

Gauging Form PF:

Data tolerances in regulatory reporting on hedge fund risk exposures

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Views and opinions expressed are those of the speaker and do not necessarily represent official OFR positions or policy.

Form PF: AUM, NAV, financing, derivatives, concentrations, performance, strategy type, counterparties, asset class exposures, liquidity, sensitivity analysis, VaR, investor liquidity.

We examine the precision of Form PF as an instrument for measuring hedge fund risk exposures.

We develop a novel portfolio simulation methodology using Form PF fields as a vector-valued constraint.

We find that Form PF's measurement tolerances leave significant "wobble room" that may obscure reporting funds' actual risks.

FORM PF (Paper Version) Reporting Form for Investment Advisers to Private Funds and Certain Commodity Pool Operators and Commodity Trading Advisors	OMB APPROVAL OMB Number: 3235-0679 Expires: December 31, 2014 Estimated average burden hours per response: 52.88
Form PF: General Instructions	Page 1
Read these instructions carefully before completing Form PF. Failure to follow these instructions, properly complete Form PF, or pay all required fees may result in your Form PF being delayed or rejected.	
In these instructions and in Form PF, "you" means the <i>private fund adviser</i> completing or amending this Form PF. If you are a "separately identifiable department or division" (SID) of a bank, "you" means the SID rather than the bank (except as provided in Question 1(a)). Terms that appear in <i>italics</i> are defined in the Glossary of Terms to Form PF.	
1. Who must complete and file a Form PF?	
You must complete and file a Form PF, if:	
A. You are registered or required to register with the SEC as an investment adviser; <i>OR</i> You are registered or required to register with the CFTC as a CPO or CTA and you are also registered or required to register with the SEC as an investment adviser; <i>AND</i>	
B. You manage one or more <i>private funds</i> . <i>AND</i>	
C. You and your <i>related persons</i> , collectively, had at least \$150 million in <i>private fund assets under management</i> as of the last day of your most recently completed fiscal year.	
Many <i>private fund advisers</i> meeting these criteria will be required to complete only Section 1 of Form PF and will need to file only on an annual basis. <i>Large private fund advisers</i> , however, will be required to provide additional data, and <i>large hedge fund advisers</i> and <i>large liquidity fund advisers</i> will need to file every quarter. See Instructions 3 and 9 below.	
For purposes of determining whether you meet the reporting threshold, you are not required to include the <i>regulatory assets under management</i> of any <i>related person</i> that is <i>separately operated</i> . See Instruction 5 below for more detail.	
If your <i>principal office and place of business</i> is outside the United States, for purposes of this Form PF you may disregard any <i>private fund</i> that, during your last fiscal year, was not a <i>United States person</i> , was not offered in the United States, and was not beneficially owned by any <i>United States person</i> .	
2. I have a <i>related person</i> who is required to file Form PF. May I and my <i>related person</i> file a single Form PF?	
<i>Related persons</i> may (but are not required to) report on a single Form PF information with respect to all such <i>related persons</i> and the <i>private funds</i> they advise. You must identify in your response	

Image source : SEC

General idea: *Generate N portfolios from actual securities data following simple but plausible quantitative strategies, treating a given Form PF filing as a vector-valued constraint.*

- Hedge funds filing Form PF on 12/31/2013. \$500M in capital, \$450M to invest.
- Equity market-neutral strategies: factor alpha screen and momentum screen
- Using cash equities only (CRSP); no derivatives. Fixed leverage.
- Long 25 stocks from top quintile, short 20 stocks from bottom quintile. Cash collateral for shorts earns zero interest; no short rebate.
- Shorts are equally weighted. Weights for longs solved for numerically such that total portfolio
 - satisfies “PF constraint,” i.e. produces given relevant PF field values, and
 - is beta- and dollar-neutral.
- Q40: VaR. With VaR constraint ($N=25k$) and without VaR constraint ($N=100k$)
- Examine distributions of market risk measures of these portfolios.

Relevant Constraints from Form PF



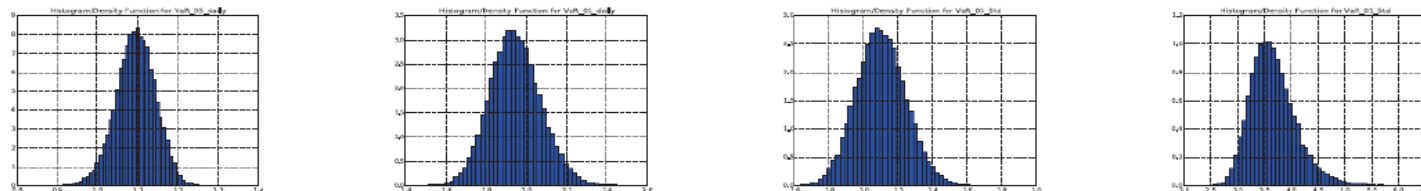
Form PF question	Description	Momentum screen	Factor alpha screen
8	Gross asset value	\$950M	\$950M
9	Net asset value	\$500M	\$500M
12(a)	Dollar amount of total borrowings	\$450M	\$450M
13	Derivatives positions?	No	No
14	Level 1 Assets	\$950M	\$950M
	Level 1 Liabilities	\$450M	\$450M
19	Strategy category	Single primary strategy	Single primary strategy
20	Investment strategy	Equity, market neutral	Equity, market neutral
32	Liquidity – 1 day or less	100	100
35	Positions >5% NAV	N.A.	N.A.
40	Value at risk (VaR)	$1.205 \leq 1\text{-day, } 5\%, \Delta\text{-norm VaR} < 1.215$	$0.975 \leq 1\text{-day, } 5\%, \Delta\text{-norm VaR} < 0.985$
41	Other risk metrics	ES, worst day, vol, skewness	ES, worst day, vol, skewness
42	Risk factors: Equity prices increase 5%	0	0
	Risk factors: Equity prices decrease 5%	0	0
	Risk factors: Equity prices increase 20%	0	0
	Risk factors: Equity prices decrease 20%	0	0
43(b)(i)(A)	Cash collateral posted with prime broker	\$500M	\$500M
43(b)(i)(B)	Securities collateral posted with prime broker	\$450M	\$450M
44	Aggregate derivatives	N.A.	N.A.

Image source : OFR analysis

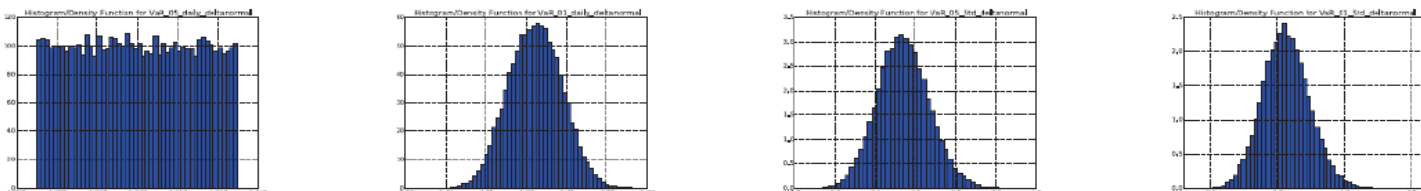
Results (with VaR constraint, N = 25K)



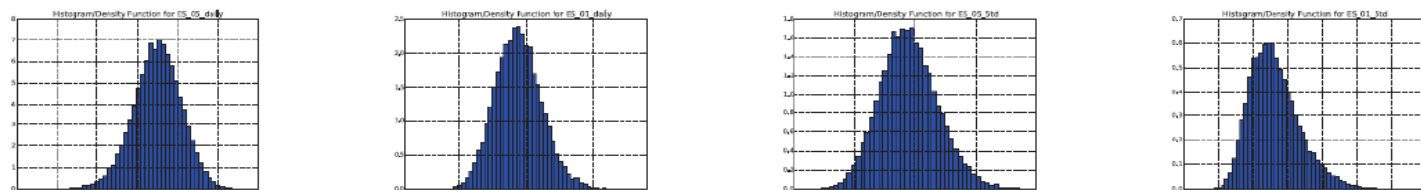
**Value at Risk
(hist. sim.)**
1-day and 5-day
5% and 1%



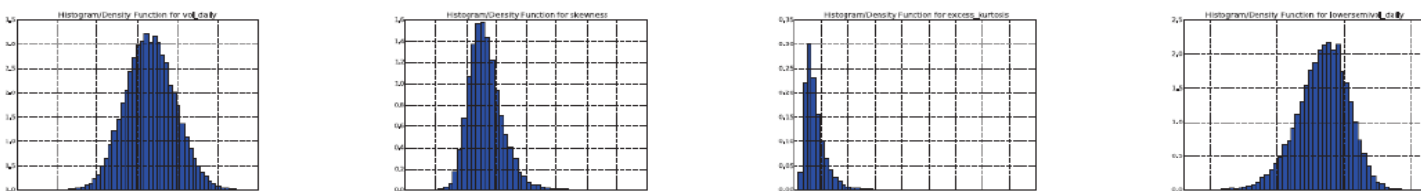
**Value at Risk
(Δ -normal)**
1-day and 5-day
5% and 1%



**Expected shortfall
(hist. sim.)**
1-day and 5-day
5% and 1%



Distributional stats.
Volatility, skewness,
excess kurtosis,
lower semi-volatility



Worst loss
1-day
5-day
1-month

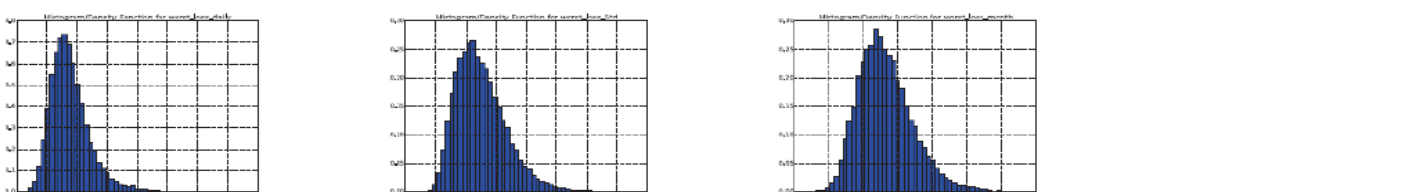


Image source : OFR analysis

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Results (with VaR constraint, N = 25K)



Risk measure	Factor alpha strategy							Momentum strategy						
	Mean	S.dev.	Min	25%	50%	75%	Max	Mean	S.dev.	Min	25%	50%	75%	Max
Value at Risk 5% over 1 trading day	1.096	0.049	0.890	1.064	1.097	1.129	1.302	0.943	0.032	0.745	0.921	0.943	0.964	1.062
Value at Risk 1% over 1 trading day	1.947	0.127	1.488	1.859	1.941	2.028	2.578	1.535	0.084	1.245	1.477	1.531	1.589	1.957
Value at Risk 5% over 5 trading days	2.101	0.144	1.612	2.003	2.098	2.196	2.865	2.033	0.124	1.540	1.948	2.031	2.116	2.581
Value at Risk 1% over 5 trading days	3.673	0.432	2.474	3.373	3.623	3.917	6.335	3.221	0.280	2.389	3.026	3.198	3.393	4.617
Value at Risk, Δ -normal 5% over 1 trading day	1.210	0.003	1.205	1.207	1.210	1.212	1.215	0.980	0.003	0.975	0.977	0.980	0.982	0.985
Value at Risk, Δ -normal 1% over 1 trading day	1.762	0.007	1.738	1.758	1.762	1.767	1.786	1.401	0.008	1.375	1.396	1.401	1.407	1.431
Value at Risk, Δ -normal 5% over 5 trading days	2.340	0.128	1.849	2.253	2.337	2.425	2.966	2.098	0.094	1.699	2.034	2.101	2.163	2.442
Value at Risk, Δ -normal 1% over 5 trading days	3.564	0.173	2.901	3.445	3.558	3.678	4.413	3.045	0.114	2.537	2.967	3.047	3.124	3.482
Expected shortfall 5% over 1 trading day	1.550	0.059	1.249	1.512	1.551	1.590	1.768	1.265	0.040	1.120	1.238	1.265	1.292	1.439
Expected shortfall 1% over 1 trading day	2.441	0.171	1.782	2.322	2.436	2.552	3.241	1.859	0.119	1.464	1.777	1.853	1.935	2.523
Expected shortfall 5% over 5 trading days	2.949	0.238	2.143	2.784	2.938	3.103	3.979	2.684	0.175	2.096	2.563	2.678	2.798	3.529
Expected shortfall 1% over 5 trading days	4.644	0.714	2.876	4.123	4.554	5.062	8.362	3.855	0.423	2.752	3.557	3.812	4.102	7.849
Volatility 1 trading day	12.865	0.124	12.359	12.780	12.863	12.947	13.352	9.813	0.157	9.288	9.705	9.810	9.920	10.409
Skewness 1 trading day	0.331	0.291	-0.985	0.137	0.297	0.485	2.843	0.052	0.186	-4.586	-0.068	0.046	0.163	1.841
Excess kurtosis 1 trading day	3.883	2.288	0.702	2.465	3.317	4.638	41.104	1.872	0.973	0.301	1.329	1.710	2.223	76.513
Lower semivol 1 trading day	8.837	0.193	7.843	8.719	8.851	8.970	9.493	6.905	0.133	6.357	6.815	6.905	6.997	7.751
Worst loss 1 trading day	3.772	0.653	2.246	3.325	3.674	4.094	9.337	2.774	0.460	1.667	2.449	2.706	3.023	10.709
Worst loss 5 trading days	6.994	1.658	3.474	5.772	6.746	7.955	17.756	5.388	1.011	3.138	4.662	5.222	5.953	12.455
Worst loss Monthly	5.276	1.572	1.022	4.154	5.088	6.197	13.737	6.330	1.433	2.125	5.311	6.164	7.163	14.409

Image source : OFR analysis

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Results (without VaR constraint, N = 100K)



Risk measure	Factor alpha strategy							Momentum strategy						
	Mean	S.dev.	Min	25%	50%	75%	Max	Mean	S.dev.	Min	25%	50%	75%	Max
Value at Risk 5% over 1 trading day	1.109	0.123	0.757	1.024	1.091	1.173	2.123	0.946	0.087	0.669	0.887	0.939*	0.996	2.015*
Value at Risk 1% over 1 trading day	1.990	0.298	1.171	1.788	1.940*	2.132	4.654*	1.566	0.191	1.042	1.433	1.540*	1.670	4.417*
Value at Risk 5% over 5 trading days	2.141	0.295	1.307	1.939	2.098*	2.292	5.104*	2.045	0.232	1.296	1.885	2.022*	2.178	4.743*
Value at Risk 1% over 5 trading days	3.768	0.699	2.136	3.290	3.644**	4.105	11.110**	3.369	0.616	1.943	2.955	3.240**	3.626	11.269**
Value at Risk, Δ-normal 5% over 1 trading day	1.248	0.176	0.872	1.136	1.206*	1.308	3.131*	1.011	0.124	0.714	0.926	0.982*	1.063	2.705*
Value at Risk, Δ-normal 1% over 1 trading day	1.816	0.250	1.278	1.656	1.756*	1.901	4.470*	1.444	0.175	1.024	1.325	1.404*	1.520	3.855*
Value at Risk, Δ-normal 5% over 5 trading days	2.423	0.390	1.528	2.164	2.338*	2.583	6.023*	2.167	0.292	1.378	1.966	2.107*	2.306	5.890*
Value at Risk, Δ-normal 1% over 5 trading days	3.676	0.550	2.403	3.312	3.557*	3.901	8.744*	3.141	0.405	2.057	2.862	3.056*	3.331	8.483*
Expected shortfall 5% over 1 trading day	1.578	0.200	1.012	1.443	1.545*	1.674	3.312*	1.282	0.132	0.868	1.191	1.266*	1.357	3.228*
Expected shortfall 1% over 1 trading day	2.527	0.463	1.445	2.228	2.436**	2.708	7.878**	1.949	0.327	1.246	1.727	1.871**	2.080	6.666**
Expected shortfall 5% over 5 trading days	3.018	0.468	1.773	2.698	2.942*	3.250	7.299*	2.785	0.430	1.658	2.489	2.699*	2.988	7.676*
Expected shortfall 1% over 5 trading days	4.817	1.127	2.484	4.047	4.593**	5.329	17.246**	4.432	1.599	2.188	3.483	3.875**	4.480	16.249**
Volatility 1 trading day	13.213	1.709	9.380	12.120	12.822	13.810	31.183	10.100	1.197	7.225	9.277	9.836	10.646	26.778
Skewness 1 trading day	0.425	0.495	-3.893	0.152	0.327	0.554	4.895	-0.379	1.152	-6.794	-0.146	0.012	0.145	5.174
Excess kurtosis 1 trading day	5.575	6.891	0.329	2.526	3.573	5.538	115.637	8.548	17.274	0.285	1.393	1.873	2.797	137.022
Lower semivol 1 trading day	9.017	1.085	6.271	8.306	8.808	9.461	20.564	7.216	1.045	5.050	6.528	6.923	7.496	19.483
Worst loss 1 trading day	4.156	1.536	1.764	3.265	3.745**	4.472	22.596**	4.023	3.126	1.477	2.439	2.793**	3.378	20.895**
Worst loss 5 trading days	7.408	2.633	2.779	5.712	6.855**	8.372	36.887**	6.663	3.466	2.552	4.625	5.393**	6.687	30.434**
Worst loss Monthly	5.534	1.942	1.137	4.201	5.237**	6.493	29.432**	6.577	1.854	2.249	5.285	6.275**	7.505	24.860**

Image source : OFR analysis

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- Incorporate options and possibly other derivatives.
- Options are accounted for on Form PF using delta-adjusted notional values.
- Considering the following strategies involving options:
 - Capital Decimation Partners
 - Buying and selling volatility with straddles and strangles.
 - Long stock + Long OTM put vs Long stock + Short OTM put

Thank you!