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Hedge Fund Regulation and Performance. THEM IN

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HEDGE FUNDS have collectively accumulated over two trillion dollars in assets as of 2007. Hedge funds typically promise investors alphas of 5% or more, which (implausibly) implies there will be over \$100 billion in excess returns for hedge funds. Further, the increasing pool of hedge fund capital under management and activist investment strategies has the potential to move other markets and impact financial stability. These developments have attracted increased regulatory scrutiny to the hedge fund industry in many countries around the world.

The purpose of this study is to facilitate an understanding of the impact of hedge fund regulation on fund governance and performance. In theory, there is an ambiguous relation between hedge fund regulation and hedge fund structure and performance. On one hand, a lack of regulatory oversight may give rise to fund managers that disguise investment schemes and merely capture the fees. Hedge fund registration and oversight would curb this type of behaviour and thereby improve hedge fund structure and average performance. On the other hand, regulatory oversight may hamper fund performance where hedge fund managers and their investors lose freedom to contract and organize their resources in the way that they deem to be most efficient, and thereby exacerbate agency problems.

The international data examined in this paper indicate regulatory requirements in the form of restrictions on the location of key service providers as marketing

channels that permit wrappers tend to be associated with worse performance and a reduction in risk. But the reduction in risk is not sufficient to compensate for the lowering in performance.

HEDGE FUND REGULATION

In the U.S., hedge funds are formed as limited partnerships whereby investors are considered limited partners and the hedge fund managers are general partners. Typically, the limited partners are wealthy individuals and institutional investors. Compensation for hedge fund managers comprises a 1-2% fixed management fee based on hedge fund asset size and a 15-20% carried interest performance fee based on the profits. There is no restriction on the minimum size to operate as a hedge fund, and no restrictions on the location of key service providers. Hedge funds in the U.S. can avoid the public disclosure requirements of the U.S. Securities Act of 1933 by claiming the status of a private placement.

Hedge funds face different regulations in other countries. The most common forms of regulation in different countries around the world include restrictions on the location of key service providers. A typical hedge fund does not have any employees but instead delegates different functions to service providers of the hedge fund, such as the administrator, custodian, investment advisor, auditors, legal and tax advisors, accountants and consultants. Outsourcing a hedge fund's functions minimizes risks of collusion among hedge

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fund participants to perpetuate fraud, and also mitigates liability in the event the hedge fund participants are accused of improperly performing their management duties. Hedge fund regulations also differ internationally for minimum capitalization requirements, and restrictions on distribution channels, such as banks, fund distribution companies, wrappers, private placements, investment managers, and other regulated financial institutions as well as non-regulated financial institutions. These regulations are summarized by PWC (2006, 2007) and Cumming (2008).

DATA

This paper makes use of two datasets: (1) Center for International Securities and Derivatives Markets ("CISDM"), and (2) HedgeFund.Net ("HFN") DataExport collected by Channel Capital Group Inc. The CISDM data comprise a total of 2,462 funds. Of these, 1,127 have performance statistics for 2003-2005, the three-year period considered by this study. The HFN data comprises a total of 5,298 funds. Of these, 1,350 have performance statistics for 2003-2005 and complete information on fund domicile and other variables of interest. Among these funds I found an overlap of 340 funds in the HFN data and the CISDM data. In total, therefore, I use 1,127 funds from CISDM and 1,010 funds from HFN. The total sample comprises 2,137 hedge funds from the 24 countries as enumerated in Cumming (2008).

The average hedge fund's alpha was 4.56% [median 2.15] and the average MPPM was 9.07 [median 7.42]. The average monthly percentage return was 0.99 [median 0.80]. The average age for the hedge funds with performance data in January 2003 to December 2005 was 86.69 months [median 74 months], and the average hedge fund size was \$129.061 million [median \$28.249 million] in 2005 US dollars. The average fixed fee for the hedge funds was 1.37% [median 1.00%], and the average performance fee was 18.09% [median 20.00%].

METHODOLOGY

I use Goetzmann et al.'s (2007) Manipulation-Proof Performance Measure (MPPM), Fung and Hsieh's (2004) multifactor alpha, average monthly hedge fund returns and standard deviation of average monthly returns over the January 2003 to December 2005 period to measure hedge fund performance. The results are also robust

to earlier time periods, albeit the earlier time periods comprise smaller samples since many funds in the data were formed only recently.

The MPPM is analogous to the Sharpe ratio, originally called the "reward-to-variability" ratio. The Sharpe Ratio and other reward-to-risk measures may be manipulated with option-like strategies (Goetzmann et al., 2007), and this type of manipulation may reasonably be expected to be commonplace among hedge funds. The MPPM proposed by Goetzmann et al. is as follows:

$$\hat{\Theta} \equiv \frac{1}{(1-\rho)\Delta t} \ln\left(\frac{1}{T} \sum_{t=1}^T [(1+r_{ft})^{-1}(1+r_{ft}+x_t)]^{1-\rho}\right)$$

where r_{ft} and x_t is the per-period (not annualized) risk free rate and the excess return of the fund over period t . The parameter ρ is the relative risk aversion; historically, this number ranges from 2 to 4 for the CRSP value-weighted market portfolio, depending on the time and frequency of data used. The Θ can be interpreted as the annualized continuously compounded excess return of the portfolio (Goetzmann et al., 2007). The MPPM is interpreted as the average per period welfare of a power utility investor in the portfolio over the time period in question. I found the regression results to be very robust to MPPMs for three different risk aversions: 2, 3 and 4. I report MPPM values for risk aversion 3.

In addition to MPPM, I consider alphas generated from a multifactor model. The multifactor models could be expressed in a general form as following:

$$r_t^i = \alpha^i + \sum_{k=1}^K \beta_k^i F_{k,t} + \varepsilon_{i,t}$$

where r_t^i is the excess return (in excess of the risk-free rate) on hedge fund i for month t , α^i is the abnormal performance of hedge fund i over the regression time period, β_k^i is the factor loading of hedge fund i on factor k during the regression period, $F_{k,t}$ is the return for factor k for month t , and $\varepsilon_{i,t}$ is the error term. The main difference among those models is the selection of factors. Fung and Hsieh (2004) developed a seven factor model, which has strong explanatory power in hedge fund performance. Based on their model, I run the following regression:

$$r_t^i = \hat{\alpha}^i + \sum_{k=1}^K \hat{\beta}_k^i F_{k,t} + \hat{\varepsilon}_{i,t}$$

The factors are S&P 500 return minus risk-free rate, Wilshire small cap minus large cap return, change in the

Table 1: Regression Analyses

This table presents OLS regression analyses of the determinants of MPPM, multifactor alpha, monthly average returns and the standard deviation of monthly average returns for the cross-section of funds in the data. Dummy variables are included for the continents in which assets are primarily located, and the funds' primary strategy (30 dummy variables in total). All the regressions use the standard HCCME correction for heteroskedasticity.

Variable	MPPM		Multifactor Alpha		Average Monthly Return		Standard Deviation of Monthly Returns	
	Coefficient	t-statistic	Coefficient	t-statistic	Coefficient	t-statistic	Coefficient	t-statistic
Constant	133.238	5.671***	-17.098	-0.319	13.108	6.540***	16.145	3.192***
Hedge Fund Regulation Variables								
Log Minimum Capitalization	-0.108	-1.341	0.156	0.902	-0.010	-1.551	-0.026	-2.001**
Restrictions on Location of Key Service Providers	-7.352	-3.623***	-5.299	-1.283	-0.702	-4.156***	-0.567	-1.737*
Marketing Bank	2.466	1.392	3.043	0.883	0.243	1.638	0.240	0.833
Marketing Fund Distribution Company	1.192	0.444	-14.948	-2.047**	0.215	1.035	0.525	1.271
Marketing Via Wrappers	-6.114	-2.520**	6.444	1.036	-0.634	-3.236***	-0.766	-1.962**
Marketing Private Placement	-2.322	-0.686	14.472	1.450	-0.095	-0.309	-0.181	-0.231
Country GNP and Legal Origin								
Log GNP Per Capita	-11.383	-5.644***	0.807	0.186	-1.062	-6.354***	-0.998	-2.476**
French Legal Origin	-4.428	-1.839*	10.083	1.681*	-0.377	-1.781*	-0.429	-0.833
German Legal Origin	-2.484	-0.676	5.607	0.270	0.378	0.904	0.803	0.563
Fund Characteristics								
Yearly Capital Redemptions	2.684	4.216***	0.433	0.286	0.242	4.042***	0.322	2.168**
Log Assets	0.282	2.146**	-0.701	-1.165	-0.012	-0.951	-0.307	-7.610***
Log Age	0.080	0.195	0.020	0.016	-0.054	-1.467	0.502	3.413***
Minimum Investment	-6.537E-10	-0.009	-2.098E-08	-0.112	8.399E-11	0.013	-1.174E-09	-0.067
Management Fee	0.214	1.261	1.071	1.969*	0.019	1.253	0.132	1.744*
Performance Fee	-0.044	-1.013	0.071	0.578	0.002	0.551	0.029	1.750*
HFN Data Dummy	-8.271	-10.035***	-3.648	-1.179	-0.387	-5.291***	0.007	0.019
Dummy Variables for Primary Location of Assets?	Yes			Yes		Yes		Yes
Dummy Variables for Primary Fund Strategy?	Yes			Yes		Yes		Yes
Model Diagnostics								
Number of Observations		2137		2137		2137		2137
Adjusted R ²		0.374		0.039		0.246		0.202

constant maturity yield of the 10-year Treasury, change in the spread of Moody's Baa minus the 10-year Treasury, bond PTFS, currency PTFS, and commodities PTFS, where PTFS denotes primitive trend following strategy. The estimated intercept α^i is the alpha performance measure or the abnormal performance of hedge fund i over the regression time period.

In the regression analyses below, I control for a variety

of characteristics other than hedge fund regulation that may impact hedge fund performance, including legal origin to proxy the quality of investor protection (La Porta et al., 1998). I also control for a variety of hedge fund characteristics, including the frequency with which investors may withdraw capital, hedge fund size, hedge fund age, minimum investment amounts per investor, and performance and management fees.

RESULTS

The central focus of the following discussion is on the impact of regulation on hedge fund performance and structure. Robustness to inclusion/exclusion of control variables for legal origin, GNP per capita, and various hedge fund characteristics are also considered. Table 1 reports regression results for the use of both the CISDM and HFN datasets. The results are robust to other specifications (unless otherwise indicated), including different explanatory variables, excluding select countries (such as the U.S. and UK) from the dataset, excluding the HFN dataset, and Heckman (1976, 1979) sample selection models (see Cumming 2008).

At a broad level, the data indicate that regulatory requirements in the form of restrictions on the location of key service providers and marketing channels permitting wrappers tend to be associated with lower MPPMs, lower fund alphas, and lower average returns. The standard deviation of returns is lower among jurisdictions with restrictions on the location of key service providers and higher minimum capitalization requirements.

The data indicate that jurisdictions with restrictions on the location of key service providers (PWC 2006, 2007; Cumming 2008) have worse performance results. MPPMs are 7.35 lower among jurisdictions with restrictions on location of key service providers. (In related specifications, not explicitly presented in this paper, I also found Sharpe ratios are approximately 0.10-0.12 lower for funds in jurisdictions with restrictions on the location of key service providers.) This effect is statistically significant at 1% level. Also, the effect is economically large: it is over 50% of one standard deviation of the MPPM. The implication of the data is that a location restriction inefficiently constrains the human capital available to a hedge fund, thereby leading to worse performance.

Multifactor alphas are lower for restrictions on the location of key service providers, but this effect is not statistically significant in Table 1. Note, however, that with other specifications not reported but available on request, such models as with Heckman selection models and models that exclude HFN data, we find a negative and statistically significant relation between restrictions on location and multifactor alphas. Table 1 similarly indicates that for jurisdictions which restrict the location of key service providers, average monthly returns are significantly lower by 0.702%, and this effect is statistically significant.

WHILE HEDGE FUND REGULATION TENDS TO INHIBIT PERFORMANCE, IT ALSO HAS THE POTENTIAL TO LOWER RISKS IN THE MARKET.

Note as well that the restriction on the location of key service providers lowers the standard deviation of monthly returns in Table 1, but that reduction is not sufficient to compensate for the reduction in returns and as such the Sharpe ratio is lower. This is consistent with the findings when using other risk-adjusted performance measures such as the MPPM.

Overall, the data indicate little or no apparent corporate governance benefit to a geographic proximity between a hedge fund's service providers and the hedge fund's regulatory body.

The data indicate some evidence that restrictions on minimum capitalization in a jurisdiction are associated with differences in hedge fund performance. Table 1 shows that an increase in required minimum capitalization for a hedge fund from \$1 to \$2 million is associated with a reduction in standard deviation of monthly returns by 1%, and this effect is statistically significant.

The minimum capitalization restrictions are generally insignificant in the other regressions. One limitation with regards to minimum capitalization (as indicated in PWC, 2006, 2007; Cumming, 2008) is that proxies are needed for some countries, since the requirements are not exact. Note as well that minimum capitalization requirements appear binding on only a small proportion of the sample (that is, some funds in countries without minimum capitalization are smaller than the minimum capitalization levels in other countries); nevertheless, it is possible that some funds face problems associated with first achieving the minimum capitalization hurdle when they first start the fund.

The data indicate that jurisdictions with marketing restrictions via wrappers show lower MPPMs by 6.114, and this effect is statistically significant. Hedge funds have a Sponsor that has the responsibility for marketing

the Sponsor Fund. In the case of wrappers, the sponsor distributes the offering materials for the Sponsor Fund as well as the disclosure materials for the affiliated wrapper products. There is a potential conflict of interest between the Sponsor and the Fund Manager with respect to the disclosure of the wrapper relating to the Fund Manager (Gerstein, 2006). This conflict of interest is one possible explanation for the negative association between wrappers and fund performance. This effect is statistically significant in the regressions for average monthly returns, where the economic significance is -0.634. Also, wrappers are associated with lower standard deviations in Table 1; however, the reduction in standard deviation is comparatively smaller than the reduction in average returns, thereby giving rise to a reduction in the Sharpe ratio (for example, based on the estimates in Table 1, the Sharpe ratio is estimated to be 8.7% lower among jurisdictions that permit wrappers).

I note that the negative association between wrappers and performance is statistically insignificant for alpha. The regression in Table 1 indicates jurisdictions which permit distributions via fund distribution companies have lower alphas. However, in other models that exclude the HFN data and Heckman sample selection models, that effect is not statistically significant.

A few of the control variables are statistically significant. Most notably, French and German legal origin countries are negatively associated with MPPMs and average monthly returns. These results are consistent with La Porta et al. (1998) (a dummy variable for English legal origin is suppressed to avoid perfect collinearity). As well, there is evidence that hedge fund characteristics impact performance and structure. Funds with yearly capital redemptions tend to have better performance but greater risk, consistent with greater illiquidity and flexibility for the hedge fund manager. Similarly, larger hedge funds tend to have higher MPPMs and lower standard deviation of monthly returns. There are other significant variables that are considered in Cumming (2008), but these variables are not as robust. Other variables were also considered but not reported since they were immaterial.

CONCLUSION

This paper empirically analyzed the impact of hedge fund regulation on fund structure and performance using a cross-country dataset of 2,137 hedge funds from 24 countries. Restrictions on the location of a hedge fund's key service providers tend to give rise to worse

performance in terms of lower MPPMs, lower alphas, and lower average monthly returns. Distribution via wrappers is associated with lower performance results, which may reflect conflicts of interest associated with the marketing and distribution of companion products. Nevertheless, I did see some evidence that distributions via wrappers as well as minimum capital requirements tend to be associated with lower standard deviations of returns, albeit not by a sufficient amount to compensate for the lower returns. Hence, while hedge fund regulation tends to inhibit performance, it also has the potential to lower risks in the market. The current evidence from hedge fund regulation therefore does offer guidance for the ongoing policy debates on hedge fund regulation. Further research is warranted as more data and natural experiments arise with the likely upcoming changes in the regulatory environment around the world. ■

ACKNOWLEDGMENTS

I owe thanks to Sofia Johan, Andrew Karolyi and Michael King for helpful comments and suggestions and to Li Que for research assistance. Also, I owe thanks to the seminar participants at Hofstra University, Vanderbilt Law School, the 2007 American Law and Economics Association Annual Conference at Harvard Law School, the 2007 Western Finance Association Annual Conference, the 2007 Northern Finance Association Conference, the 2007 DeGroote Conference on Market Structure and Market Integrity, the 2008 Financial Intermediation Research Society Conference, and the 2008 Amsterdam/Schulich Conference on Financial Intermediation at the Crossroads.

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