PORTFOLIO ENGINEERING 102

HARRY HAD A PROBLEM

Ten great money making MPT investment tips

Don Gimpel, April 2011

You are entitled to ask, “Why this lecture at this time?”

And the answer is, “Because it has to be done and besides it will give you useful information.”

THE ASSET ALLOCATION DECISION

Harry had to come up with an idea for a PhD thesis and he chose the biggest, baddest one of them all … the "Asset Allocation Decision." This is the most important idea not resolved by classical investment theory. There's not one word from Professors Graham and Dodd on this subject.

Harry needed a home run idea that day on 55th street.

So what did Harry do?

- Harry decided to design a portfolio with the added dimension of risk.
- What did Harry mean by the word “Risk?”
- It’s probably not what you think!

From the Random House Unabridged Dictionary:

"risk (risk), n. 1. Exposure to chance of an injury or loss; a hazard or dangerous chance … 2. Insurance. a. the hazard or chance of loss. b. the degree of probability of such loss, c. the amount that the insurance company might lose …

Remember that Harry was trained in the use of statistics.

Q. So what statistical concept measures risk? A. Variance or its square root, Standard Deviation.

So he wrote the equations for a 2 investment portfolio:

$$E_e = X_1 * E_1 + X_2 * E_2 \qquad (1)$$

E_e is expected earnings of the portfolio and E_1, E_2 are the investments earnings. X_j are the asset allocations.

$$V_p = X_1^2 * V_1 + X_2^2 * V_2 + 2 * X_1 * X_2 * C_{12} \qquad (2)$$

V_j is the variance of return,

C_{jk} is the covariance of return

$$1 = X_1 + X_2 \qquad (3)$$

Then he drew a graph …

Harry's assumptions:

1. Each investor makes decisions on the basis of expected rates of return, standard deviation of return, and the covariance of return amongst the securities. All investors have the same predictions.
2. Each investor constructs an optimal portfolio based on the previously outlined steps.
3. Each investor can borrow or lend to any degree desired at the risk-free rate of interest.
4. The market is "perfect," so there are no impediments that would prevent an investor from holding an optimal portfolio

Do these assumptions seem reasonable to you?

Well, they're almost true!

The market isn't perfect.

All investors do not have access to all information.

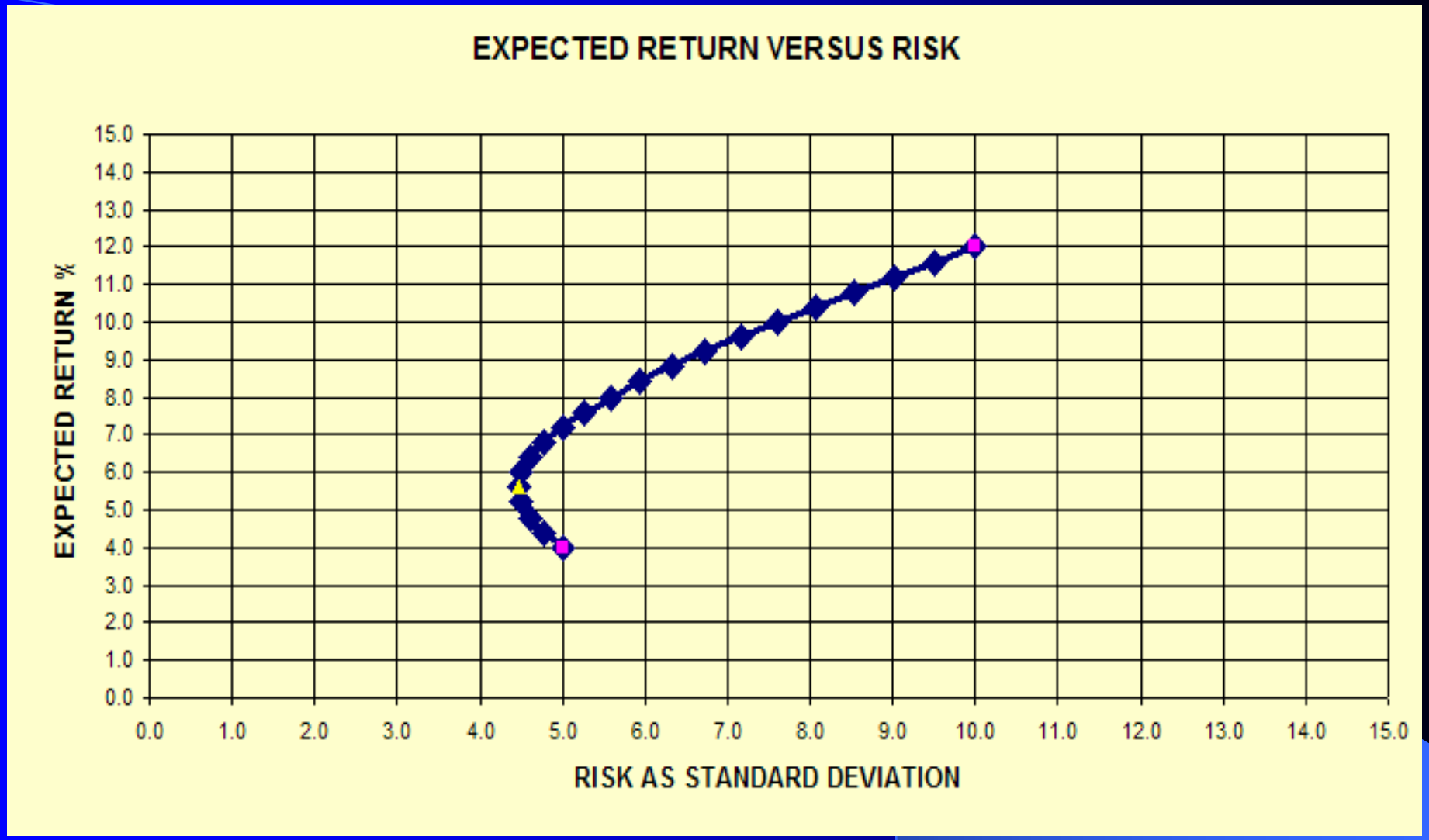
Most investors do not use these methods, and so on.

The important thing is that there are no restrictions on the type of investment. They can be stocks, bonds, works of art, futures, etc., as long as they can be valued.

Tip 1: MPT is perfectly general

You can use any kind of investment as long as it can be valued and have the two required statistical measures of Expected Return and Standard Deviation.

This is what Harry saw that shook the investment world!



Why was this result important?

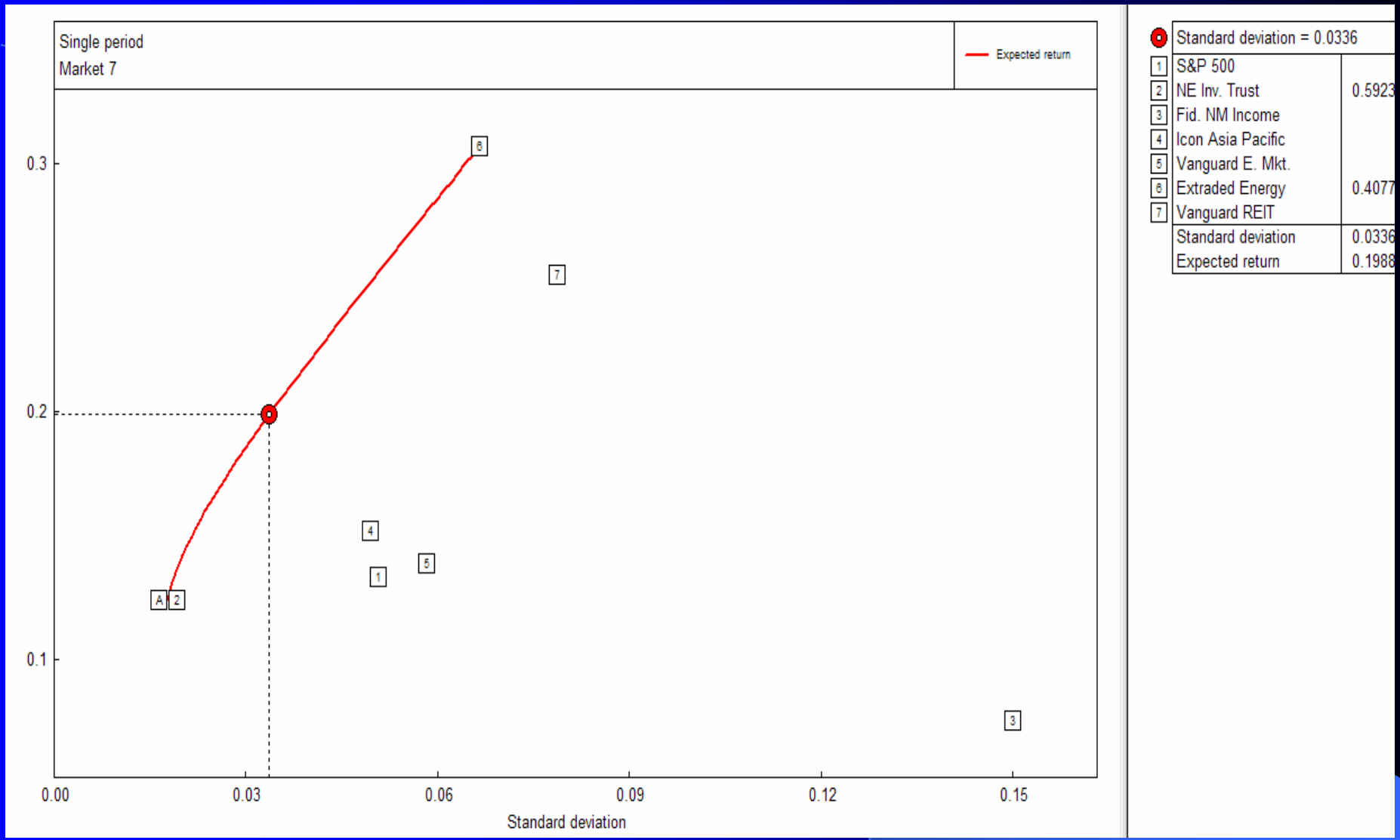
One investment had an Expected Return of 12 and a Standard Deviation of 10.

The other had 4 and 5 correspondingly.

As you varied the allocation, risk as Standard Deviation, reduced to a minimum.

If you can’t see it yet, try this real life example.

Real world example:



Do you see what I see?

- This is a portfolio of 8 securities (mutual funds) and the solid Expected Return line, the “Efficient Frontier,” is higher than the expected return of any of the securities.

- You can put together a portfolio with any level of risk that makes you comfortable.

- Of the 8 choices only 2 would be required for an expected 20% return. You need not invest in the other 6.

Tip 2: It's like getting something for nothing!

- An "Efficient Portfolio" is one lying on the "Efficient Frontier" and it can have a higher Expected Return than any of its component investments for any level of risk.

- Equivalently, you can achieve a lower level of risk than any of the portfolio's standard deviations.

There's two kinds of risks:

There are two kinds of risks:

1. The first is called the "Systematic Risk" and it is common to all investments. It is usually called the "Market Risk."
2. The second kind is called the "Unsystematic Risk" and it is that associated with each investment.

Tip 3: All Efficient Portfolios have eliminated their "Unsystematic Risk"

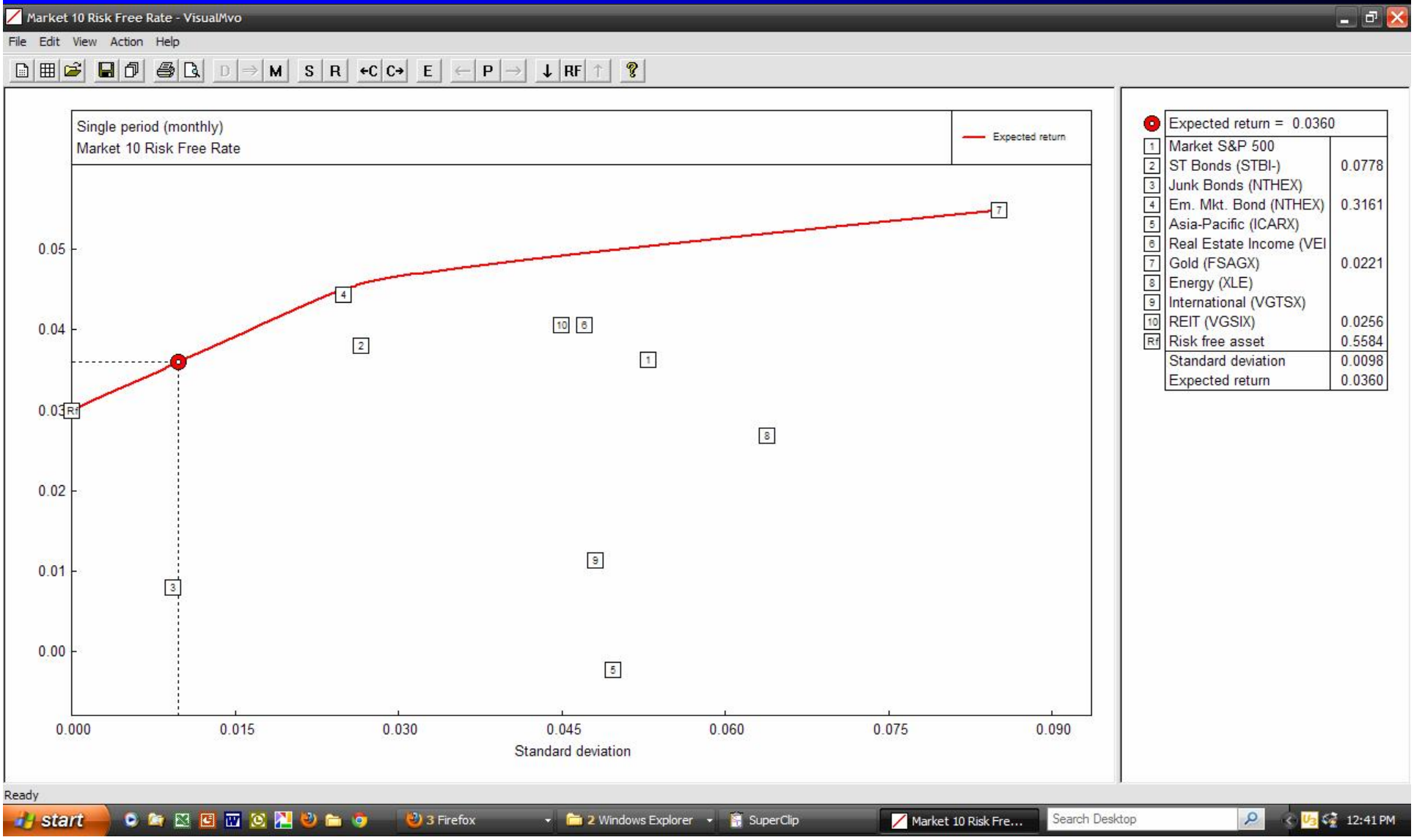
That is why you can seem to get "something for nothing."

Also, portfolios of "efficient portfolios" are also efficient.

Tip 4: Is this the best that we can do?

- There is one portfolio with a unique property.
- Draw a straight line from the "Risk-free Return" on the Y-axis tangent to the Efficient Frontier.
- The portfolio at that point is called "The Efficient Portfolio."
- By allowing borrowing, you can obtain a return larger than that allowed by the "Efficient Frontier."
- By allowing lending, you can get risk down to zero.
- Why would you use any other portfolio?

This is the best that you can do by allowing lending and borrowing



Tip 5: I can't handle risk and want it to be zero!

- Gold usually has a negative cross-correlation of about –0.3 with most equities.
- By mixing between 5 to 10% gold in a portfolio, risk is reduced to 0.

Is their a downside to MPT?

There were two downsides:

1. 1. 1950's computers couldn't handle the math required to solve Harry's quadratic equations. That's why Bill's CAPM got such acclaim.

2. 2. The theory couldn't handle "Black Swans" (outliers) like Bill Gates earnings from Microsoft. Thanks to Professor Sortino, it can now handle Black Swans.

Tip 6: Can I do the calculations for free?

You betcha!

Go to http://www.WolframAlpha.com and enter up to four investment codes in the entry box and get a complete analysis.

Do it this way:

IBM APPLE FNMIX

But I have more than 4 investments!

Buy some software at:

http://www.effisols.com/

It’s going to cost you $89.00!

You will be able to handle up to 20 investments.

Tip 7: Can I use MPT to rank investments?

Sharpe's Ratio does a great job of ranking investments! It identifies those investments furthest to the 'northwest' on a Capital Markets Plot. They are the most desirable. Here is the equation:

Sharpe's Ratio = (Eej - Erf) / SDj

Here Eej is the expected (future) return of a security, Erf is the risk free return, SDj is the standard deviation of return of that security.

Large numbers are desirable.

Tip 8: But I want to take “Black Swans” into account and I don’t want to have to buy anything!

Try using one of Gummy-stuff’s Excel spreadsheets. They’re free! Look for Buy-Sell-Colours . To find it go to:

http://www.gummy-stuff.org

Look around for the spreadsheet or get it free from Don. He’ll give it to you if he likes you! It also does Sharpe’s Ratio and other neat things.

DGimpel@RoadRunner.com

	A	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S
1		Color: Buy-Sell																
2	Buy if greater than				0.1				0.1	0.5			0.0	70	80	80	0.0	4.0%
3	Sell if less than	clear the Colors			-0.1				-0.1	0.1			0.0	40	20	20	0.0	-4.0%
4																		
5			Price	SMA	MACD	EMA	Bolli-UP	Bolli-DN	"Annual"	"Annual"	Volume/	Avg	Sharpe	100-RSI	%K	%D	Sortino	Zweig 4%
6	Stock	parameters		20	12.26	9	20	2	return	Volatility	1000	Daily Rtn	Ratio	14	14	3	Ratio	14
8	VANGUARD ST BOND	BSV	79.75	79.95	-0.11	79.69	80.47	79.39	3.1%	4.2%	360	0.0%	-0.44	63	28	27	-0.68	0.0%
9	POWERSHARES DB OI	DBO	28.64	26.85	0.44	27.91	29.12	24.70	41.3%	37.0%	532	0.2%	0.02	54	98	97	0.03	11.5%
10	DELAWARE FOUNDATI	DFIAX	9.61	9.59	-0.01	9.54	9.77	9.40	23.8%	10.1%		0.1%	-0.06	84	72	69	-0.08	0.0%
11	WISDOMTREE PAC TT	DND	62.19	59.47	0.72	60.70	62.72	56.29	64.1%	37.5%	19	0.2%	0.04	34	100	97	0.06	8.3%
12	BLACKROCK INC	BLK	238.92	235.10	2.48	237.64	245.30	225.72	91.2%	55.2%	224	0.3%	0.05	44	78	55	0.07	0.0%
13	ISHARES MSCI E.M.	EEM	43.20	41.35	0.64	42.15	43.44	39.33	76.3%	38.6%	41,118	0.2%	0.05	30	100	97	0.07	8.2%
14	ISHARES MSCI EAFE	EFA	57.25	55.56	0.44	56.28	57.37	53.82	35.5%	31.4%	12,827	0.1%	0.00	44	100	97	0.00	5.6%
15	ML EURO01 HLDR124	EKH	64.46	63.38	0.55	64.31	65.46	61.46	37.9%	34.6%	1	0.2%	0.01	47	76	80	0.02	4.5%
16	IPATH EUR/USD EXC	ERO	56.08	56.21	-0.43	55.97	57.09	55.23	7.5%	18.1%	0	0.0%	-0.08	48	88	59	-0.12	0.0%
17	ISHARE MSCI BRAZI	EWZ	77.47	74.53	1.00	75.78	78.68	70.43	112.3%	43.6%	9,773	0.3%	0.07	50	95	94	0.10	9.0%
18	FT ISE REVERE NAT	FCG	18.97	17.75	0.56	18.41	19.47	16.22	49.8%	49.3%	631	0.2%	0.02	39	99	96	0.03	9.1%
19	FIRST TR FTSE EP	FFR	30.77	30.41	0.28	30.79	31.22	29.63	39.5%	44.9%	22	0.2%	0.01	39	75	91	0.02	0.0%
20	FT ISE CHINDIA ID	FNI	22.44	21.49	0.38	21.89	22.57	20.45	95.8%	42.7%	43	0.3%	0.06	24	91	92	0.09	7.2%
21	ISHARES TR FTSE I	FXI	44.00	42.72	0.07	43.05	44.66	40.71	60.8%	42.3%	12,765	0.2%	0.03	32	83	87	0.05	6.6%
22	SPDR GOLD SHARES	GLD	111.37	109.09	-0.03	109.18	112.48	105.52	32.6%	20.5%	15,895	0.1%	0.00	43	97	94	0.00	4.9%
23	CLAYMORE/ALPHASHA	HAO	27.95	26.69	0.40	27.01	28.25	25.09	111.6%	41.4%	259	0.3%	0.07	36	97	96	0.10	9.5%
24	ML INTERNET HLDR1	HHH	57.93	57.76	0.40	58.62	60.11	55.54	76.1%	32.7%	21	0.2%	0.05	43	52	50	0.08	0.0%
25	ISHARES DJ US IN	IAK	27.54	26.75	0.28	27.14	27.67	25.91	21.7%	50.2%	8	0.1%	0.00	29	95	97	0.00	5.6%
26	iShares Trust	IFAS	29.64	28.80	0.24	29.14	29.94	27.67	43.9%	38.2%	7	0.2%	0.02	38	90	89	0.03	6.8%
27	ISHARES DJ US HCP	IHF	50.74	48.92	1.00	49.59	50.88	47.25	43.4%	32.3%	153	0.2%	0.02	23	100	91	0.02	5.2%
28	ISHARES S&P LAT A	ILF	49.82	47.87	0.63	48.54	50.23	45.55	88.5%	41.2%	1,354	0.3%	0.06	32	100	99	0.08	8.5%
29	IPATH ETNS LINKED	INP	66.38	64.08	1.26	65.48	67.59	60.76	119.3%	48.1%	390	0.4%	0.07	36	85	92	0.12	8.2%
30	ISHARE SP500 BAR	IVE	54.85	53.37	0.58	53.89	54.73	52.11	28.2%	30.1%	351	0.1%	-0.01	35	100	100	-0.01	4.7%
31	ISHARE SP500 BAR/	IVW	59.12	57.98	0.58	58.70	59.53	56.55	34.4%	23.8%	862	0.1%	0.00	35	100	99	-0.01	4.3%

Tip 9: I have four investment candidates and I can't figure out which to buy.

- I've already referred you to WolframAlpha.com and told you how to use it.
- It provides the absolutely best fundamental investment analysis on the internet including key-ratios, projections and so on. Don't miss clicking on the almost invisible button on the top right of each box. That's where the really good stuff is located.

Who are Harry and Bill, and did they ever get recognition for their work?

- "Harry" is New York University Professor Harry Markowitz.
- "Bill" is Stanford's Professor William Sharpe.
- They both received the Nobel Prize for their work in 1990 some 39 years after Harry completed his Doctoral thesis at the University of Chicago in 1950.

Tip 10: Easy diversification:

- Can I reduce a portfolio's unsystematic risk through diversification?
- Yes! Provided all investments are uncorrelated. 17 uncorrelated investments will eliminate 99% of a portfolio's unsystematic risk.
- There's another easier way to do this by designing an "Efficient" portfolio (See Portfolio Engineering 101).
- Remember that risk really means uncertainty. That's all I wanted to say in the first place!