Hedge Fund Replication and Synthetic Funds

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Synthetic Funds Would Solve Many Problems

- **Excessive fees**
- **Lack of liquidity**
- **Lack of transparency**
- **Lack of capacity**
- **Hidden risks**
- **Style drift**
- **Regulation**

Hedge Fund Replication?

Hedge fund replication tries to solve these problems by designing *mechanical* trading strategies in *traditional* assets that generate *hedge fund-like returns*.

Primary objective is to eliminate the need for expensive managers.

Important Distinctions

What do we mean by "hedge fund-like returns"?

Strict replication = same returns month-to-month.

Weak replication = same return properties.

How is it done?

Creation = in significantly different way as hedge fund

Imitation = in similar way as hedge fund (but how is this different from a naïve hedge fund?)

And The Most Important One

What is the target?

Single hedge fund = high level of idiosyncratic risk.

Hedge fund index = strong diversification effects.

Most replication attempts so far have been aimed at replicating hedge fund *indices*, not individual funds!

Strict Replication: The Factor Model Approach

Dates back to Sharpe (1992).

Known to work well for traditional portfolios.

But serious (potential) problems for hedge funds.

- missing factors.

- lack of dynamic trading.

Factor Models for Single Funds

Strategy Group	Average Variation Explained
Convertible Arbitrage	17.3%
Emerging Markets	19.4%
Equity Market Neutral	10.4%
Event Driven	19.5%
Fixed Income Arbitrage	14.9%
Global Macro	14.8%
Long/Short Equity	21.6%

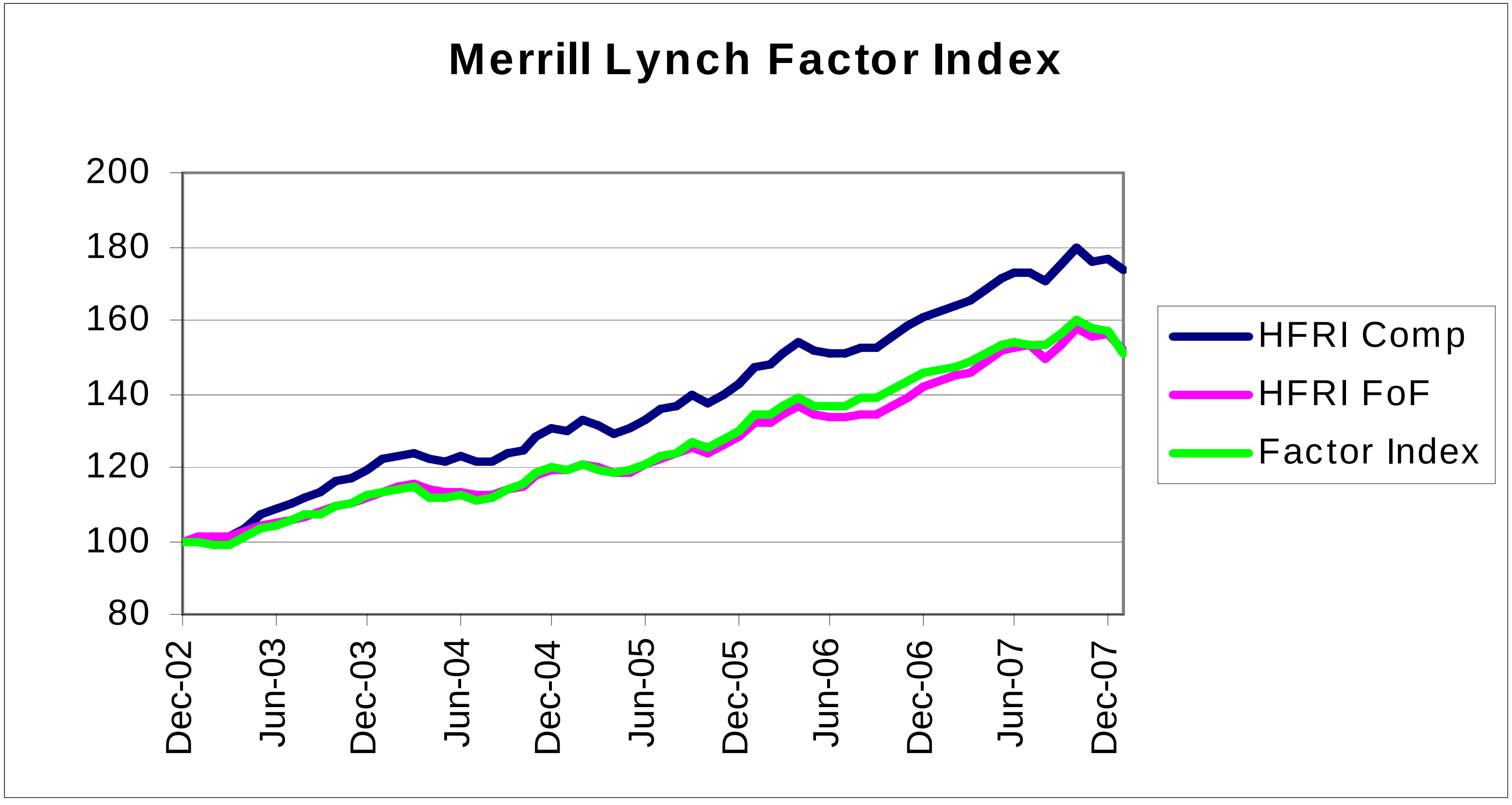
Source: Hasanhodzic and Lo (2006, Table 5).

Factor Models for Single Strategy Indices

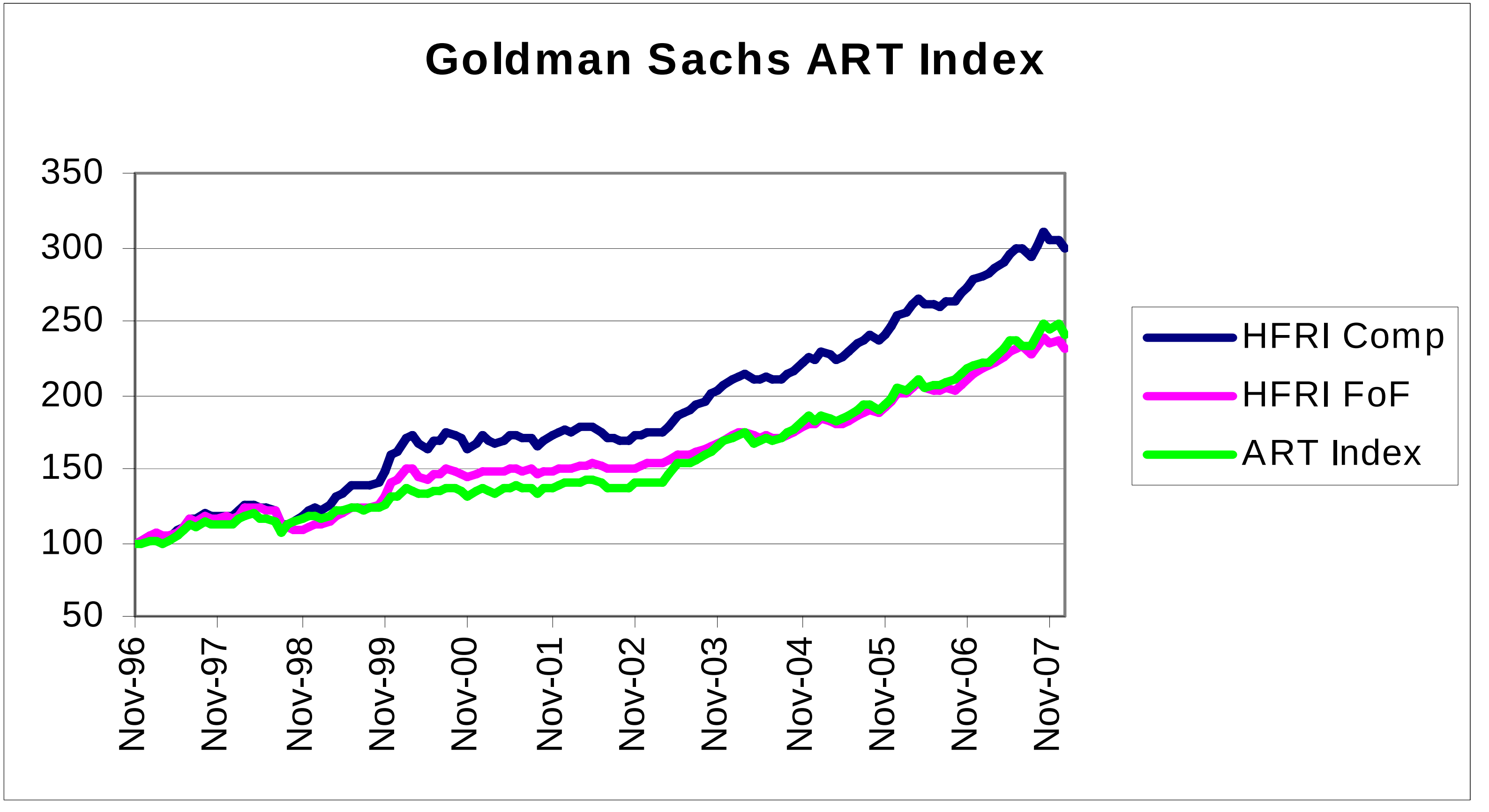
HFRI Index	Variation Explained
Managed Futures	34.3%
Equity Market Neutral	35.3%
Fixed Income Arbitrage	40.5%
Global Macro	49.7%
Merger Arbitrage	52.9%
Convertible Arbitrage	54.0%
Distressed	68.4%
Long/Short Equity	88.5%

Source: Jaeger and Wagner (2005, Table 1).

Multi-Strategy Index Replication: ML Factor Index



Multi-Strategy Index Replication: GS ART Index



A Conundrum

Why is it that some indices can be accurately replicated and others not?

The answer: Different degrees of diversification

The returns on highly diversified indices, although calculated from hedge fund data and referred to as "hedge fund indices", have very few hedge fund-like features and are mainly driven by equity and credit risk, which is what makes strict replication possible.

Correlation Index Clones with S&P 500

	Comp	FoF	FI	ART	ABS
1997	0.70	0.74	NA	0.83	NA
1998	0.93	0.70	NA	0.93	NA
1999	0.74	0.64	NA	0.69	NA
2000	0.49	0.31	NA	0.16	-0.10
2001	0.88	0.71	NA	0.86	0.09
2002	0.79	0.46	NA	0.50	0.49
2003	0.82	0.59	0.92	0.70	0.77
2004	0.81	0.73	0.78	0.70	0.68
2005	0.76	0.65	0.77	0.79	0.69
2006	0.74	0.76	0.81	0.81	0.76

Conclusion Strict Replication

Replication of single hedge funds is an illusion.

Replication of diversified hedge fund indices is possible but does not really classify as true hedge fund replication as returns are far from “hedge fund-like”.

High correlation of index clones with stock market makes these products less suitable as diversifiers.

Strict replication only works when you don’t really need it to work!

Weak Replication

Mechanically generating returns with the same properties as hedge fund returns.

Two Approaches on Offer:

- Imitation = mechanization of popular hedge fund trades.

- Creation = FundCreator

Weak Imitation

Are mainly single strategy products. For example:

ML Equity Volatility Arbitrage Index (since Feb 2007)

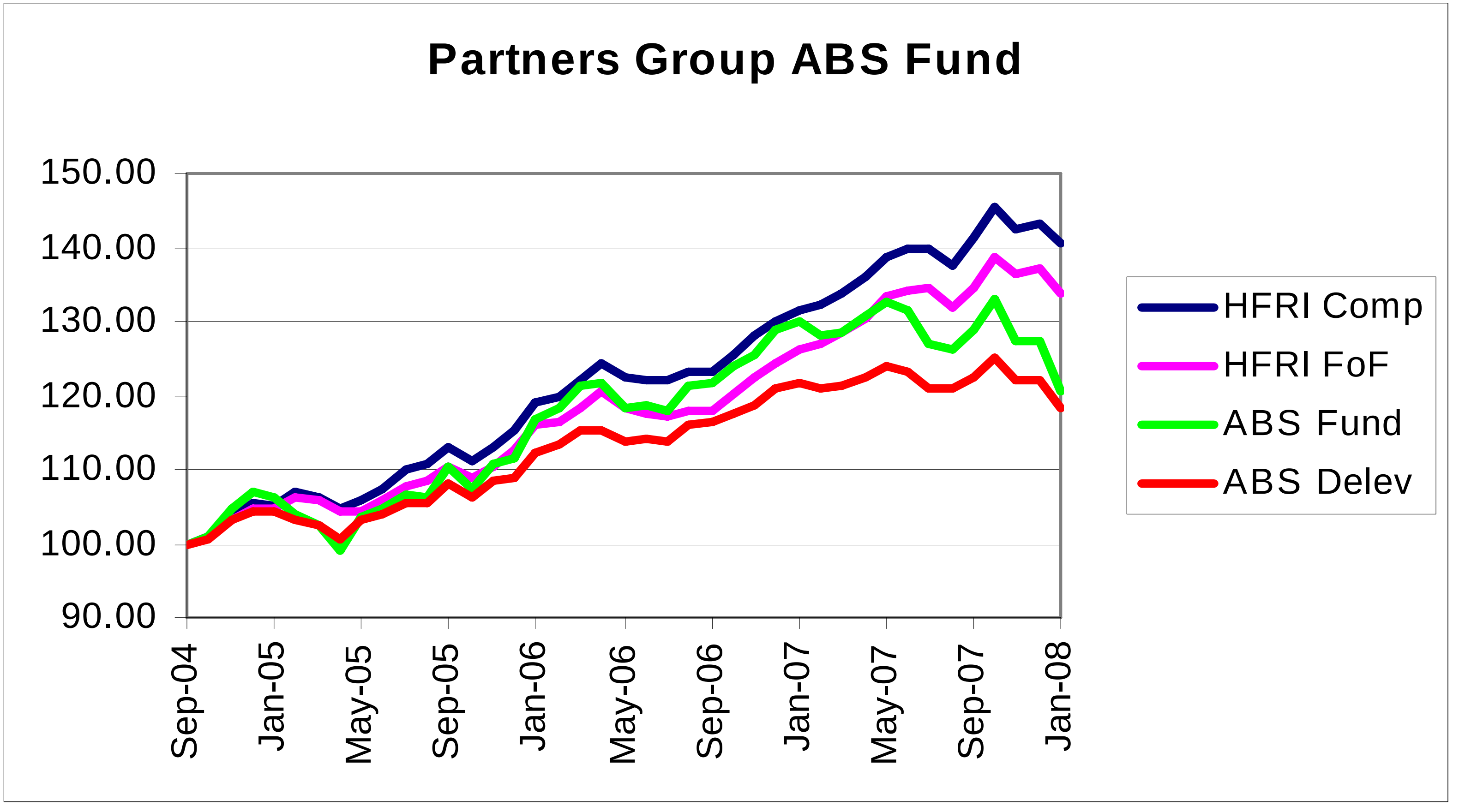
ML FX Clone (since March 2007)

DB Currency Return Index (since March 2007)

Few multi-strategy products so far. For example:

Partners Group ABS Fund (since October 2004)

Weak Diversified Index Imitation: ABS Fund



ABS return is gross fund return minus 100bps (normal 1.25 plus 15 without hurdle rate).

Conclusion ABS Fund

Intellectually more appealing story than factor model-based products.

But, especially when corrected for leverage, this does not translate in more attractive returns.

Mixing single strategy imitations produces same high correlation with equity as in diversified hedge fund indices.

Weak Creation: FundCreator

FundCreator is a unique risk management system that allows one to manipulate the risk profile of an investment portfolio.

1. Choose a portfolio.

2. Decide on desired risk profile.

3. Use FundCreator to design a trading strategy that changes the portfolio's existing risk profile into the desired risk profile.

FundCreator Has Various Applications

- Fund risk profile modification/stabilization.
- Replication of (hedge) funds and indices.
- Tailor-made fund creation.

Note

When we say "risk profile", we mean "all the characteristics of the fund return except the expected return". This includes all common risk measures such as volatility, correlation with stocks and bonds, skewness, etc.

FundCreator Has a Solid Foundation

FundCreator is based on the same technology that investment banks use to price and hedge their options positions.

It is not a fantasy idea, but tried and tested technology!

Hedge Fund Index Replication with FundCreator

	Index				Synthetic Fund			
	Mean	StDev	Skew	Corr	Mean	StDev	Skew	Corr
CA	4.98%	5.44%	-0.04	0.21	3.89%	5.44%	-0.03	0.23
DS	9.48%	7.72%	0.23	0.15	8.56%	7.95%	0.28	0.12
EM	13.69%	16.82%	-0.15	0.68	17.49%	17.40%	0.66	0.68
LS	7.47%	10.52%	0.64	0.58	9.28%	10.94%	0.79	0.59
EMN	2.76%	2.77%	0.27	-0.03	3.58%	2.87%	0.04	-0.07
FI	4.29%	3.67%	-0.14	0.50	4.17%	3.92%	0.09	0.51
GM	5.39%	6.51%	0.36	0.31	6.69%	6.60%	0.39	0.31
MA	4.49%	3.86%	-0.92	0.37	3.54%	3.72%	-0.19	0.36
SS	-1.99%	23.61%	-0.52	-0.55	17.06%	25.61%	0.22	-0.54
FOF	4.69%	7.14%	0.40	0.51	7.89%	7.19%	1.17	0.49

But Why Replicate If You Can Now Create?

Given the ability to create returns with tailor-made properties, why would you still want to replicate what is obviously imperfect?

Instead of replicating an imperfect diversifier, FundCreator can create a much more attractive diversifier.

A Simple Example

Initial Portfolio = 3M-Eurodollar, 10Y-Note, 30Y-Bond, S&P 500, Russell 2000, and GSCI futures equally weighted.

Reference Portfolio = 50% S&P 500 and 50% 30Y-Bond.

Risk profile Initial Portfolio:

Volatility = 6.58%

Correlation Reference Portfolio = 0.70

Skewness = -0.50

Initial versus Target Risk Profile

The Initial Portfolio does not make a good diversifier.

- Skewness is negative,

- Correlation is too high.

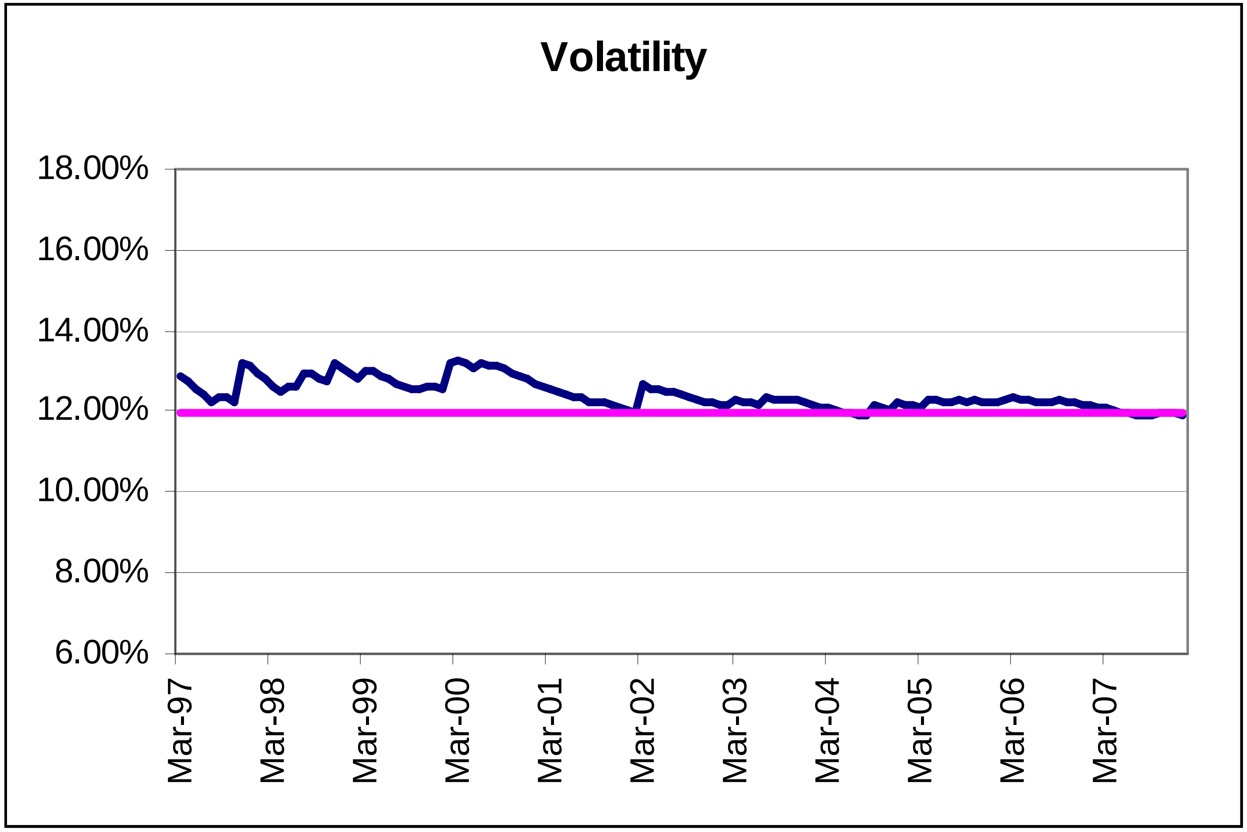
Change risk profile into:

- Zero correlation with Reference Portfolio,

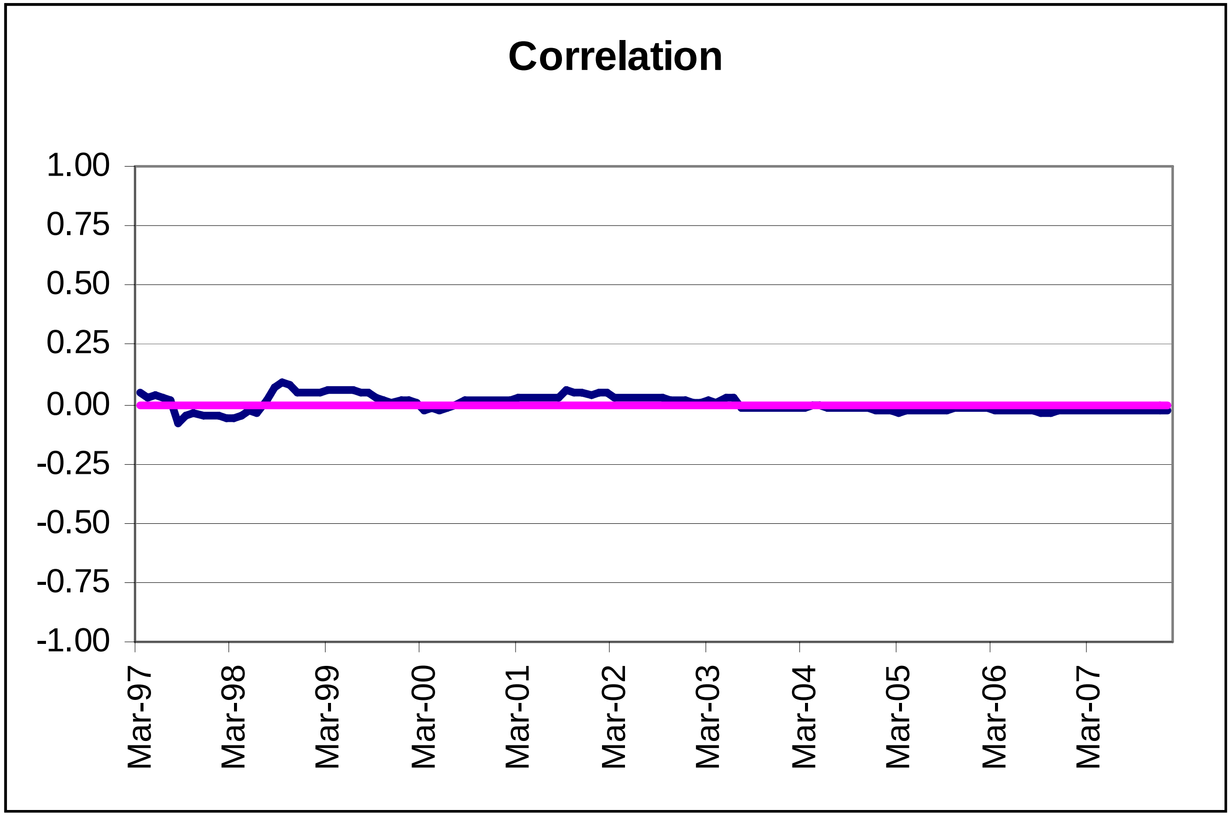
- Zero skewness,

- 12% volatility.

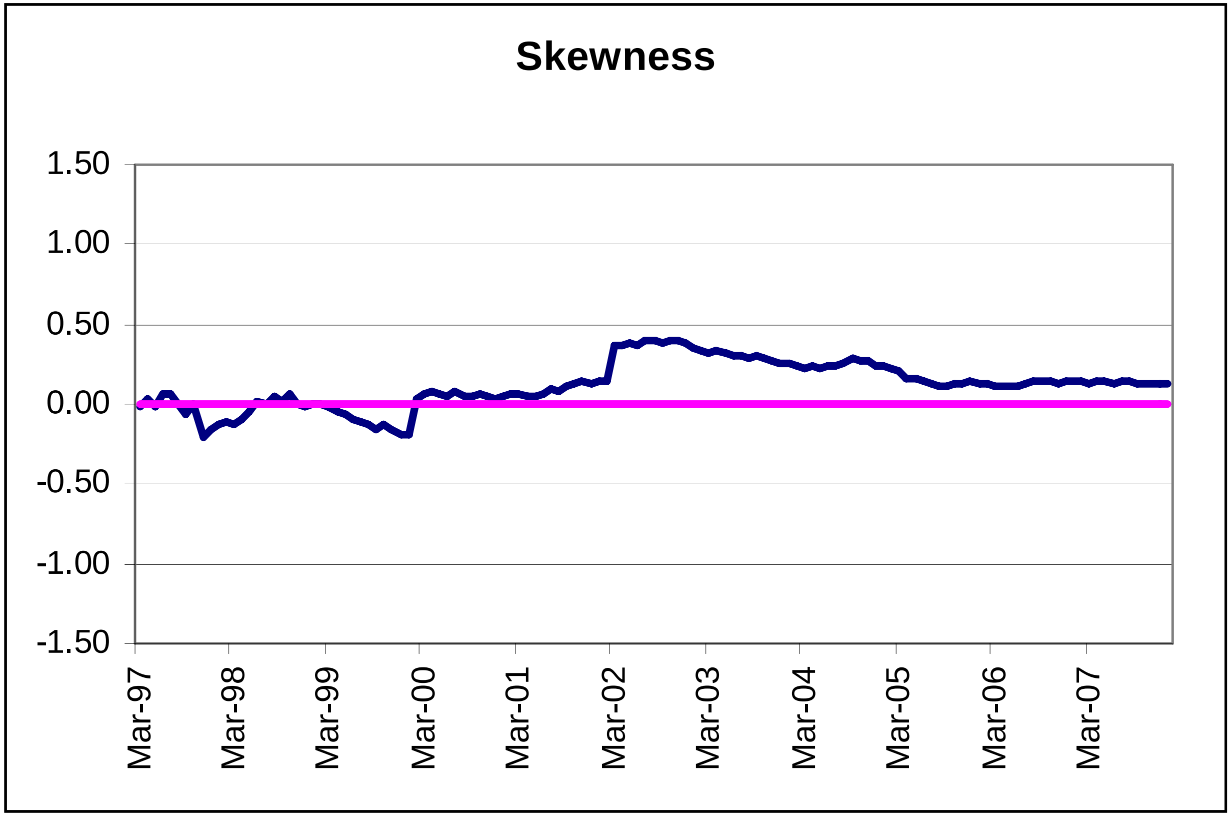
New Portfolio Volatility 1997-2008



New Portfolio Correlation 1997-2008



New Portfolio Skewness 1997-2008



New Portfolio Marginal Properties 1995-2008

	50/50	New
Mean	9.68%	9.82%
StDev	7.84%	11.93%
Skew	-0.16	0.13
Sharpe	0.72	0.49

The new portfolio is not particularly interesting as a stand-alone investment………………

New Portfolio Mixed with Initial Portfolio

	50/50	New	10% New	20% New	30% New
Mean	9.68%	9.82%	9.69%	9.70%	9.71%
StDev	7.84%	11.93%	7.13%	6.67%	6.49%
Skew	-0.16	0.13	-0.19	-0.18	-0.12
Sharpe	0.72	0.49	0.80	0.86	0.88

…….. but due to its low correlation, the new portfolio mixes very well with stocks and bonds (and the 12% vol is not a problem at all)!

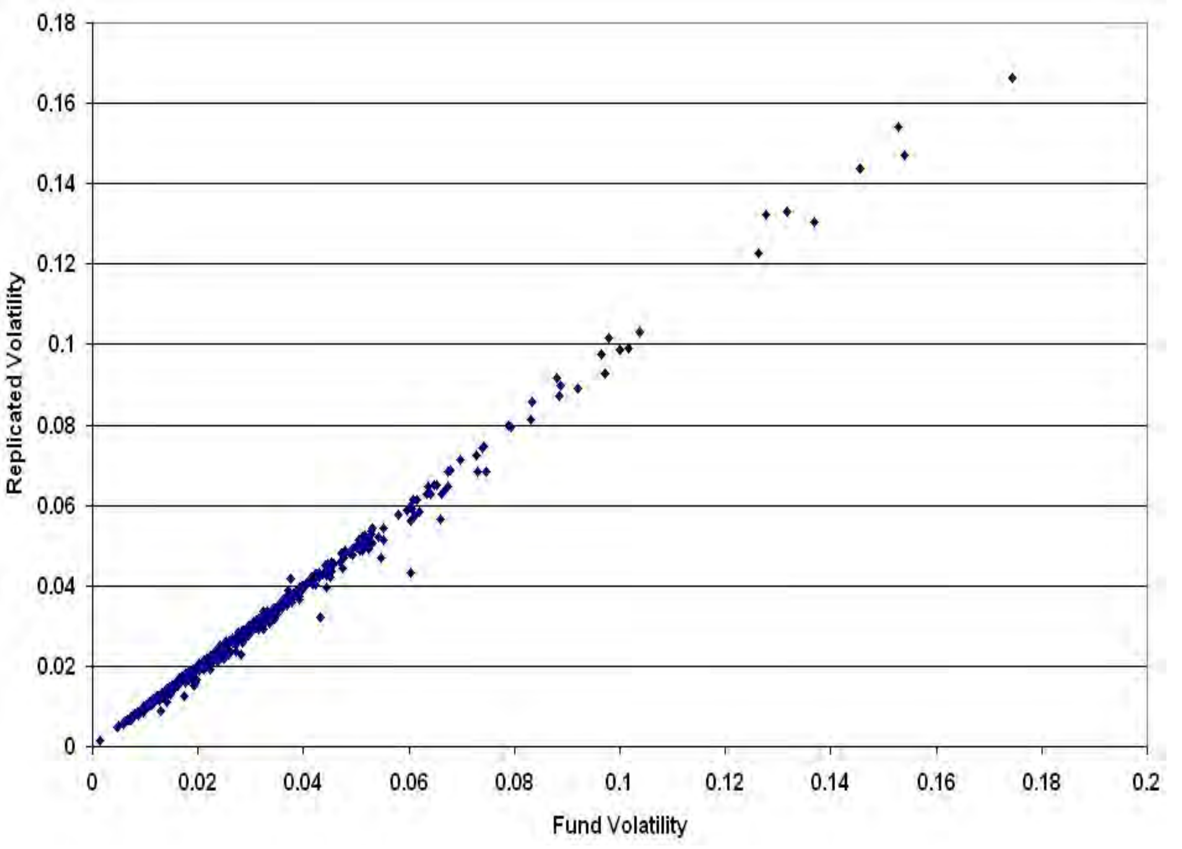
FundCreator as a Fund Evaluation Tool

We can use FundCreator to build a risk-replica of any (hedge) fund or index.

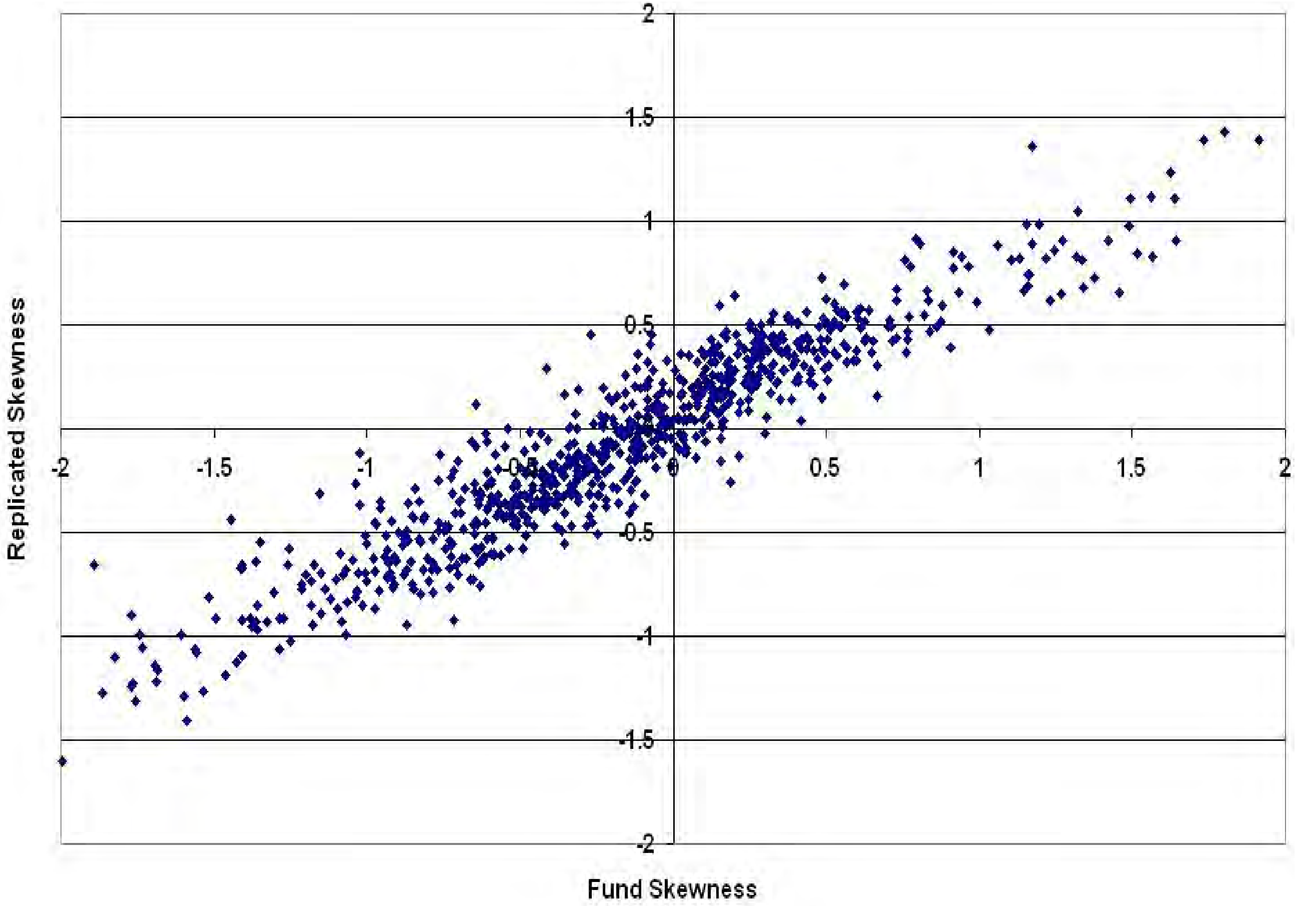
Being able to replicate a fund's risk profile, we can use the average return on the replicating strategy as a performance benchmark.

Assuming risk and return are related, a higher average for the strategy means the fund is inefficient and vice versa.

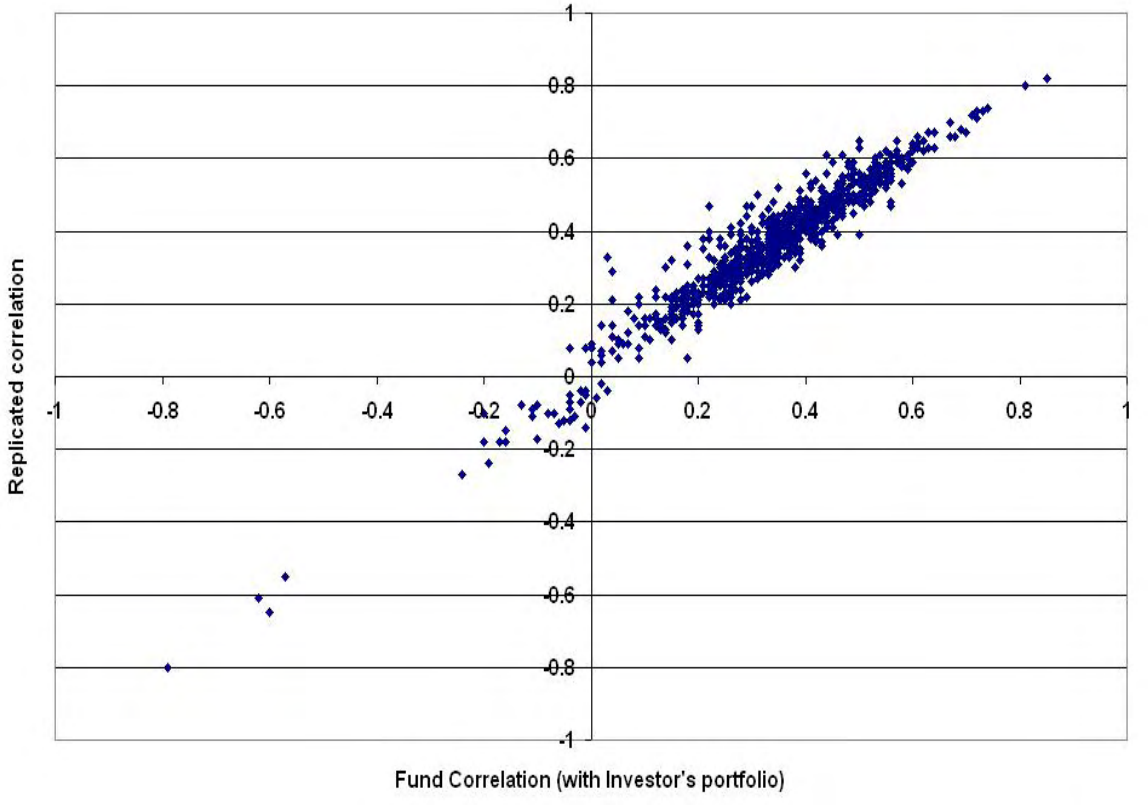
Volatility Replication of 875 Funds of Funds



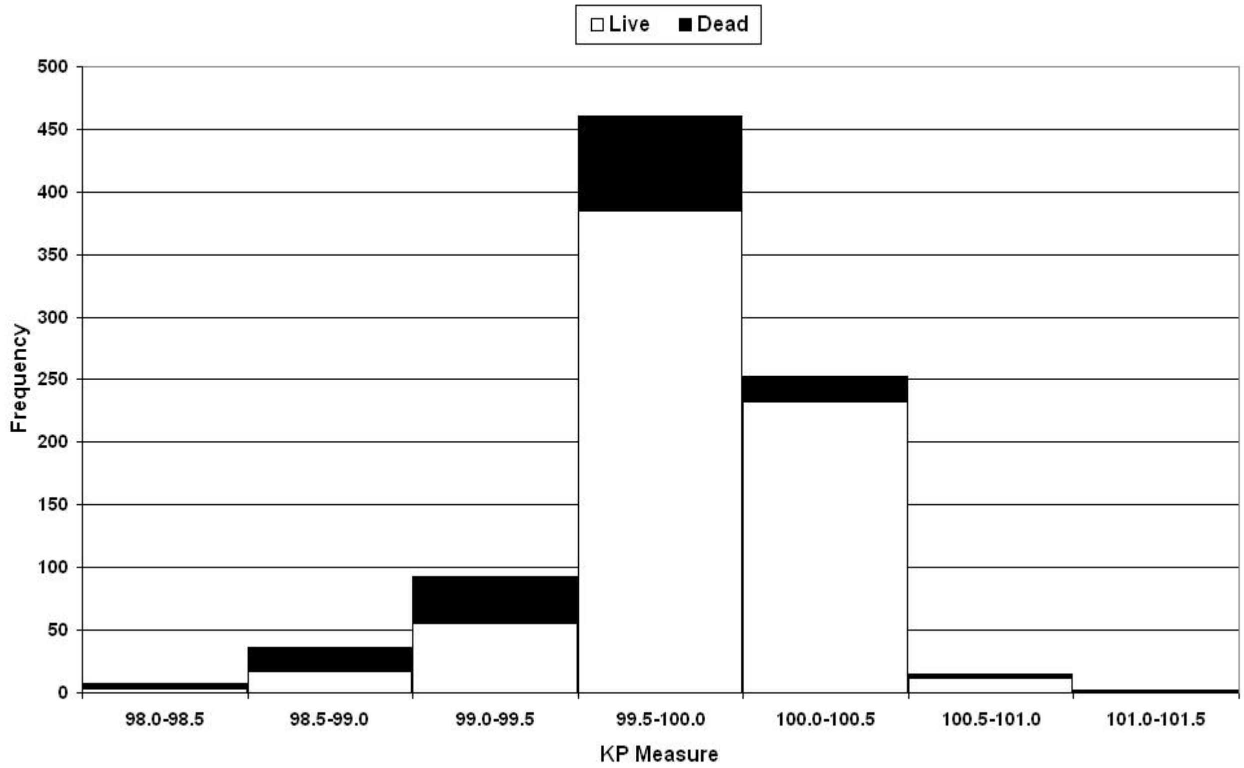
Skewness Replication of 875 Funds of Funds



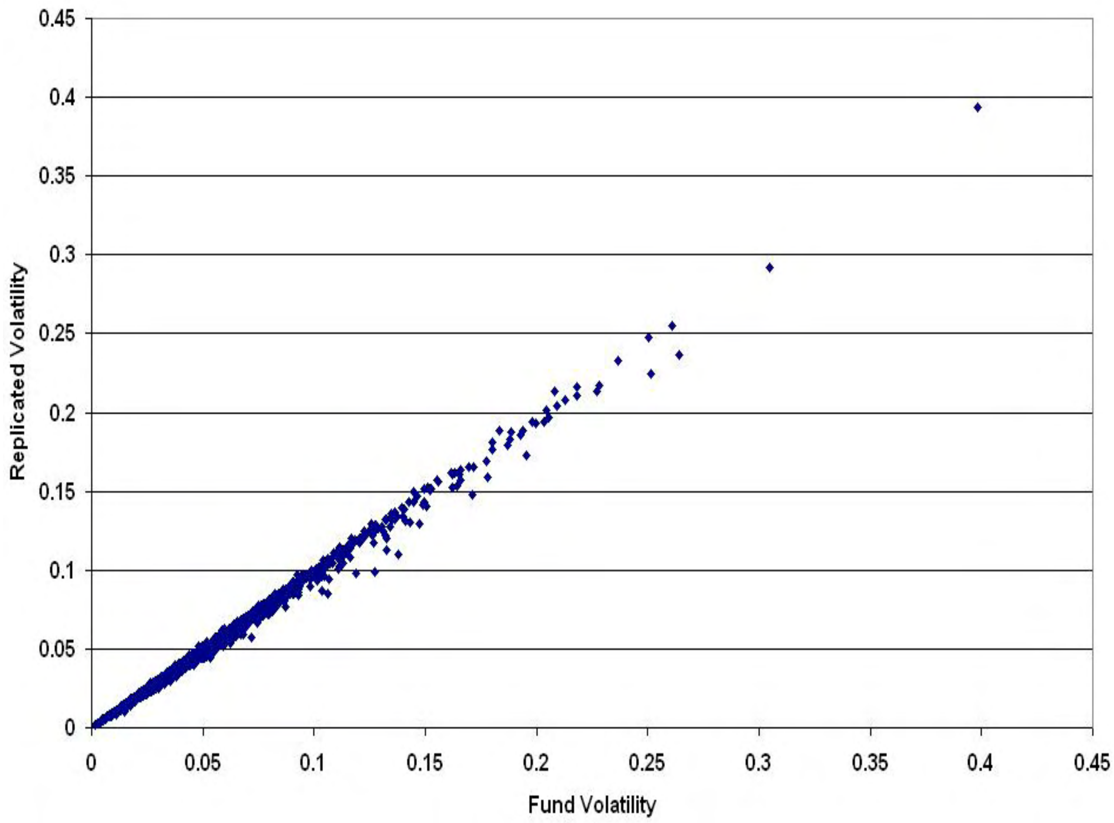
Correlation Replication of 875 Funds of Funds



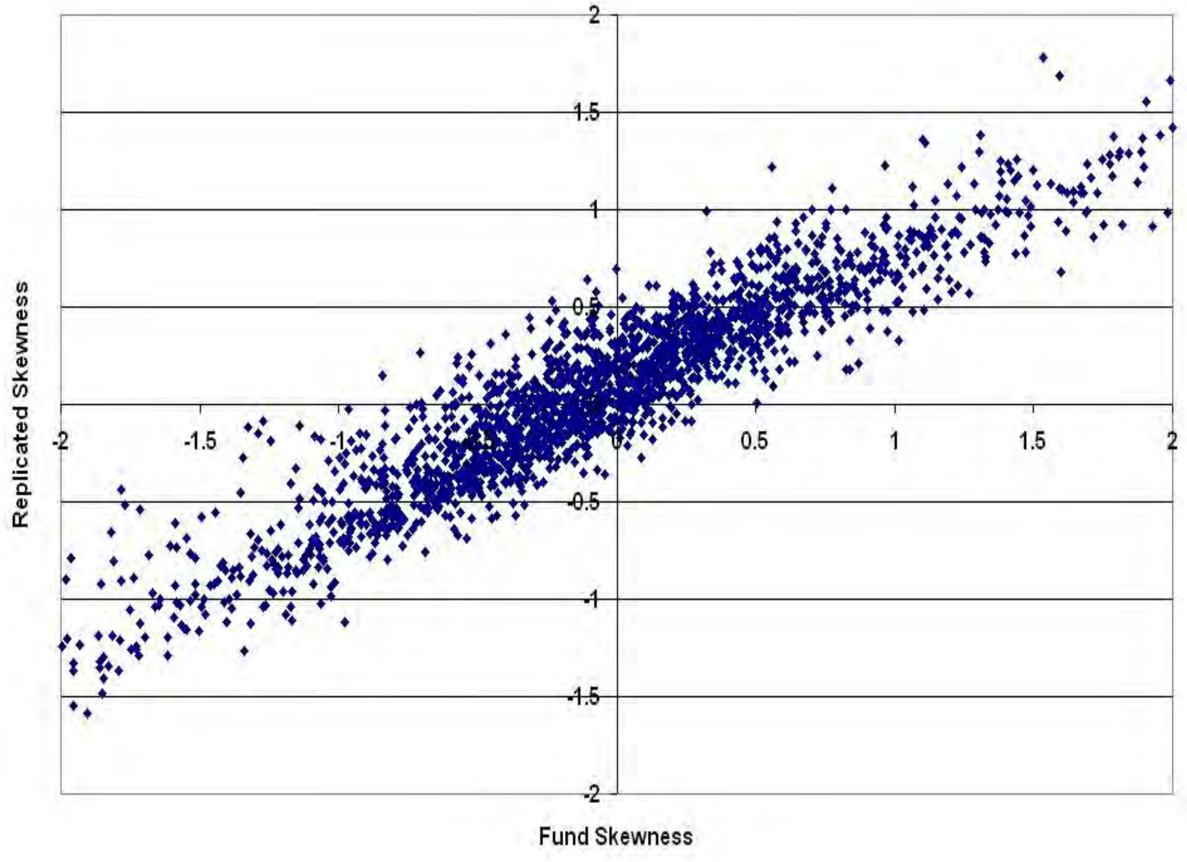
Evaluation of 875 Funds of Funds: 18.6% Efficient



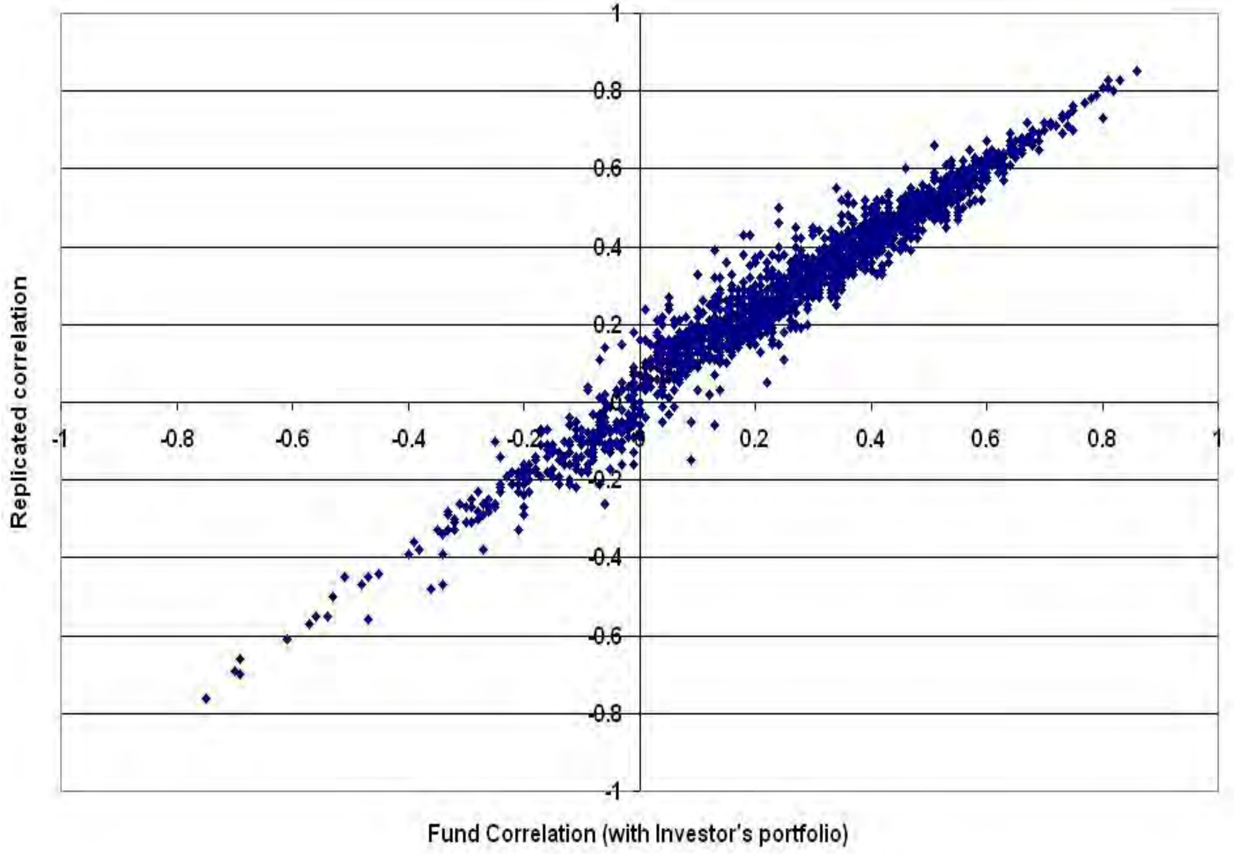
Volatility Replication of 2073 Individual Funds



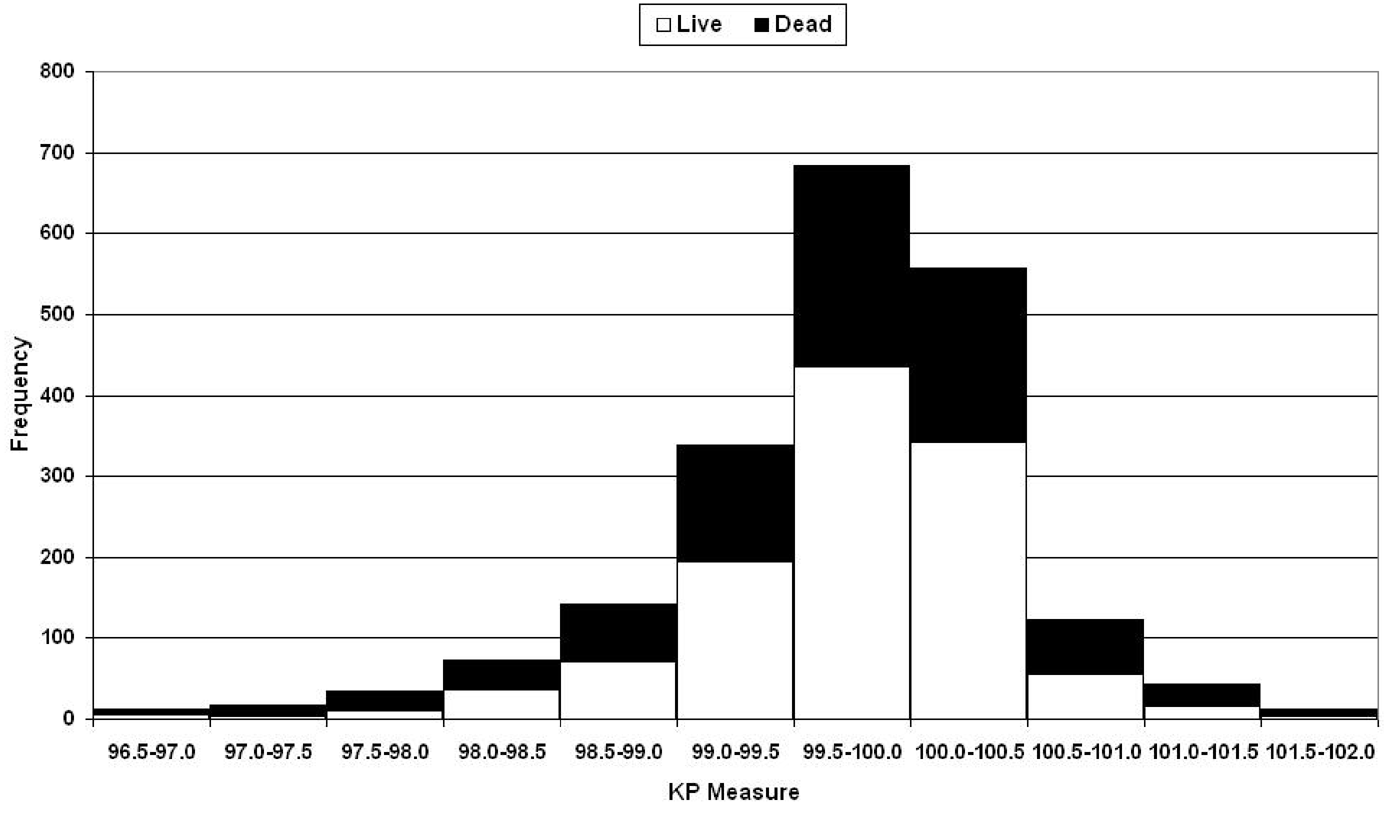
Skewness Replication of 2073 Individual Funds



Correlation Replication of 2073 Individual Funds



Evaluation of 2073 Individual Hedge Funds: 22.5%



Conclusion

- Only 20% of hedge funds and funds of funds add value.

- Strict hedge fund replication is an illusion.

- Strict hedge fund index replication is possible but trivial.

- Weak replication offers interesting possibilities.

- But why replicate if you can create?

For research papers visit the Alternative Investment Research Centre website at:

www.cass.city.ac.uk/airc

For specifics on FundCreator visit:

www.FundCreator.com