingly little about what drives their choice to lever, or their observed level of leverage. Why do some managers make extensive use of leverage while others do not? What drives managers to increase or reduce existing leverage? How are these decisions affected by a manager's asset selection strategy or the governance environment? These are important questions whose answers have implications for policy and regulation, as well as contractual design and governance. In this paper we address these questions.

Many commercial banks, investment banks, hedge funds, and buyout funds make extensive use of leverage, while open-end mutual funds and venture capitalists use little or none. Even within a class of firms there can be considerable variation. For instance, large European banks are much more highly levered than their American counterparts. Perhaps lesser known is the fact that many closed-end funds make extensive use of leverage, while other closed-end funds eschew leverage entirely. This is true even within a particular asset class, e.g., domestic equity funds.

An extensive literature has developed around the study of how non-financial firms finance their operations (see Graham and Leary (2010) for a recent survey of this literature). Much of this literature focuses on the search for an optimal capital structure and testing the traditional static trade-off model which stipulates a trade-off between interest tax shields and costs of financial distress. Other studies focus on the Pecking Order Hypothesis of Myers (1984) which posits that frictions make external finance costly and push firms to favor internal finance, and debt over equity if external finance is needed. Tests of these ideas typically exclude financial firms, as well they should. In any event, the capital structure decisions of portfolio managers are of a fundamentally different nature. For instance, many funds pay no taxes, provided income is passed through to investors, rendering interest tax shields a mute point. So, an extensive study of the leverage decisions of portfolio managers is long overdue. We focus on closed-end equity funds as a means to that end.

The study of leverage use by portfolio managers requires two essential ingredients: 1) a class (or classes) of asset managers with cross-sectional variation in their use of leverage; and 2) transparency on the use of leverage in the form of available data on leverage decisions. Some portfolio managers make extensive use of leverage but reveal few if any details on their leverage use to the public. For instance, many hedge funds are known to make extensive use of leverage to amplify returns, yet there are no rules that force hedge funds to reveal details on their use of leverage, not to mention their performance or governance. At the other extreme are open-end mutual funds. They are required to disclose a great deal about their operations and performance, yet only a handful of open-end funds use leverage in an attempt to boost

returns. Instead, the vast majority of open-end funds that use leverage do so as a temporary stop-gap to meet unexpected redemptions. Enter closed-end funds.

Like open-end funds, closed-end funds fall under the purview of the Investment Company Act of 1940 (hereafter, ICA), and therefore they face essentially identical, if not more extensive, disclosure requirements, forcing them to file a myriad of disclosures with the SEC on a regular basis.[1] Together these filings reveal many intimate details about the inner workings of a fund, from their capital structure and fees, to their holdings, board structure, and other governance data. In addition to the substantial disclosures that closed-end funds make, they also make extensive use of leverage: as of 2006, roughly 40% of all domestic equity closed-end funds had significant leverage. In fact, the use of leverage by closed-end funds is extensive across every asset class, save international equity funds.

In this paper, we study the leverage decisions of closed-end funds, focusing on domestic equity funds, which allow us to exploit detailed data on the funds' holdings that are filed with the SEC on a regular basis. We compile data on the 136 domestic equity closed-end funds in existence any time between 1995 and 2010 (no survivorship bias). Of these 136 funds, 55 have significant leverage (i.e., >5%) in their capital structure for at least part of the sample. The typical *levered* closed-end equity fund has leverage of about 25-30%, but many funds choose to remain unlevered. We are interested in understanding (1) which fund-specific characteristics affect the leverage decision, controlling for macro-economic factors; and (2) how portfolio managers adjust leverage in response to changes in macro-economic conditions and portfolio characteristics.

Among our more interesting findings are that leverage is an increasing function of the *illiquidity* of the CEF's underlying assets (i.e., levered funds are more prone to invest in illiquid assets than are their un-levered peers). This result is very robust to various measures of illiquidity; moreover, this result appears to hold beyond equity funds, with fixed income and municipal funds also following this pattern. We argue that this is consistent with a world in which some fund managers have skill, managers have the greatest opportunity to exploit their skill among illiquid assets, and skilled managers seek to magnify their potential gains using leverage. However, it is also the case that less skilled managers will be tempted to mimic the behavior of their more skilled peers, because managers are typically compensated

[1] For example, like open-end funds, they must file form N-SAR and N-CSR on a semi-annual basis. In addition, like other publicly-traded corporations, they must hold an annual shareholders meeting, preceded by the filing of a proxy statement (Form DEF 14), containing assorted governance data. Moreover, whenever anyone acquires a stake of 5% or more they are required to file Form SC13G or SC13D, revealing their intentions regarding the shares purchased, and/or Form DEFN 14A if the outside investor has designs on a board seat(s). Finally, prospectuses must be filed if additional finance is sought, such as a rights or a preferred share offering.

based on total assets under management rather than net assets under management, implying that managers are able to significantly increase their fees by using leverage.

We develop a simple governance index based on board structure and state of incorporation, and we divide the sample based on governance score. We find that funds with governance that can be categorized as less shareholder-friendly are more likely to use leverage. Moreover, we find that it is funds with poor governance AND illiquid investments that are most prone to lever up. These results potentially co-mingle two effects. On the one hand, this is exactly the behavior you would expect if relatively less talented managers were seeking to insulate themselves against takeovers and exploit shareholders, using leverage as a means to boost fees. On the other hand, if skilled managers were seeking gains for shareholders by holding relatively less liquid assets, strong takeover protections enable the portfolio manager to effectively lengthen the holding period to the benefit of long term shareholders.

We distinguish between these two effects by examining fund manager performance based on the disclosed portfolio holdings. We form equally-weighted portfolios of levered and non-levered CEFs and regress holding-based portfolio returns on the three Fama-French factors augmented by the momentum factor of Carhart (1997) and a liquidity factor in the spirit of Pastor and Stambaugh (2003). We find that the alpha of the levered portfolio is 3.74% per year, while the alpha of the non-levered portfolio is not significantly different from zero. Furthermore, controlling for governance, we show that the shareholder-friendly (low governance index) levered portfolio significantly outperforms both the non-levered portfolio and the entrenched (high governance index) levered portfolio by 4.75% and 3.41% per year, respectively. Thus, it appears that levered funds with shareholder-friendly governance deliver superior performance for shareholders, while funds with poor governance magnify risks using leverage and investments in illiquid assets with no particular benefit for shareholders.

An examination of the factor loadings in our performance tests suggest that the levered funds are loading up on small cap, value stocks, both in an absolute sense, and relative to non-levered funds, and levered funds' exposure to the market portfolio is significantly less than for non-levered funds. There is little evidence of a consistent momentum strategy, but there is some evidence suggesting a tendency on the part of levered funds to overweight illiquid assets. These are all consistent with the earlier-reported finding that levered CEFs hold primarily illiquid stocks. Also consistent with this is that the levered funds have noticeably lower turnover than their unlevered peers. Finally, we examine the determinants of leverage changes and find that funds respond in an intuitive way to changes in risk, whether measured by VIX, beta, or residual risk. Moreover, funds are more likely to increase leverage when it becomes easier to service the leverage, as measured by an increase in income. Interestingly, we find that more entrenched funds are more likely to boost leverage.

The paper closet in spirit to ours is Ang, Gorovyy, and Van Ewegen (2011), which studies the leverage decisions of hedge funds. While our focus is on CEFs, we feel that many of the findings may also apply to hedge funds. Our paper has two distinct advantages over the Ang et al. (2011) paper: 1) Since CEFs are publicly-traded with all the disclosure requirements that that entails, there is a wealth of data on CEFs that is simply not available for hedge funds; 2) We consider the universe of equity CEFs while the Ang et al. (2011) paper is limited to data from a single fund of funds. Interestingly, in the Ang et al. (2011) paper, they cite the long-only[2] leverage of the average hedge fund over their sample period to be 1.36, which translates to leverage being 26.5% of total assets, a figure essentially identical to the leverage of the average levered equity CEF.

Following this introduction, the remainder of the paper proceeds as follows: we review the ICA and other elements of the regulatory environment, as well as the relevant academic literature in Section 2; Section 3 discusses the data used in this study as well as the methodology used to analyze the data; Section 4 presents and interprets the results, and Section 5 concludes.

2. Discussion

2.1 Regulatory Issues

Mutual funds, both open and closed-end, fall under the jurisdiction of the Investment Company Act of 1940 (ICA). Regarding leverage, the ICA restricts the degree to which mutual funds can lever, as well as the type of leverage permissible. All mutual funds (Open-end funds, hereafter, OEFs, and closed-end funds, hereafter, CEFs) are allowed to borrow up to an amount equal to 50% of their NAV.[3] But, as a practical matter, CEFs make frequent use of leverage for investment purposes, while OEFs primarily use loans to handle unexpected redemptions, rather than to boost returns. In addition to loans, CEFs are allowed to issue preferred shares up to an amount equal to 100% of their NAV.[4] OEFs are forbidden to issue senior equity securities.

The ICA stipulates that funds that are in violation of the leverage guidelines must act promptly to rectify their excessive leverage. Such action is likely to prove costly, since it is likely to involve liquidating some assets at depressed prices as part of a de-leveraging process. However, failure to act has rather severe consequences. Any fund found to be in violation of the ICA guidelines is prohibited from paying distributions to shareholders (including

[2] They define long-only leverage as total of all long positions, a measure that is similar in spirit to our measure of CEF leverage.

[3] Open-end funds are only allowed to borrow from a bank, while closed-end fund are allowed to issue bonds (senior debt securities), in addition to bank borrowing.

[4] Note that if CEFs issue preferred shares, CEFs must give preferred shareholders the right to elect two of the board's directors on their own, with the ceding of further control rights under certain conditions.

preferred). Moreover, CEFs utilizing preferred shares might eventually be forced to relinquish to preferred shareholders the right to elect a *majority* of directors to the board, thereby giving preferred shareholders effective control of the board. In fact, in such instances, the preferred shareholders could force the redemption of their shares by open-ending the fund. As a result, it is not surprising that the typical levered CEF maintains their leverage at a level well below the ICA-dictated maximum.

2.2 Redemption

Though hedge funds do not face regulatory constraints on their leverage, they do face costs for using excessive leverage. Hedge fund shares are redeemable periodically, and the threat of redemptions in the face of several trades souring simultaneously is likely to dramatically affect leverage decisions: substantially limiting the amount of leverage that a hedge fund should prudently use. OEFs are redeemable on a daily basis so nearly all OEFs eschew the use of leverage entirely, and most are reluctant to invest in illiquid assets. In contrast, CEFs can invest in illiquid assets without the fear of redemptions. Rather than being redeemable, CEF shares are tradable on a liquid stock exchange. A CEF investor who wishes to cash out simply sells his shares on the exchange at the prevailing price, which can be above or below the NAV.

But even CEFs do not have infinite maneuvering room: if investors lose confidence in the CEF manager they will implement the "Wall Street Walk", dumping CEF shares, which drives down CEF prices relative to NAV. As CEF share prices fall relative to NAV the CEF increasingly becomes a prospective target for open-ending.[5] Not surprisingly, many CEFs take precautions by instituting takeover protections like classified boards, and by incorporating in less takeover-friendly states like Maryland, rather than Delaware, New York, or Massachusetts (see Bebchuk and Cohen (2003) and Barzuza (2009)).

2.3 Governance, Compensation and Incentives

CEF managers are typically compensated based on a percentage of assets under management rather than NAV. Therefore, CEF Managers can easily increase their compensation by taking on leverage. The decision to lever up will expose underperformance in the long run, but in the short run, a portfolio manager with little or no talent can boost his compensation via leverage. The governance of a levered CEF is therefore especially important. Left unchecked, a talentless manager can use leverage to reap considerable short term rewards at the expense of shareholders. On the flipside, a talented manager can boost shareholder returns, as well as his own compensation, using leverage.

Several papers have examined the governance of CEFs. Gemmill and Thomas (2006) find that funds that are more shareholder friendly charge lower fees and generate better

[5] Open-ending can be thought of as an extreme form of redemption (Bradley et al. (2010), and Stein (2005)).

performance. Dann, Del Guercio, and Partch (2003) find that funds with more independent boards charge lower fees and are more likely to undertake value-enhancing restructurings. These papers confirm the importance of controlling for governance structure.

Berk and Stanton (2007) show that if portfolio managers are compensated with fees tied to assets under management, the presence of some managerial skill leads to a trade-off between skill and compensation.[6] If managers are underpaid (overpaid) for their skills, the fund will trade at a premium (discount). Moreover, since talented managers are likely to generate outside offers, while weaker performers may be hard to fire, we typically see funds trade at a discount. Clearly, both skilled and unskilled portfolio managers can boost compensation by using leverage. However, using leverage increases a manager's human capital at risk. We might expect unskilled managers to entrench themselves by incorporating in a takeover-unfriendly state, or stacking the board with insiders and/or classifying the board. We might expect truly skilled managers to be less insistent on these defenses. Of course, the extent that these distinctions matter will depend on the perceived threat form activists.

2.4 Liquidity and Leverage

Cherkes, Sagi, and Stanton (2008) argue that the raison d'être of closed-end funds is to provide a liquid means of investing in illiquid assets. Teo (2011) and Sadka (2011) both provide evidence that hedge funds earn excess returns by providing liquidity. If CEFs are investing in illiquid assets and pursuing trading strategies that require long holding periods, we might expect funds to institute strong takeover protections as a means of deflecting potential open-ending campaigns. Moreover, leverage, especially in the form of preferred stock, can deter open-ending campaigns by dramatically increasing the costs of open–ending.[7]

Several recent papers [e.g., Brunnermeier and Pederson (2009), Tang (2011), Aragon and Strahan (2009), Adrian and Shin (2010), and Acharya and Vishwanathan (2010)] focus on the interaction between leverage and liquidity, but their focus is primarily on macro or systemic implications. Ang et al. (2011) study the leverage decisions of hedge fund managers and find that macro factors explain leverage use much better than do firm-specific factors. These conclusions are based on data from a single fund of hedge funds, so it is difficult to know if these results generalize.

[6] There is considerable evidence that a significant subset of portfolio managers have the ability to outperform benchmarks, even after fees. Examples of such evidence include Kacperczyk, Sialm, and Zheng (2005); Kacperczyk and Seru (2007); Wermers Wu, and Zechner (2008); Alexander, Cici, and Gibson (2009); and Nohel, Wang, and Zheng (2010), among others.

[7] Since open-end funds are not allowed to issue senior equity securities, a levered CEF that was open-ended would be forced to redeem all the outstanding preferred shares; an undertaking that would likely be quite costly for shareholders, including those seeking to open end the fund. See Cherkes, Sagi and Wang (2012).

3. Data and Variable Definitions

In this section, we describe our data sources; define key variables used in our empirical analysis, and present summary statistics.

3.1 Data Sources

Our data sample includes 136 domestic equity CEFs traded in the U.S. during the period from 1995 to 2010. The list of domestic equity CEFs, including inception and termination dates, is provided by Morningstar. The leverage details for these funds are obtained from the annual NSAR filings with the SEC. The NSAR filings contain detailed breakdowns for total assets and total liabilities. Total liabilities are broken down into senior notes (including bank loans), preferred stock, reverse repo, short positions, written options, and other debts. The NSAR filings also provide other fund characteristics including average net assets, portfolio turnover, components of total expenses, components of investment income (including dividend and interest income), diversification status (as defined by 1940-Act), etc.

We obtain fund-level portfolio holdings from Morningstar, augmented by the CDA/Spectrum database. The holdings data is typically available on a quarterly basis. For some CEFs, Morningstar has monthly holdings towards the end of our sample period. We download weekly NAV returns and discount data from Morningstar Direct.

To measure the effectiveness of fund governance, we hand collect three measures from the proxy statements (form DEF 14), semi-annual reports (form N-CSR), and from preferred share offering prospectuses (form N-2) filed with the SEC. They include the state of incorporation, the percentage of board seats controlled by fund insiders, and the presence of a classified board.

For risk adjustment, we use the standard Carhart (1997) four-factor model augmented by the traded liquidity factor of Pastor and Stambaugh (2003). The three Fama-French factors and the momentum factors are downloaded from Ken French's website (http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html). We obtain the traded liquidity factor from CRSP. We also calculate the DGTW characteristic-adjusted returns (Daniel, Grinblatt, Titman, and Wermers 1997) based on portfolio holdings. The DGTW benchmarks are available via http://www.smith.umd.edu/faculty/rwermers/ftpsite/Dgtw/coverpage.htm.

3.2 Variable Definitions

We now provide definitions for the key variables used in the subsequent empirical analysis.

Leverage: we track only ICA recognized leverage. This consists of either bank loans or preferred stock issuances. We define leverage as the dollar-value of the sum of loans and preferred equity outstanding, divided by total assets. The ICA dictates strict guidelines on

allowable leverage. Specifically, loans require asset coverage of 300%, while preferred shares require asset coverage of 200%. These translate to 33% and 50% leverage, respectively. Therefore, some of our tests of determinants of leverage employ a TOBIT regression with leverage as the dependent variable, which is left-censored at 0, and right-censored at 0.5.

We construct two broad groups of explanatory variables to explain the leverage decisions of fund managers: *macro-economic* factors and *fund-specific* characteristics.

The *macro-economic* factors included are S&P500 returns, VIX index, LIBOR, Yield Spread, and Default Spread. The Yield Spread is the difference between ten-year Treasury bond yield and three-month Treasury bill yield. The Default Spread is the difference between the Baa-rated corporate bond yield and the AAA-rated corporate bond yield. The above macro-factors are all measured monthly. We then average across all months in any fiscal year to convert them into annual measures.

The fund-specific variables are included to reflect fund size and age, various aspects of portfolio characteristics, and managerial skill. The detailed definitions for these variables are as follows.

AvgNetAssets: Average monthly net assets (applicable to common shareholders) as reported in the annual NSAR filings. When missing in NSAR filings, we supplement with the net assets data from Morningstar. We take the logarithm transformation to smooth the distribution.

Age: Fund age at the end of each fiscal year measured in months. We take the logarithm transformation to smooth the distribution.

Turnover: Portfolio turnover ratio as reported in the annual NSAR filings. It is measured as the minimum of total purchase and total sale of securities divided by the average net assets.

Expense: To make the expense ratio comparable between levered and non-levered funds, we take the reported total expenses from the annual NSAR filings, subtract the interest expense incurred during the year (since this doesn't go to the manager), and then normalize by average net assets.

Div/Interest Income: net investment income derived from dividend and interest (as reported in annual NSAR filings) normalized by total assets.

Diversification: An indicator variable that equals one if the fund declares itself as a diversified fund based on the 1940-Act definition.

Alpha, Residual Risk, and Beta: We measure fund performance, idiosyncratic risk, and systematic risk exposure based on the disclosed portfolio holdings. Following Daniel, Grinblatt, Titman, and Wermers (1997), we construct monthly raw portfolio returns by taking the value-weighted returns across all disclosed stock holdings. For quarterly disclosures, we assume that fund managers re-balance their portfolios at the end of each quarter. We then regress these raw returns on S&P500 index returns in each fiscal year to obtain the portfolio's market exposure *Beta*. We define *Alpha* as the DGTW characteristic-adjusted return. For each

stock held in the fund portfolio, we first assign it into a DGTW benchmark portfolio based on size, book-to-market, and momentum. We then compute the benchmark-adjusted return by subtracting benchmark portfolio return from the stock return. Finally, we compute *Alpha* as the value-weighted averages of benchmark-adjusted returns across all stocks in the portfolio. We repeat the process for each month and average across all months in a fiscal year to obtain the annual *Alpha* measure. The *Residual Risk* is calculated as the standard deviation of monthly portfolio *Alpha* in each fiscal year.

Asset Illiquidity: We measure the illiquidity of a fund's asset holdings in three ways. First, following Getmansky, Lo, and Makarov (2004), we compute the first-order autocorrelation coefficient based on weekly NAV returns. We do this for each fiscal year. A higher autocorrelation in NAV returns may suggest more illiquid portfolio holdings. Second, for each stock reported in the portfolio, we calculate the Amihud Illiquidity ratio (Amihud 2002) based on daily stock returns. We then aggregate the stock-level Amihud Illiquidity ratios into the portfolio level by taking the value-weighted averages. We obtain the annual Amihud Illiquidity measure by averaging over all holding disclosures in any fiscal year. Third, for each stock holding, we obtain the Gibbs effective trading cost estimates (Hasbrouck 2009) from http://people.stern.nyu.edu/jhasbrou/Research/GibbsCurrent/gibbsCurrentIndex.html. We then aggregate the stock-level Gibbs estimates into the portfolio level by taking the value-weighted averages. We obtain the annual Gibbs measure by averaging over all holding disclosures in any fiscal year.

Governance Index: we follow the lead of Bebchuk et al. (2009) and propose a highly streamlined index of CEF governance. Using proxy statements filed annually by CEFs, we construct an index that is the sum of a dummy that takes on the value of 1 if the fund has a staggered board and 0 otherwise, another dummy that takes on the value of 1 if the fund is incorporated in Maryland (an extremely popular choice among REITs and CEFs) and 0 otherwise, and a third dummy that takes on the value of 1 if the board has at least 25% affiliated directors, and zero otherwise. Our governance index thus takes on values between zero and three. We classify index values of 0 or 1 to be shareholder friendly, and values of 2 and 3 to represent governance structures that are hostile to shareholders.

4. Results

4.1 Summary Statistics

We present summary statistics for the levered and unlevered funds in Table 1. The sample period is 1995 – 2010, and median values appear in parentheses. Expenses, expressed as a percentage of net assets, include management fees only; debt/equity financing costs are excluded. We find that many portfolio managers eschew leverage altogether -- there are more unlevered fund than levered funds. It is only during the period 2002 - 2008 that we see a

dramatic increase in the use of leverage. Of course, this period has some notable trends, namely rising stock prices and falling long-term interest rates.

Before the financial crisis, portfolio managers have a strong preference for preferred stock financing. This pattern reverses in 2009, after problems in the auction rate securities market raised the cost of equity financing. Using the 1940-Act definition of leverage, we find that leverage ratios are fairly constant between 1995 and 2007, with mean values ranging from 24% to 28%. Leverage ratios peak in 2008, then fall dramatically as the financial crisis takes hold.

We see that levered funds are usually larger than unlevered funds, with mean (median) net asset values ranging from $309.48 million ($167.66 million) in 2008 to $686.51 million ($544.38 million) in 2006. Before 2005, levered funds charge lower average (median) fees than unlevered funds, generally 1.00% to 1.25% of total assets. These fees rise significantly in 2008 – 2010, ultimately exceeding the fees charged by unlevered funds.

Between 1995 and 1999, levered funds turn over their assets more frequently than unlevered funds, with mean (median) turnover rates ranging from 49% (38%) in 1999 to 74% (51%) in 1995. This pattern reverses in 2000, and for the next 10 years, the mean (median) turnover rates for unlevered funds exceed the turnover rates for levered funds. The closed-end funds we examine have longer asset holding periods than both equity-based hedge funds and equity-based mutual funds [see Kacperczyk et al. (2005) and Brunnermeier and Nagel (2004)].

We examine changes in leverage in Table 2. A rise in debt levels or a decline in asset values will result in an increase in the leverage ratio. Since we are interested in how funds actively manage leverage, we focus on leverage changes that coincide with a minimum 5% change in total debt outstanding. There are 50 instances of leverage increases and 49 instances of leverage declines.

Focusing first on leverage increases, we find 13 funds electing to initiate leverage and 37 funds raising leverage. For the 13 funds that initiate leverage, the average (median) leverage increase is 20% (22%) of assets. For the 37 funds raising leverage, the leverage increase has an average (median) value of 6% (7%) of assets, or 53% (41%) of total debt outstanding. These leverage increasing activities are scattered through time, with peak activity in the years 2005 – 2007.

Focusing next on leverage declines, we find 27 funds electing to reduce leverage, 6 funds completely de-levering (to zero leverage) and 16 funds terminating. For the 27 funds that reduce leverage, the average (median) leverage reduction is 9% (7%) of assets, or 43% (37%) of total debt outstanding. For the 6 funds de-levering, leverage falls by an average (median) value of 22% (20%) of assets. For the 16 funds that terminate, the average (median) leverage ratio is 32% (32%) of assets. The leverage decreasing activities are highly concentrated in the period 2008 – 2010.

In Tables 3A and 3B, we present summary information on fund type and fund governance data. We consider three time snapshots corresponding to the following years: 2000, 2006 and 2010. Within the general equity fund category, there is little time variation in the proportion of funds that use leverage. Most funds remain unlevered. Approximately 25% of the general equity funds use leverage, and the mean leverage ratio is 21%.

Within the real estate fund category, we observe significant time variation in the proportion of funds that use leverage. In the year 2000, none of the real estate funds use leverage. By 2006, 13 funds, representing more than ¾ of all real estate funds, use leverage, with a mean leverage ratio is 28%. After the financial crisis, the proportion of real estate funds using leverage falls below 40%.

The sector fund category includes communications, energy, financial, natural resources and utility funds. Among these funds, there is little time variation in the proportion of funds that use leverage. Approximately half of all sector funds use leverage. For these funds, leverage ratios peak in 2006 at 29% of net assets.

We consider three dimensions of corporate governance in Table 3B. We use dummy variables to signify whether a fund is incorporated in Maryland, allocates at least 25% of all board seats to insiders, and uses a classified board structure. We sum these dummy variables for each fund and obtain a governance index with values ranging from 0 to 3. We then report summary data for those funds with a low governance index (< 2) and those funds with a high governance index (>= 2).

Most of the levered funds have high governance index values. In the year 2006, there are 39 levered funds, but only 8 of these funds enjoy low governance index values. Of the 31 levered funds with high governance index values, all 31 funds use classified boards, 23 funds incorporate in Maryland and 19 funds allocate at least 25% of all board seats to insiders.

In contrast, approximately half of the unlevered funds have low governance index values. In the year 2006, there are 34 unlevered funds with low governance scores and 28 funds with high governance scores. Among the 34 unlevered funds with low governance scores, only 4 funds allocate at least 25% of all board seats to insiders, and only 10 funds incorporate in Maryland.

4.2 Empirical Results

We examine the determinants of leverage in Table 4. Here, the dependent variable is the annual leverage ratio. The independent variables include annual lagged measures of equity risk and return, debt financing costs, credit risk, and fund characteristics such as fund size, age, turnover, expenses, performance, risk, income, and governance. We consider three measures of asset illiquidity: AR(1), and measures proposed by Amihud and Gibbs. For the latter two measures, we use dummy variables to signal whether a fund's computed illiquidity sits above

the annual sample mean. We also use dummy variables to capture fund type and diversification status.

In these Tobit regressions, we find that leverage ratios are positively related to asset illiquidity. All three measures of asset illiquidity are statistically significant at the one percent level, providing strong evidence that funds with less liquid assets employ more leverage.

Table 4 confirms that fund governance has a strong effect on a portfolio manager's leverage decision. Funds with weaker governance (higher governance index values) use more leverage, and funds with both weaker governance and more illiquid assets prefer still higher levels of leverage (as indicated by the statistically significant positive coefficient on the interaction variable, Gov Index * Illiquidity). For example, when using AR(1) as the illiquidity measure, the expected leverage ratio predicted from the Tobit regression is 0.16. The marginal effect on leverage of higher governance index and high asset illiquidity is 0.05. Hence, funds with high governance index and high asset illiquidity tend to have leverage ratios 31% higher than other funds.

Fund characteristics such as size, turnover, expenses, and dividend/interest income have significant effects on leverage ratios. Real estate funds, large funds and funds with greater income, higher expenses or longer asset holding periods employ more leverage. We also see that financing costs weigh on a portfolio manager's leverage decision. An increase in short-term funding costs (Libor) or an increase in interest rate risk or inflationary expectations (Yield Spread) prompts a portfolio manager to reduce leverage.

We compare the performance of levered and unlevered funds in Table 5. Here, the dependent variable is the monthly return earned on an equally weighted portfolio of levered (1 – 3) or unlevered funds (4). We consider two measures of performance: asset returns based on fund holdings data (Panel A) and NAV returns (Panel B). The former measure includes fund expenses. The independent variables are the monthly returns earned by five factors: the four Carhart factors – Market, SMB, HML and MOM, plus the Pastor-Stambaugh liquidity factor.

In Panel A, the levered funds enjoy positive alphas and carry positive factor loadings for all five factors, except the momentum factor. The unlevered funds have insignificant alphas and carry positive factor loadings for all five factors except the liquidity factor. Comparing the levered funds to the unlevered funds (1 – 4), it appears that levered funds have less exposure to market risk, load up on small and value stocks, pursue a more contrarian investment strategy, and take on more liquidity risk. The finding is largely consistent with the Tobit regression results in Table 4 that funds with more illiquid assets are likely to take on higher leverage. The difference in alpha between the levered and the unlevered funds is positive but not statistically significant though.

When separating the levered funds into two groups based on the governance index, we find a positive alpha differential for the levered funds with strong governance (3 – 4) and a

statistically insignificant alpha differential for the levered funds with weak governance (2 – 4). The monthly alpha for the better-governed levered funds outperforms the non-levered group by 39.6 basis points (statistically significant at the 1 percent level). Comparing the levered funds with weak governance to the levered funds with strong governance (2 – 3), funds with weak governance significantly underperform by 28.4 basis points per month. Furthermore, these weakly governed funds eschew market risk and momentum strategies, and load up on small firms and value plays. This suggests that some funds with weak corporate governance are willing to double up the risk by levering up illiquid positions – with no particular benefits to shareholders.

In Panel B, we observe similar results, except the performance advantage of levered funds over unlevered funds takes on statistical significance, with a monthly alpha of 44.5 basis points. The results in Panel B are more representative of the returns investors earn, because they reflect all fund expenses, including financing costs. The momentum and liquidity factors lose statistical significance in Panel B, but it is still true that compared to the unlevered funds, the levered funds appear to be loading up on small company stocks and value plays.

We examine changes in leverage ratios in Table 6. The table reports the second-stage regression results from the Heckman procedure. In the first-stage regression, we model the leverage decision using the same set of variables as in Table 4. In the second-stage regression, we regress annual changes in leverage ratios on lagged measures of equity return and risk, debt financing costs, credit risk, and fund characteristics such as fund size, age, turnover, expenses, performance, risk, income, and governance. We consider three measures of asset illiquidity: AR(1), and measures proposed by Amihud and Gibbs. Unlike Table 4, we use the continuous definitions of the Amihud and Gibbs illiquidity measures. We find that changes in the leverage ratio are positively related to our governance index. Levered funds with weak governance prefer more leverage than their counterparts with strong governance. We see that changes in leverage ratios are negatively related to the Amihud and Gibbs measures of illiquidity, suggesting portfolio managers reduce their use of leverage when there is a negative liquidity shock.

We find that leverage changes are negatively related to two measures of risk -- the change in the default spread and the change in residual risk. However, portfolio managers appear to have an unusual tolerance for market volatility, as they appear to increase leverage when the VIX rises. Since leverage ratios rise when debt levels rise or when asset values fall, this effect may be driven more by the negative price shock to asset values than by outright increases in debt.

Table 6 confirms that fund characteristics such as fund size and changes in turnover and dividend/interest income are positively related to changes in leverage ratios. Clearly, diversified funds prefer less leverage in general. Finally, changes in leverage are negatively

related to lagged leverage ratios, consistent with a mean reversion effect in which portfolio managers actively adjust their debt levels to keep leverage ratios close to a desired target.

We noted earlier that leverage ratios rise when asset values fall or when debt levels rise. We seek to tease out these effects in Table 7, where we examine changes in debt levels. The table reports the second-stage regression results from the Heckman (1979) procedure. In the first-stage regression, we model the leverage decision using the same set of variables as in Table 4. Here we find evidence that the positive relation between leverage ratio changes and VIX changes, which we observed earlier, is likely driven more by falling asset values, rather than rising debt levels. Portfolio managers respond to increased market risk by reducing their debt levels. We observe a similar effect with betas. Unfortunately, coincident asset value declines swamp the debt reduction effort, and leverage ratios rise as a result.

Though equity portfolio managers fear market risk, they appear to be undaunted by credit risk, as debt levels rise when the default spread increases. For other measures of risk, the behavior of portfolio managers is harder to pin down. An increase in asset illiquidity has a statistically insignificant effect on debt levels (using AR (1) and Amihud measures of illiquidity) or prompts portfolio managers to reduce debt (using the Gibbs measure of illiquidity). An increase in residual risk has a statistically insignificant effect on debt levels (using the Gibbs measure) or results in higher debt (using Amihud's measure) or lower debt (using the AR (1) measure).

As we saw in Table 7, governance has a strong effect on debt levels. Funds with stronger shareholder rights prefer lower debt levels. Financing costs also affect debt levels. As Libor rises, portfolio managers reduce their debt levels. Other fund characteristics, such as size and changes in dividend/interest income or turnover are positively related to changes in debt levels. The positive relation between alpha and changes in total debt suggests skilled managers are comfortable with increased debt levels. Because the relation between leverage ratio changes and fund alpha in Table 6 is statistically insignificant, we might infer that skilled managers who are comfortable with higher debt levels don't squander the additional capital they receive via debt financing by investing in poor-performing assets which would raise leverage ratios.

5. Conclusion

Leverage is used extensively by many portfolio managers, yet we know little about what drives their decision to lever, or the observed level of leverage. These are important issues that have implications for policy and regulation, as well as contractual design and governance. In this paper, we study the leverage decisions of closed-end funds, focusing on domestic equity funds, which allow us to exploit detailed data on the funds' holdings that are filed with the SEC on a regular basis.

We compile data on the 136 domestic equity closed-end funds in existence any time between 1995 and 2010 (no survivorship bias). Of these 136 funds, 55 have significant leverage (i.e., >5%) in their capital structure for at least part of the sample. The typical levered closed-end equity fund has leverage of about 25-30%, about on par with the average hedge fund. We use a TOBIT framework to study CEF leverage decisions since leverage has a lower bound of 0, and an upper bound dictated by the limits set forth in the ICA (i.e., the data are right and left-censored). We also study fund performance in the context of a 5-factor model that includes the three Fama-French factors augmented by the momentum factor of Carhart (1997) and a liquidity factor in the spirit of Acharya and Pedersen (2005).

We find that financing costs, market risks and fund characteristics strongly affect a portfolio manager's leverage decision. We show that levered funds pursue different trading strategies than unlevered funds, resulting in a statistically significant performance differential. Generally, levered funds pursue more contrarian investment strategies, eschewing market risk and loading up on value stocks and liquidity risk. Moreover, levered funds with good governance trade differently than levered funds with weak governance, and these different trading strategies affect performance. Compared to levered firms with good governance, levered funds with weak governance eschew momentum strategies and load up on small stocks, resulting in underperformance. Finally, we find that leverage ratios are positively related to several measures of asset illiquidity, providing strong evidence that funds with less liquid assets employ more leverage.

In future work we hope to extend our ideas to taxable fixed income funds and municipal bond funds. The taxable bond funds are likely to prove the most interesting to look at since there is considerable variation in their use of leverage. Moreover, while municipal bond funds and domestic equity funds rely almost exclusively on the use of preferred stock as a means of levering their assets, taxable bond funds are more evenly divided between bank loans and preferred stock for that purpose, enabling us to consider the effects of the source of leverage on fund behavior.

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Table 1: Summary Statistics

This table presents fiscal-year end mean (median) statistics for leverage ratio (defined as in 1940-Act), net assets, expense ratio, and turnover ratio. For levered funds, we also present the source of financing: the proportions of senior notes/loans (SN) and preferred stock (PS) in total debt. For net assets, expense ratio, and turnover ratio, we separately report the statistics for levered and non-levered groups.

Year	No. of Funds		Leverage			Net Assets (Million $)		Expense (%)		Turnover (%)	
	Total	Levered	Ratio	SN	PS	Levered	Non-Levered	Levered	Non-Levered	Levered	Non-Levered
1995	41	9	0.27 (0.32)	0.11 (0.00)	0.89 (1.00)	366.52 (148.73)	358.94 (110.46)	1.10 (1.25)	1.25 (1.24)	73.89 (51.00)	44.75 (31.00)
1996	43	11	0.27 (0.31)	0.13 (0.00)	0.87 (1.00)	342.46 (154.21)	374.43 (118.55)	1.00 (1.10)	1.29 (1.13)	57.27 (38.00)	42.75 (28.00)
1997	43	12	0.26 (0.29)	0.03 (0.00)	0.97 (1.00)	349.28 (150.87)	488.06 (158.90)	1.10 (1.03)	1.18 (1.12)	61.67 (48.50)	45.23 (39.00)
1998	43	13	0.24 (0.24)	0.00 (0.00)	1.00 (1.00)	487.18 (162.53)	472.65 (134.36)	1.22 (1.21)	1.26 (1.12)	59.31 (43.00)	47.70 (46.50)
1999	43	14	0.25 (0.25)	0.00 (0.00)	1.00 (1.00)	469.02 (183.25)	519.89 (153.00)	1.26 (1.26)	1.35 (1.20)	49.14 (38.00)	48.60 (43.00)
2000	44	15	0.25 (0.25)	0.00 (0.00)	1.00 (1.00)	469.08 (163.82)	480.12 (152.12)	1.16 (1.19)	1.28 (1.24)	45.67 (30.00)	65.86 (33.00)
2001	43	14	0.26 (0.25)	0.00 (0.00)	1.00 (1.00)	473.37 (182.03)	396.26 (145.52)	1.25 (1.22)	1.46 (1.42)	37.29 (24.00)	57.45 (41.00)
2002	45	17	0.29 (0.32)	0.00 (0.00)	1.00 (1.00)	401.25 (325.06)	321.11 (123.89)	1.21 (1.22)	1.73 (1.46)	34.94 (24.00)	47.21 (29.50)
2003	52	24	0.27 (0.26)	0.04 (0.00)	0.96 (1.00)	437.33 (285.50)	327.56 (160.03)	1.04 (1.13)	1.55 (1.20)	31.92 (21.00)	47.57 (31.50)
2004	71	39	0.27 (0.29)	0.07 (0.00)	0.93 (1.00)	576.78 (437.48)	452.38 (287.73)	1.07 (1.02)	1.31 (1.02)	25.64 (22.00)	55.63 (31.00)
2005	98	40	0.27 (0.28)	0.11 (0.00)	0.89 (1.00)	584.58 (395.28)	481.45 (339.47)	1.21 (1.14)	1.15 (0.96)	27.38 (23.00)	54.38 (31.50)
2006	103	40	0.26 (0.26)	0.10 (0.00)	0.90 (1.00)	686.51 (544.38)	471.58 (318.73)	1.26 (1.11)	1.16 (1.09)	26.43 (23.00)	51.56 (37.00)
2007	106	42	0.28 (0.29)	0.14 (0.00)	0.86 (1.00)	646.21 (494.12)	521.71 (313.65)	1.29 (1.15)	1.13 (1.08)	31.19 (26.00)	57.58 (44.00)
2008	108	44	0.32 (0.34)	0.28 (0.00)	0.72 (1.00)	309.48 (167.66)	329.86 (201.66)	1.69 (1.34)	1.23 (1.12)	35.80 (26.00)	56.80 (42.00)
2009	104	37	0.26 (0.25)	0.45 (0.25)	0.55 (0.75)	434.35 (214.76)	349.03 (230.33)	1.80 (1.58)	1.52 (1.16)	60.24 (42.00)	63.15 (57.00)
2010	99	34	0.23 (0.24)	0.44 (0.21)	0.56 (0.79)	591.06 (314.63)	372.64 (263.61)	1.58 (1.52)	1.36 (1.13)	40.09 (24.50)	55.02 (40.00)

Table 2: Summary Statistics: Changes in Leverage

This table presents summary statistics for annual changes in leverage. We report the mean (median) statistics for cases when both the leverage ratio and the total debt move UP or DOWN. For "Leverage UP", we separately report statistics for leverage initiation and leverage increase. For "Leverage Down", we separately report statistics for leverage decrease, de-lever, and fund termination. For each category, we report the number of changes, mean (median) change of leverage ratio ($\Delta L=L_t-L_{t-1}$), and mean (median) proportional change in total debt ($\Delta D=(D_t-D_{t-1})/D_{t-1}$).

Year	**Leverage UP**					**Leverage Down**						
	Initiation		**Increase**			**Decrease**			**De-Lever**		**Termination**	
	#	**ΔL**	**#**	**ΔL**	**ΔD**	**#**	**ΔL**	**ΔD**	**#**	**ΔL**	**#**	**ΔL**
1995	0	--	0	--	--	0	--	--	0	--	0	--
1996	1	0.06 (0.06)	1	0.10 (0.10)	1.56 (1.56)	0	--	--	0	--	1	-0.25
1997	3	0.24 (0.22)	0	--	--	1	-0.06 (-0.06)	-0.12 (-0.12)	1	-0.06 (-0.06)	0	--
1998	2	0.12 (0.12)	1	0.09 (0.09)	0.84 (0.84)	0	--	--	0	--	0	--
1999	0	--	0	--	--	0	--	--	0	--	0	--
2000	0	--	0	--	--	0	--	--	0	--	0	--
2001	0	--	1	0.10 (0.10)	1.23 (1.23)	0	--	--	0	--	0	--
2002	0	--	2	0.10 (0.10)	0.42 (0.42)	0	--	--	0	--	0	--
2003	2	0.23 (0.23)	3	0.06 (0.08)	0.63 (0.40)	0	--	--	0	--	0	--
2004	0	--	4	0.01 (0.01)	0.30 (0.29)	1	-0.04 (-0.04)	-0.10 (-0.10)	0	--	0	--
2005	0	--	8	0.05 (0.05)	0.40 (0.43)	0	--	--	0	--	2	-0.35 (-0.35)
2006	0	--	5	0.05 (0.06)	0.57 (0.58)	0	--	--	1	-0.23 (-0.23)	2	-0.32 (-0.32)
2007	1	0.16 (0.16)	7	0.07 (0.06)	0.36 (0.26)	1	-0.05 (-0.05)	-0.23 (-0.23)	0	--	1	-0.27 (-0.27)
2008	1	0.14 (0.14)	1	0.14 (0.14)	0.61 (0.61)	10	-0.08 (-0.06)	-0.70 (-0.71)	0	--	7	-0.34 (-0.38)
2009	1	0.22 (0.22)	1	0.10 (0.10)	1.33 (1.33)	13	-0.12 (-0.10)	-0.28 (-0.25)	3	-0.22 (-0.17)	3	-0.28 (-0.24)
2010	2	0.31 (0.31)	3	0.04 (0.03)	0.49 (0.32)	1	-0.03 (-0.03)	-0.45 (-0.45)	1	-0.37 (-0.37)	0	--

Total	13	0.20 (0.22)	37	0.06 (0.07)	0.53 (0.41)	27	-0.09 (-0.07)	-0.43 (-0.37)	6	-0.22 (-0.20)	16	-0.32 (-0.32)

Table 3a: Breakdown of U.S. Equity Funds by Investment Categories

This table compares the leverage ratio and proportion of levered funds among three investment categories: General Equity funds, Real Estate funds, and other Sector funds (including Communications, Energy, Financial, Natural Resources, and Utilities). We present the mean leverage ratio and the number and percentage of levered funds within each category based on fiscal-year end information for 2000, 2006, and 2010.

	General Equity			**Real Estate**			**Sector**		
	Leverage Ratio	No. of Funds	% of All Funds	Leverage Ratio	No. of Funds	% of All Funds	Leverage Ratio	No. of Funds	% of All Funds
2000	0.21	8	26.67%	--	0	0.00%	0.28	7	58.33%
2006	0.20	13	21.31%	0.28	13	76.47%	0.29	14	56.00%
2010	0.21	15	25.86%	0.28	5	38.46%	0.24	14	50.00%

Table 3b: Breakdown of U.S. Equity Funds by Governance Index

This table presents governance details for levered and unlevered funds. We construct the governance index (on a scale from 0 to 3) based on whether the fund was incorporated in Maryland, whether more than 25% of board members are insiders, and whether the fund has a classified board. High vs. Low Governance Index fund is defined based on whether the governance index is above or below 2. For the High (Low) Governance Index group, we count the total number of funds, the number of funds incorporated in Maryland (MD), the number of funds with insiders controlling more than 25% of the board (Insider), and the number of funds with classified boards (Classified). Panel A presents the counts for levered funds, while Panel B presents the counts for unlevered funds.

	High Governance Index					**Low Governance Index**			
	MD	**Insider**	**Classified**	**Total**		**MD**	**Insider**	**Classified**	**Total**
Panel A: Levered Funds									
2000	7	4	7	7		0	0	6	7
2006	23	19	31	31		1	1	4	8
2010	17	14	22	22		1	1	7	11
Panel B: Unlevered Funds									
2000	12	9	14	15		5	2	4	13
2006	19	14	27	28		10	4	14	34
2010	20	17	28	29		7	3	18	34

Table 4: Determinants of Leverage Ratio: Tobit Regressions for U.S. Equity Funds

This table investigates the determinants of leverage ratio using Tobit regressions. The dependent variable is the fiscal-year end leverage ratio. The explanatory variables include both macro-economic variables and fund-specific characteristics. The macro-economic variables include the average monthly S&P500 return, VIX, LIBOR, Yield Spread, and Default Spread in the previous fiscal year. The fund-specific characteristics include the logarithm of average net assets, the logarithm of fund age in months, the turnover and expense ratios, the Alpha measured as the average monthly DGTW characteristic-adjusted returns, the Residual Risk measured as the standard deviation of DGTW returns, the portfolio CAPM Beta based on asset returns, the proportion of Dividend and Interest income in total assets, the Asset Illiquidity measured by AR(1) coefficient based on weekly NAV returns, Amihud ratio based on daily stock returns, and the Gibbs estimate based on daily stock returns; the indicator variable that equals one if the governance index is high; and two indicator variables for real estate and other types of sector funds. All explanatory variables are lagged by one year. The standard errors (in parentheses) are heteroskedastic robust and clustered at the fund level. Statistical significance at the 1%, 5% and 10% levels are indicated by ***, **, and *.

	Leverage Ratio					
	Illiquidity: AR(1)		Illiquidity: Amihud		Illiquidity: Gibbs	
S&P500 Ret	0.397 (0.87)	0.398 (0.85)	0.372 (0.83)	0.541 (1.14)	0.482 (1.01)	0.473 (0.99)
VIX	0.275 (1.32)	0.284 (1.40)	0.277 (1.33)	0.252 (1.31)	0.340 (1.62)	0.292 (1.44)
Libor	-4.044** (-2.10)	-4.178** (-2.15)	-4.849** (-2.45)	-4.796*** (-2.65)	-3.845** (-1.97)	-4.230** (-2.40)
Yield Spread	-5.516** (-2.09)	-5.734** (-2.15)	-6.175** (-2.31)	-5.904** (-2.43)	-5.405** (-2.04)	-5.898** (-2.41)
Default Spread	-3.963 (-1.06)	-3.979 (-1.08)	-4.048 (-1.14)	-4.842 (-1.41)	-2.725 (-0.72)	-3.545 (-1.02)
Log(AvgNetAssets)	0.058*** (3.24)	0.059*** (3.32)	0.069*** (4.39)	0.065*** (4.21)	0.062*** (3.64)	0.063*** (3.93)
Log(Age)	0.008 (0.43)	0.007 (0.36)	0.009 (0.46)	0.007 (0.41)	0.002 (0.12)	0.004 (0.20)
Turnover	-0.090** (-2.18)	-0.093** (-2.26)	-0.067* (-1.70)	-0.060* (-1.69)	-0.096** (-2.11)	-0.088** (-2.08)
Expense	4.928** (2.08)	5.008** (2.13)	3.905* (1.76)	3.831* (1.66)	4.132* (1.79)	4.383* (1.94)
Alpha	0.739 (0.82)	0.798 (0.89)	1.536* (1.69)	1.324 (1.17)	0.573 (0.64)	0.256 (0.27)
Residual Risk	-0.542 (-0.98)	-0.506 (-0.91)	-1.267** (-2.09)	-0.846 (-1.36)	-1.030* (-1.81)	-0.574 (-1.01)
Beta	-0.058 (-1.52)	-0.056 (-1.44)	-0.065 (-1.58)	-0.067* (-1.67)	-0.101** (-2.56)	-0.094** (-2.14)
Div/Interest Income	1.604** (2.39)	1.581** (2.40)	2.039*** (2.93)	2.210*** (2.84)	1.569** (2.33)	1.663** (2.56)
Diversification	-0.076*	-0.072	-0.103**	-0.094**	-0.083*	-0.085*

	(-1.64)	(-1.58)	(-2.23)	(-2.10)	(-1.83)	(-1.93)
Asset Illiquidity	0.040*** (2.61)		0.153*** (3.61)		0.106*** (2.68)	
Governance Index	0.167*** (3.30)	0.133*** (2.63)	0.140*** (2.86)	0.080 (1.52)	0.160*** (3.26)	0.112** (2.21)
GovIndex*Illiquidity		0.062*** (3.12)		0.195*** (3.93)		0.140*** (2.80)
Real Estate	0.192*** (3.36)	0.193*** (3.40)	0.167*** (2.94)	0.150*** (2.77)	0.200*** (3.32)	0.173*** (3.00)
Sector	0.057 (1.15)	0.055 (1.12)	-0.004 (-0.08)	0.003 (0.05)	0.057 (1.13)	0.060 (1.19)
No. of Observations	632	632	622	622	620	620
Pseudo R2	0.59	0.59	0.67	0.70	0.61	0.63

Table 5: Performance Comparison: Levered vs Non-levered U.S. Equity Funds

This table compares the performance of levered vs. non-levered equity funds. For each month from 1995 to 2010, we form four equally weighted portfolio based on leverage and governance index: All levered funds (Levered), levered funds with high governance index (L_GovHigh), Levered funds with low governance index (L_GovLow), and non-levered funds (NL). We then regress the monthly portfolio return and paired return difference on the Carhart (1997) four-factor model augmented by the Pastor-Stambaugh traded liquidity factor. Panel A presents the results based on underlying asset returns and Panel B presents results based on the reported NAV returns. The standard errors are reported in parentheses. Statistical significance at the 1%, 5% and 10% levels are indicated by ***, **, and *.

	Portfolio Return					**Difference in Portfolio Returns**			
	(1) Levered	**(2) L_GovHigh**	**(3) L_GovLow**	**(4) NL**		**– (4)**	**(2)- (4)**	**(3) - (4)**	**- (3)**
Panel A: Asset Returns									
Alpha	0.312** (2.54)	0.232* (1.77)	0.516*** (3.49)	0.120 (1.25)		0.193 (1.57)	0.113 (0.86)	0.396*** (2.67)	-0.284** (-1.96)
Market	0.869*** (33.10)	0.834*** (29.65)	0.919*** (29.05)	0.974*** (47.55)		-0.106*** (-4.02)	-0.141*** (-5.04)	-0.056* (-1.76)	-0.085*** (-2.74)
SMB	0.266*** (7.98)	0.354*** (9.90)	0.100** (2.50)	0.101*** (3.88)		0.165*** (4.96)	0.253*** (7.12)	-0.000 (-0.01)	0.253*** (6.43)
HML	0.325*** (9.11)	0.344*** (9.00)	0.213*** (4.96)	0.089*** (3.19)		0.236*** (6.62)	0.255*** (6.72)	0.125*** (2.89)	0.130*** (3.10)
MOM	-0.056*** (-2.69)	-0.086*** (-3.89)	0.039 (1.54)	0.046*** (2.83)		-0.102*** (-4.90)	-0.132*** (-5.99)	-0.007 (-0.29)	-0.125*** (-5.10)
Liquidity	0.062** (2.13)	0.060* (1.94)	0.071** (2.04)	-0.013 (-0.57)		0.074** (2.58)	0.073** (2.37)	0.084** (2.40)	-0.011 (-0.32)
Panel B: NAV Returns									
Alpha	0.450*** (3.04)	0.331** (2.00)	0.663*** (4.41)	0.005 (0.08)		0.445*** (3.18)	0.326** (2.08)	0.658*** (4.45)	-0.332** (-2.26)
Market	0.760*** (24.02)	0.747*** (21.12)	0.776*** (24.14)	0.764*** (55.17)		-0.003 (-0.11)	-0.016 (-0.49)	0.012 (0.39)	-0.029 (-0.92)
SMB	0.217*** (5.39)	0.297*** (6.60)	0.076* (1.87)	0.028 (1.61)		0.189*** (4.96)	0.268*** (6.31)	0.048 (1.19)	0.220*** (5.54)
HML	0.217*** (5.04)	0.245*** (5.09)	0.128*** (2.93)	0.039** (2.09)		0.177*** (4.36)	0.205*** (4.51)	0.089** (2.06)	0.117*** (2.74)
MOM	-0.036 (-1.43)	-0.046 (-1.64)	0.001 (0.04)	-0.020* (-1.80)		-0.016 (-0.68)	-0.026 (-0.98)	0.021 (0.83)	-0.047* (-1.89)

Liquidity	0.045 (1.28)	0.036 (0.94)	0.064* (1.79)	0.006 (0.37)		0.039 (1.19)	0.031 (0.84)	0.058* (1.66)	-0.027 (-0.78)

Table 6: Changes in Leverage Ratio: U.S. Equity Funds

This table investigates how funds adjust leverage ratios in response to changes in macro-economic conditions and fund-specific characteristics. We present in the table the 2nd stage regression results from a Heckman correction procedure. The 1st stage is the probit regression on leverage decisions using the same set of explanatory variables as in Table 3. In the 2nd stage regression, we regress the annual change in leverage ratio (computed based on fiscal-year end leverage ratio) on the lagged leverage ratio, the lagged stock market performance (S&P500 Ret), the logarithm of the lagged average net assets, the logarithm of the lagged age, lagged return (Alpha) measured by DGTW characteristic-adjusted return, the indicator variables for diversified and high governance index fund (Diversification and Governance Idex), and the lagged changes for VIX, LIBOR, Yield Spread, Turnover, Expense, Residual Risk, asset CAPM Beta, Asset Illiquidity, and Dividend and Interest Income. Asset Illiquidity is measured by AR(1) coefficient based on weekly NAV returns, the Amihud ratio based on daily stock returns, or the Gibbs measure based on daily stock returns. . The standard errors (in parentheses) are heteroskedastic robust and clustered at the fund level. Statistical significance at the 1%, 5% and 10% levels are indicated by ***, **, and *.

	Change in Leverage Ratio		
	Illiquidity: AR(1)	**Illiquidity: Amihud**	**Illiquidity: Gibbs**
Leverage_Lagged	-0.423*** (-5.33)	-0.468*** (-5.68)	-0.404*** (-5.07)
S&P500 Ret	0.984 (1.45)	0.568 (0.84)	0.033 (0.06)
VIX_Chg	0.103*** (4.24)	0.111*** (5.96)	0.112*** (4.91)
Libor_Chg	0.007 (0.68)	0.000 (0.02)	0.011 (1.15)
Yield Spread_Chg	0.001 (0.71)	0.001 (0.66)	0.003 (1.58)
Default Spread_Chg	-0.067** (-2.26)	-0.068** (-2.30)	-0.067** (-2.20)
Log(AvgNetAssets)	0.022*** (3.49)	0.020*** (3.64)	0.024*** (2.93)
Log(Age)	-0.002 (-0.35)	-0.003 (-0.57)	-0.004 (-0.54)
Turnover_Chg	0.011** (2.13)	0.009** (2.40)	0.011** (2.23)
Expense_Chg	-0.001 (-0.08)	0.003 (0.30)	-0.009 (-0.67)
Alpha	-0.048 (-0.14)	0.031 (0.08)	0.065 (0.17)
Residual Risk_Chg	-0.028*** (-3.46)	-0.021** (-2.36)	-0.011 (-1.30)
Beta_Chg	0.003 (0.87)	0.007* (1.74)	0.005 (1.07)
Asset Illiquidity Chg	0.001 (1.18)	-0.071*** (-3.06)	-0.071** (-2.11)

Div/Interest Income Chg	0.007* (1.66)	0.007** (2.10)	0.007** (2.17)
Diversification	-0.027* (-1.93)	-0.020* (-1.82)	-0.023 (-1.54)
Governance Index	0.057*** (3.13)	0.047** (2.41)	0.053* (1.89)
No. of Observations	158	153	153

Table 7: Changes in Total Debt: U.S. Equity Funds

This table investigates how funds adjust the total amount of debt outstanding in response to changes in macro-economic conditions and fund-specific characteristics. We present in the table the 2nd stage regression results from a Heckman correction procedure. The 1st stage is the probit regression on leverage decisions using the same set of explanatory variables as in Table 3. In the 2nd stage regression, we regress the annual proportional change in total debt (computed based on fiscal-year end total debt outstanding) on the lagged leverage ratio, the lagged stock market performance (S&P500 Ret), the logarithm of the lagged average net assets, the logarithm of the lagged age, lagged return (Alpha) measured by DGTW characteristic-adjusted return, the indicator variables for diversified and high governance index fund (Diversification and Governance Idex), and the lagged changes for VIX, LIBOR, Yield Spread, Turnover, Expense, Residual Risk, asset CAPM Beta, Asset Illiquidity, and Dividend and Interest Income. Asset Illiquidity is measured by AR (1) coefficient based on weekly NAV returns, the Amihud ratio based on daily stock returns, or the Gibbs measure based on daily stock returns. . The standard errors (in parentheses) are heteroskedastic robust and clustered at the fund level. Statistical significance at the 1%, 5% and 10% levels are indicated by ***, **, and *.

	Change in Total Debt		
	Illiquidity: AR(1)	**Illiquidity: Amihud**	**Illiquidity: Gibbs**
Leverage_Lagged	-0.789* (-1.67)	-1.355*** (-2.61)	-1.040** (-1.96)
S&P500 Ret	2.259 (0.74)	0.457 (0.13)	-1.049 (-0.35)
VIX_Chg	-0.571*** (-3.72)	-0.579*** (-3.41)	-0.545*** (-3.50)
Libor_Chg	-0.084* (-1.84)	-0.118*** (-2.81)	-0.091* (-1.67)
Yield Spread_Chg	0.003 (0.70)	-0.000 (-0.02)	0.006 (0.85)
Default Spread_Chg	0.436*** (2.96)	0.343* (1.95)	0.428** (2.62)
Log(AvgNetAssets)	0.097*** (3.55)	0.058** (2.10)	0.090*** (2.80)
Log(Age)	0.039 (0.95)	0.007 (0.16)	0.022 (0.59)
Turnover_Chg	0.063** (2.05)	0.068* (1.94)	0.063** (2.14)
Expense_Chg	-0.047 (-1.24)	-0.042 (-0.71)	-0.052 (-1.23)

Alpha	3.529** (2.05)	3.461** (1.96)	3.534** (2.15)
Residual Risk_Chg	-0.080** (-2.27)	-0.060* (-1.70)	-0.015 (-0.36)
Beta_Chg	-0.049** (-2.06)	-0.039** (-2.37)	-0.033** (-2.04)
Asset Illiquidity Chg	0.002 (0.81)	0.119 (1.23)	-0.184* (-1.74)
Div/Interest Income Chg	0.100*** (8.53)	0.098*** (9.32)	0.096*** (9.95)
Diversification	-0.220*** (-3.27)	-0.142* (-1.66)	-0.181** (-2.40)
Governance Index	0.289*** (3.72)	0.146 (0.64)	0.232** (2.18)
No. of Observations	158	153	153