Drawdown Distribution as an Explanatory Variable of Private Equity Fund Performance

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ABSTRACT

The first four to five years of a Private Equity (PE) Fund's life are known as the investment period. In this period, the fund usually draws down committed capital to make investments into portfolio companies. Although it is typical that funds drawdown most of the capital during the first five years, GPs have the autonomy to invest capital even after the investment period ends because of a lack of good opportunities. However, this is uncommon because it leaves little time for the GP to create value in these investments before they are required to exit them prior to the expiration of the fund life. This paper aims to investigate the relationship between the drawdown distribution over the life of the fund and PE buyout fund returns. Before doing so, this paper brings together different explanatory variables found to be significant in previous relevant studies to form a base-case regression. Using Preqin Data, this study is based on 281 buyout funds with vintages from 1995 to 2005. After running numerous multi-variable regression, the combination of three factors consisting Corporate-BAA bond yield of the fund's vintage year, Average S&P500 returns over the Fund's Life and the Fund Number were found to be the most significant group of variables and thus formed the base-case regression. Vintage year was found to be insignificant when macro-economic variables were added to the regression. Using the same principles of calculating bond duration, the drawdown distribution of a fund can be captured in a single duration-like variable where fund distributions are time-weighted – the earlier the drawdowns, the lower the variable. This Drawdown Distribution Variable (DDV) was shown to be significant in explaining PE fund returns at a 95% confidence level. Though the increase in R-squared is little, a partial F-test shows that DDV does increase the explanatory power of the multi-variable regression model. As hypothesized, the relationship between DDV and PE fund returns is negative where the later the drawdowns (the higher the DDV), the lower the PE returns.

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1 INTRODUCTION

Interest in understanding PE returns from both practitioners and academics has been growing over the past 30 years ever since the asset class first took off in the mid-1990s. Despite the scrutiny it has received, private equity and its relevant performance drivers are not well understood. This can be attributed to a lack of familiarity, information asymmetry, and the questionable quality of data available for private equity research *(HJK, 2013a).* It is in only recent years that several commercial enterprises have successfully collected and documented reliable data on fund cash flows and returns on PE investments as the first funds raised during the mid-1990s finally begin to exit the market.

A PE fund is a closed-end fund in which a limited partnership is formed between the management of the PE funds, known as the *general partner* (GP), and its investors, known as the *limited partners* (LPs), who commit capital to the fund. The LPs consist largely of institutional investors and high net-worth individuals who commit to providing a certain amount of capital to the fund over a fixed period of time. These investors generally have long-term investment horizons and are seeking above-market returns for investments in such illiquid assets. . PE funds generally have ten-year life cycles. GPs are expected to make investments during the first four to five years of the fund, known as the *investment period*, before going on to harvest the investments over the remaining years, known as the *holding period*. Investments are expected to be realized and distributed to the investors by the end of the holding period.

Qualitatively, strong deal-sourcing abilities of GPs and a steady investment pace are desirable features of a PE fund that LPs often look out for. However, of the explanatory variables tested in preceding research, the relationship between drawdown distribution over a fund's life and historic returns has not been studied.

1.1 PURPOSE OF RESEARCH

This study has three primary objectives:

1. To develop a drawdown distribution variable (DDV) that reflects the drawdown pace and magnitude of private equity investments made by the fund as a percentage of the fund's total committed capital – the earlier the drawdowns, the lower the drawdown duration, the longer the investment period, the higher the duration

2. To bring together explanatory variables found to be significant by previous literature in a single base-case regression using the Preqin data

3. To determine the significance of drawdown distribution on expected returns by using DDV as an additional explanatory variable added to the base-case regression

1.2 HYPOTHESIS

It is hypothesized that the drawdown distribution of a PE fund is significant in explaining PE fund returns where the lower the DDV, the higher the returns of the fund. The fund's ability to drawdown capital early might reflect strong deal-sourcing abilities and generally strong macroeconomic conditions during the early years of the fund. PE funds that are only able to drawdown capital later in life are unable to create value in these portfolio companies before exiting because of the fund-life time constraint. Additionally, unlike funds that are able to make early investments, funds with a high DDV might be pressured to make sub-optimal investments before the expiration of the fund so that they are able to retain their management fees — a failure to fully drawdown committed capital results in a de facto shrinking of fund size, therefore reducing management fees.

1.3 EXPLAINING KEY TERMS

Fund Size and Managers' Compensation

The size of funds (i.e. cumulative committed capital from all LPs) varies from fund to fund based on the fund's target market and strategy. It is not uncommon for GPs to commit capital out of

their own pocket; in fact, many LPs prefer to see GPs put up money as an indication of their buy-in and aligned interest. GPs receive compensation through two kinds of fees: Management fees are paid to the GPs on an annual basis where the total sum is a percentage of total committed capital; carried interest, or carry, is the percentage of "profits" on investments claimed by the GP before returning the remainder to LPs. Typically most funds adopt a 2-20 fee structure where management fees at 2% of committed capital and carried interest is 20% of above-cost returns on investments made by the GP. Clawback provisions might be included to mandate GPs to return a portion of the management fees to LPs if the hurdle rates are not met.

Life-cycle of PE fund

Most funds have a finite life span of ten years. Although GPs can usually extend the life of a fund by agreement, most funds are dissolved at the end of their term. Like other fund terms, the length of the life of a fund varies, but the GP and LPs must come to an agreement before the investment period begins. Often, GPs have the right to extend the life of the fund if said extension privileges are granted during legal negotiations prior to the investment period or all LPs agree at the time of request[1].

The life of the private equity fund can be split into distinct stages. After fundraising, the *closing period* is when the partnership documents are signed, indicating that the fund is definitively in operation. Most funds have several closings and the final fund size and number of LPs involved are not known until the final closing. That said, some LPs who closed early might demand capping the size of the fund to prevent dilution of their stake in the fund, a right that early investors often exercise.

Once commitments have been finalized, the fund enters the *investment period*, which is also known as the *commitment period*. During this period, the firm eponymously draws down capital

[1] Some funds known as evergreen funds have no fixed term and may live on indefinitely. These open-end PE funds are rare and are hard to examine because their returns are examined using a different performance measure as compared to closed end funds.

from the committed pool to make investments on behalf of the fund into newly sourced deals. The length of the investment period is typically five to seven years. This number is predetermined and will expire, which means that PE funds have a finite period of time in which they need to draw down the committed capital to make investments. Following the investment period, the manager is typically permitted to make additional investments only in limited circumstances, including follow-on investments necessary to protect or enhance the value of investments already made, and completion of investments committed to or actively under consideration at the time the commitment period ended. There typically is a cap on the percentage of capital that can be expended on follow-on investments and a time limit of six months to one year after which the manager may no longer complete pending investments. The appropriate cap on the amount of follow-on investments will depend on the nature of the fund's investment strategy.

After the expiration of the investment period, funds enter what is known as the *holding period* where they will hold investments for an additional period of five to seven years to harvest the value of their investments. Investments are either sold piecemeal throughout this period, or can also be sold prior to entering the holding period. At the end of this period, if the fund still has unrealized investments, the GP may choose to request to extend the holding period either unilaterally or with advisory committee or investor consents. If the extension is not enough for the GP to liquidate the investment, the GP can request for another extension, sell their stake in the investment to another GP at a discount through the secondary market or distribute the investments in-kind to the LPs. All unfunded commitments net of fees and carry will be distributed to investors, reducing the overall fund size. These LP commitments can also be sold in the secondary market to other LPs prior to expiration of investment period.

2 LITERATURE REVIEW

Before we consider the body of literature, it is important to point out that because of the inaccessibility to PE fund returns and difficulty in collecting data, much of the research done has been based on differing sets of data, some more accurate or more recent than others, thus different research papers have presented varying conclusions. One of the objectives of this paper is to do a literature review and collate which factors might be relevant to the dataset from Preqin before testing them using the Preqin dataset and thereafter including drawdown distribution as an explanatory variable.

Persistence and Aggregate Capital Inflows into PE Industry

In the *HJK (2013a)* and *HJK (2013b)* suggest that persistence of performance (fund sequence number) and capital inflows into the PE industry are statistically significant in explaining PE returns. Funds with higher persistence in performance are more likely to do well in their subsequent funds while heavy capital inflows into the industry during vintage years in which funds are raised depress PE returns. This supports the fact that that too much money chasing the same limited deals might have a negative impact on returns because of high valuations. Additionally, they showed that there is no significant relationship between fund size and returns for buyout funds after controlling for vintage year. For Venture Capital (VC) funds, however, funds in the bottom quartile of fund size are found to underperform. These conclusions are consistent with Kaplan and Schoar's research using a different set of data (KS, 2005).

Pro-cyclicality of PE fundraising and investments

Another significant variable in explaining PE fund returns is the macroeconomic conditions during the vintage year and over the life of the fund. In *RS (2011),* Robinson and Sensoy show that the amount of funds raised during boom periods are significantly higher than funds raised during troughs and that funds raised in hot markets tend to underperform on an absolute basis.

However, their paper goes on to show that this underperformance disappears once the results are compared to a public market equivalent return, controlling for vintage year effects. Thus on average, PE funds are still able to provide higher returns than public market investments in both peaks and troughs of business cycles. This makes sense because PE funds are liquidity provider (sinks) when capital markets are strong (weak) and valuations are high (low), making net cash flows highly pro-cyclical. Additionally, their study suggests that while both capital calls and distributions rise with public equity valuations (i.e. they are pro-cyclical), distribution calls are more sensitive than capital calls.

A study done by Phalippou and Zollo reaffirms the pro-cyclical nature of PE fund performance. In *PZ (2005),* they show that systematic risk of PE funds is not a driver of fund performance, but rather macro-economic conditions are more significant in explaining historic returns. As proxies for macro-economic conditions, the paper looks at variables that vary closely with both business cycles and public stock-markets: real GDP growth rate, BAA-bond yields, credit spreads, market portfolio performance, and option-based risk factors on a quarterly basis. Of these, yield on Corporate-BAA bonds (negative correlation) and the average stock-market return (positive correlation) at the time of investment are most significant in explaining returns.

So, to summarize, I will begin the analysis by building a base-case regression using proxies of the following explanatory variables:

1. Vintage Year
2. Macro-economic Conditions
3. Persistence

The aim is to first recreate the base-case scenario based on the current existing literature review.

3 DATA AND METHODOLOGY

3.1 PREQIN DATA

Ideally, I would have preferred to use the same Burgiss data used in *HJK (2013a)*. However, due to funding constraints, I used data from the Preqin Performance Analyst Database which The Wharton School, University of Pennsylvania, is already currently subscribed to. It covers up to 6,500 funds and allows users to compare across fund types, vintage years, key performance data, historic performance, cash flow graphs of contributed and distributed capital. Preqin collects information annually from individual funds in the PE industry directly. It is comforting to note that in their most recent paper, Harris, Jenkinson and Kaplan show that the data from Preqin is qualitatively similar to that in Burgiss, the database which they had used. Thus, the data used is reliable, accurate and of research quality. Data for 281 PE buyout funds in the vintages of 1995 to 2000 and had a main geographic focus of North America were used in this study. The data used had to be manually extracted from the database Wharton's Preqin subscription only gave me access to the data in a graphical form which was not usable for the purpose of this study.

3.2 METHODOLOGY

Construction of Drawdown Distribution Variable (DDV)

The drawdown distribution was constructed using semi-annual non-cumulative distribution of the funds. The methodology of calculating the DDV closely replicates that of bond duration where the non-cumulative distributions are weighted by time. The discount rate of 5.95% used is the average 10-year treasury yield from 1995 to 2005. In general, the higher the DDV, the later the drawdowns (see Table I).

$$DDV = \frac{\sum_{t=1}^{N} \frac{t.D_t}{(1+r)^t}}{\sum_{t=1}^{N} \frac{D_t}{(1+r)^t}}$$

where N = number of distributions, T = number of years from vintage year, r = yield to maturity

In addition to the basic DDV, a modified DDV was also constructed. The initial DDV only allowed us to explore the relationship between early vs late drawdowns. However, a steady investment pace might lead to better returns rather than early drawdowns. Early drawdowns might be a result of investment anxiety and over-eagerness due to a lack of experience rather than strong deal-sourcing abilities. The formula simply takes the absolute difference between DDV and the DDV of a fund which has steady drawdown distribution (see Table I)

$$DDV_{mod} = \left| \frac{\sum_{t=1}^{N} \frac{t.D_t}{(1+r)^t}}{\sum_{t=1}^{N} \frac{D_t}{(1+r)^t}} - \frac{\sum_{t=1}^{N} \frac{t}{(1+r)^t}}{\sum_{t=1}^{N} \frac{1}{(1+r)^t}} \right|$$

where N = number of distributions, T = number of years from vintage year, r = yield to maturity

Choosing the Right Return Measure

Till date, there is still much debate over the validity and quality of the different performance return measures, namely the Internal Rate of Return (IRR) of the fund, or the *Investment Multiple*. This paper will not discuss the pros and cons of the aforementioned measures. Instead, Investment Multiples will be used as the dependent variable in the multi-variable regressions because investment multiples have been found to explain substantially more of the variation in *Public Market Equivalents* (PMEs) return variables than do IRRs.

Choosing the Right Control Variables for Base-Case Regression

Based on the literature review, the following variables were first identified as possible control variables for the base-case regression

1. Vintage Year[2]
    a. Average Investment Multiple by Vintage Year: Industry-wide Average Investment Multiple for All Funds (not management group specific)
    b. Median Investment Multiple by Vintage Year: Industry-wide Median Investment Multiple for All Funds (not management group specific)
    c. Weighted-Average Investment Multiple by Vintage Year: Industry-wide Weighted-average Investment Multiple for All Funds based on Fund Dize (not management group specific)
2. Macro-economic Conditions[3]
    a. Corporate-BAA Yield of Vintage Year
    b. Average Annual S&P500 Returns over Fund Life (10 Years)
    c. Average Annual S&P500 Returns of Last 5 Years of Fund
3. Persistence[4]
    a. Fund Number: Number of Funds Raised / Serial Number of Fund

[2] Source: HJK (2013b)
[3] Source: Public Data from Yahoo Finance and Federal Reserve database in St. Louis
[4] Source: Preqin Database

I began the analysis by running simple linear regressions on Average Industry Investment Multiples as explanatory variables. Subsequently, I combined different variables from Vintage Year and Macro-economic Conditions in multi-variable linear regressions. It appears that Vintage Year factors and Macro-economic Condition factors are significant on their own. However, when run together, the explanatory power of Vintage Year is absorbed by explanatory power of Macro-Economic Confidtions.

Of the three Macro-economic Condition factors, Corporate-BAA Yield of Vintage Year and Average annual S&P500 Returns over Fund Life (10 Years) appear to be most significance (see Table II). Adding the Fund Number of the funds increases the R-squared of the regression but does not diminish the significance of the Macro-economic Condition factors (see Table III). The F-Stat is less than 4 suggesting that it adds explanatory power to the model (see Table V).

Thus, the control variables for the base-case regression consists:

1. Corporate-BAA Yield of Vintage Year
2. Average Annual S&P500 Returns over Fund Life (10 Years)
3. Fund Number

Once the base-case regression was established, I ran two separate regressions with DDV and modified DDV separately (see Table III). The results reveal that only DDV was significant in explaining PE fund returns with a 95% confidence interval. The modified DDV was not significant at all.

Lastly, to check for collinearity, I ran a correlation matrix (see Table IV) and also a multi-variable regression with the other explanatory variables on Corporate-BAA Yield. Correlations are extremely low and the regression shows that none of the factors are significant in explaining BAA-Yield. (see Table VI)

4 DISCUSSION

Preqin as Reliable Data Source

The significance of both Macro-Economic Condition factors and Persistence in explaining PE Fund Returns suggests that the data from Preqin is indeed reliable and qualitatively similar to that of the Burgiss data used in *HJK (2013a*) had used in their paper.

Vintage Year vs Macro-Economic Conditions

From the results of numerous multi-variable regressions (see Table III) using various combinations of independent variables, it appears that Vintage Year factors do not add further explanatory power to the regression after Macro-economic Conditions are already controlled for. This is not surprising since Macro-economic Conditions are year-specific and probably embedded in the Vintage Year. There are two advantages of using Macro-Economic Conditions rather than the Vintage Year of a fund. First, looking at Macro-economic Conditions takes the analysis to a more granular level since we can actually breakdown the Vintage Year effects to clear and distinct factors. As suggested in *HJK (2013a),* PE fund performance is significantly pro-cyclical since valuations both exit and entry, and organic growth of portfolio companies are necessarily affected by the larger economy. Thus, we can capture this effect by using average stock market returns over the life of the fund as a proxy for capital markets and general health of the economy. The positive relationship between Corporate-BAA yield during the vintage year of the fund and PE Fund Investment Multiple Returns is not expected. In the same aforementioned study, the relationship was negative. This was rationalized by the fact that buyout funds rely heavily on leverage to drive returns. Lower bond yields suggest deep capital markets and funds are thus able to borrow cheaply for levered buy-outs and other levered transactions. The difference in quality of data and type of funds used in *PZ(2005)* might contribute to this discrepancy. They relied on a proprietary set of data consisting of 700 PE Fund returns including Venture Capital(VC) funds to for their calculations. Further analysis should be done to ascertain the nature of the

relationship, but for now, it is clear that Corporate-BAA yield is one of the most important factors in explaining PE Fund Returns. The second advantage of using Macro-Economic Conditions is its usefulness in making predictions. Unlike Vintage Year factors that are completely opaque and backward-looking, predictions of Macro-Economic Conditions are easier estimate and obtain.

Persistence

As shown by previous literature, there is persistence in PE fund returns. In this study and *KS (2005)*, the fund number was used as a factor of persistence. To refine the regression further, lagged fund returns, either IRR or Investment Multiples, should be used as a high quality variable, as suggested by HJK and Strucke in their working paper, *Has Persistence Persisted in Private Equity?.*

Drawdown Distribution as an Explanatory Variable

The multi-variable regression (see Table III) suggest that a fund's Drawdown Distribution is a significant explanatory variable of its historic Investment Multiples. As hypothesized, there is a negative relationship between DDV and Fund Investment Multiples where the higher the DDV, the lower the Investment multiple. This means that that the earlier the drawdown distribution of a PE fund, the higher the expected returns of the fund. This might be because of strong deal-sourcing abilities that GPs with low DDVs have, unlike funds with high DDVs that are forced to make sub-optimal investments as the fund nears expiry.

When added to the base-case regression, all other factors remained significant while adjusted R-squared increased from 0.109 to 0.110. Although the increase in adjusted R-squared is considerably low, it must be noted that most regressions ran on PE Fund Returns only boast a maximum of a 0.200 R-squared value. More importantly, the F-Stat of the regression is 2.83, suggesting that DDV adds explanatory power to the base-case regression (see Table IV).

Implications

If a fund's drawdown distribution is able to explain fund returns, LPs should watch the drawdown pace of funds closely to predict expected returns. Similarly, GPs should ensure they have strong opportunities to put out money early on the funds life before raising capital. The implication for fund contracts is that LPs should put a hard cap on the investment period where GPs have only 5 years to drawdown capital. As of now, the investment period is usually negotiable with flexibility and good investments later on as reason for extensions. However, if high DDVs result in lower expected returns, LPs and GPs are better off making sure most of the committed capital is drawn down in the early years of the fund. Any capital that is not drawn down after 5 years will shrink the fund size, cutting back on management fees. However, this might create bad incentives where GPs put out money early without regard for quality of the investments, ultimately resulting in poor performance ex-ante.

Conclusion

Firstly, the study was able to identify the three most significant explanatory variables from numerous prior studies. A combination of Macro-Economic Conditions like Corporate-BAA Yield and Average Return of S&P over Fund Life, and a Persistence factor, Fund Number, formed the base-case regression for this study. It appears that the Vintage Year effect completely disappears after controlling for Macro-Economic Conditions. This makes sense because we expect most of the Macro-Economic Conditions to be embedded into Vintage Year factor. Secondly, this study shows results using that Preqin data are qualitatively similar to that of those using Burgiss Data. Lastly, the drawdown distribution of funds/DDV has a significant effect on PE fund returns. After adding DDV to the base-case regression, the adjusted R-squared increased slightly while all other factors remained significant. Additionally, a partial F-test shows that DDV does add significant explanatory power to the regression model, although not much. As hypothesized, the relationship between DDV and PE fund returns is negative where the later the drawdowns (the higher the DDV), the lower the PE returns.

Table I

Drawdown Distribution Variable Construction

This table shows the basic construction of the drawdown distribution variable used in the regression based on a discount rate of 5.56%. All three scenarios (Steady Drawdown, Early Drawdown, Late Drawdown) have a cumulative drawdown of 10 million.

	Steady Drawdown				Early Drawdown				Late Drawdown			
Year	Drawdown	PV	PV/Price	*Y	Drawdown	PV	PV/Price	*Y	Drawdown	PV	PV/Price	*Y
1	1	0.947329	0.126042	0.126042	4	3.789314	0.419539	0.419539	0	0	0	0
2	1	0.897431	0.119403	0.238806	3	2.692294	0.298081	0.596162	0	0	0	0
3	1	0.850162	0.113114	0.339342	3	2.550487	0.28238	0.847141	0	0	0	0
4	1	0.805383	0.107156	0.428624	0	0	0	0	0	0	0	0
5	1	0.762962	0.101512	0.50756	0	0	0	0	0	0	0	0
6	1	0.722776	0.096165	0.576991	0	0	0	0	0	0	0	0
7	1	0.684706	0.0911	0.6377	0	0	0	0	0	0	0	0
8	1	0.648642	0.086302	0.690414	0	0	0	0	3	1.945925	0.318076	2.544607
9	1	0.614477	0.081756	0.735805	0	0	0	0	3	1.843431	0.301322	2.711901
10	1	0.582112	0.07745	0.774498	0	0	0	0	4	2.328446	0.380602	3.806017
Total	10	7.51598	1	5.055783	10	9.032095	1	1.862842	10	6.117802	1	9.062526

Table II

Pair-wise Regression

This table shows pairwise regressions of the various independent variables on PE Fund Returns (Investment Multiples). The significance codes are '***' – 0.01, '**' – 0.05, '*" – 0.1. The coefficient of each variable is shown below its significance code and its standard error is in parentheses.

	Individual Regressions									
Multiple R-Squared	0.042	0.053	0.058	0.061	0.046	0.001	0.018	0.015	0.000	0.000
Adjusted R-Squared	0.038	0.049	0.055	0.058	0.042	-0.003	0.015	0.012	-0.004	-0.003
Intercept	***	***	***	***	***	***	***	***	***	***
	1.05	0.74	0.96	-0.72	1.40	1.64	1.50	1.89	1.67	1.66
	[0.18]	[0.24]	[0.18]	[0.56]	[0.09]	[0.08]	[0.09]	[0.12]	[0.07]	[0.06]
Vintage Year										
Average Investment Multiple	***									
	0.34									
	[0.10]									
Median Investment Multiple		***								
		0.59								
		[0.15]								
Weighted Average Investment Multiple			***							
			0.41							
			[0.10]							
Macro-economic Conditions										
BAA Yield in First Year				***						
				42.17						
				[9.90]						
Average Annual S&P Returns over 10 Years					***					
					4.90					
					[1.34]					
Average Annual S&P Returns in Last 5 Years						***				
						0.41				
						[1.06]				
Persistence										
Fund Number							***			
							0.07			
							[0.03]			
Drawdown Distribution										
Duration								***		
								-0.09		
								[0.04]		
Modified Duration										
									-2.66E-06	
									[0.05]	
Modified Duration Squared										
										0.001
										[0.004]

Table III

Base-Case Regression with Drawdown Duration Variable

This table shows multi-variable regressions of the various independent variables on PE Fund Returns (Investment Multiples). The best base-case scenario that returns the highest adjusted r-squared includes Coporate BAA Yield, Average Annual S&P Returns over 10 years and Fund Number as variables. The coefficient of each variable is shown below its significance code and its standard error is in parentheses.

	Base-Case Regressions					With DDV
Multiple R-Squared	0.102	0.102	0.104	0.102	0.111	0.123
Adjusted R-Squared	0.095	0.092	0.094	0.092	0.101	0.110
Intercept					*	
	-0.87	-0.84	-0.65	-0.81	-0.93	-0.56
	[0.55]	[0.58]	[0.62]	[0.63]	[0.55]	[0.58]
Vintage Year						
Average Investment Multiple						
			0.11			
			[0.13]			
Median Investment Multiple						
		0.05				
		[0.21]				
Weighted Average Investment Multiple						
				0.03		
				[0.15]		
Macro-economic Conditions						
BAA Yield in First Year	***	***	**	***	***	***
	40.50	38.72	33.06	38.66	39.58	38.00
	[9.71]	[12.67]	[13.20]	[13.29]	[9.69]	[9.68]
Average Annual S&P Returns over 10 Years	***	***	***	***	***	***
	4.64	4.50	4.62	4.49	4.38	4.06
	[1.31]	[1.46]	[1.31]	[1.50]	[1.31]	[1.32]
Persistence						
Fund Number					**	**
					0.05	0.05
					[0.03]	[0.03]
Drawdown Distribution						
Duration						**
						-0.11
						[0.06]

Table IV

F-Test for Base-Case Regression with DDV

This table shows the partial F-test after including DDV as an additional explanatory variable in to the base-case model.

Partial F-Test

Model 1: Multiple ~ BAA.Yield + Stock10 + Fund.Number
Model 2: Multiple ~ BAA.Yield + Stock10 + Fund.Number + Duration

	Res.Df	RSS	DF	Sum of Sq	F	Pr(>F)
1	277	210.29				
2	276	208.16	1	2.1322	2.8271	0.09381

Table V

F-Test for Base-Case Regression adding Fund Number

This table shows the partial F-test after including Fund Number as an additional explanatory variable in to the model that includes Macro-Economic Variables only.

Partial F-Test

Model 1: Multiple ~ BAA.Yield + Stock10
Model 2: Multiple ~ BAA.Yield + Stock10 + Fund.Number

	Res.Df	RSS	DF	Sum of Sq	F	Pr(>F)
1	278	212.47				
2	277	210.29	1	2.1844	2.8774	0.09096

Table VI

Correlation Matrix

	Stock10	*BAA Yield*	*Fund Number*	*Duration*
Stock10	1			
BAA Yield	0.04828016	1		
Fund Number	0.121241929	0.06137203	1	
Duration	-0.078785537	-0.067447365	0.010935431	1

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