

# COVID-19 MARKET DECLINE SPOTLIGHTS UNDER-DIVERSIFIED PORTFOLIOS

-c- 2020 by Stewart Frank CPA/PFS AIFA and J. Ben Vernazza CPA/PFS TEP emeritus

Precision Fiduciary Analytics, Inc.  
The Portfolio Diversification Institute  
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## INTRODUCTION AND BACKGROUND

Ever since Nobel Laureate, Eugene Fama and his colleague, David Booth, published their article *"Diversification Returns and Asset Contributions,"* 48-3 Financial Analysts J. 26 (May-June 1992), it has become an intellectually accepted fact that over time well diversified investment portfolios out-perform their less diversified brethren. The driver of this out-performance is less volatility. With their lower volatility, well diversified portfolios decline less during periods of market declines. Fama-Booth thought they tended to increase slightly less during periods of market increases, but for this case and others we find that well diversified portfolios can gain back as much or more. Well diversified portfolios have the advantage in overall return comparisons because when a portfolio declines less, its starting point for ensuing rebounds is from a higher plateau.

While the above referenced article is academically true, it is difficult for most non-academics to fully appreciate. So, we couldn't pass up this once-in-a-lifetime opportunity to present this case study with its recent newly diversification portfolio out-performing its less-diversified previous iteration before and throughout the COVID-19 market crisis, just like Fama & Booth published over 25 years ago.

## THE CASE STUDY

On condition of anonymity, a Diversification Institute member agreed to allow us to use their portfolio for this case study. We are extremely grateful to them for allowing us to do so. This portfolio lent itself to our case study because we originally ANALYZED it for diversification on September 18, 2019 and found it to be significantly UNDER-DIVERSIFIED. Following the analysis, we OPTIMIZED only the equity portion of the portfolio for diversification because 90% of Uncompensated Risk resides in the risk assets. We used our proprietary algorithm that brings together big data and Artificial Intelligence (AI) to determine the best way to reduce uncompensated risk to a more acceptable level. This is done by assuming a give-away of part of the portfolio with the remaining in the same pro rata relationship. We show the findings using fifty-five super sector proxies together with our algorithm and give results in 10% give-away increments up to 60%.

Shortly after September 18, 2019 our Institute member applied their expertise to the suggested 'AI' changes and IMPROVED the portfolio's holdings, not exactly as 'AI' had suggested, but tempered using this member's own "Adviser" Intelligence. Then, the member added fixed income portion as appropriate

for each client portfolio. That new portfolio followed a buy and hold strategy throughout the study period, but only the equity portion is compared in this case study in order to emphasize the value of reducing Uncompensated Risk where most of it exists – in the risk assets.

As a byproduct it also produced a Visualization of Investment Data Analytics that makes the math of portfolio diversification and uncompensated risk management more understandable to non-academics.

### **THE RESULTS – ENORMOUS AND STUNNING**

You will recall from September 18, 2019 until February 19, 2020, securities markets were bullish and both the old and the new portfolio enjoyed gains. The discontinued portfolio would have increased by 8.7% while the 40% GIVEAWAY ADVISER-DRIVEN IMPROVISED portfolio increased by 10.5%. Shortly thereafter the Pandemic and its immediate impact on the markets became a reality. From the top of the move up on February 19, 2020 to March 20, 2020, the discontinued portfolio would have decreased -37.8% while the new portfolio decreased by 'only' -33.8%. (See Schedules A and B for the details and portfolio sector recommendations made with 'AI' OTIMIZING followed by human intelligence IMPROVISATION).

A **remarkable** comparison is in the relative performances from September 18th to March 20th. The discontinued portfolio would have declined by -29.1% while the new portfolio declined by -23.3%, a difference of 580 basis points.

And, here is the **startling fact**: In order for the old portfolio to regain the new portfolio's February 19<sup>th</sup> value of +10.5% it would have to increase by 56%. While, for the new portfolio to regain its February 19<sup>th</sup> high it would only require a 44% increase -- a **diversification rebound advantage of 1,200-basis points!!**

**UPDATES:** We updated the performance on Schedule A thru April 6, 2020, where there had been a partial recovery. One can observe that the discarded portfolio regained 10.5% whereas the new portfolio regained 12.1% from March 20<sup>th</sup>, and as a result the **1,200-basis points rebound advantage remained unchanged**. The April 14, 2020, update showed even more virtuosity when the old portfolio gained 5.6% and the new portfolio rose 8.8% from April 6<sup>th</sup>. This resulted in the new portfolio gaining even more **rebound advantage with the benefit climbing to 1,400-basis points**.

**STUNNING!** This is how a DIVERSIFIED portfolio acts because it has individual investments that go in different directions, at different frequencies, some acting independently from all the other securities. This case study provides convincing evidence that there is such a thing as "added diversification return" sometimes referred to as "The Only Free Lunch in Investing."

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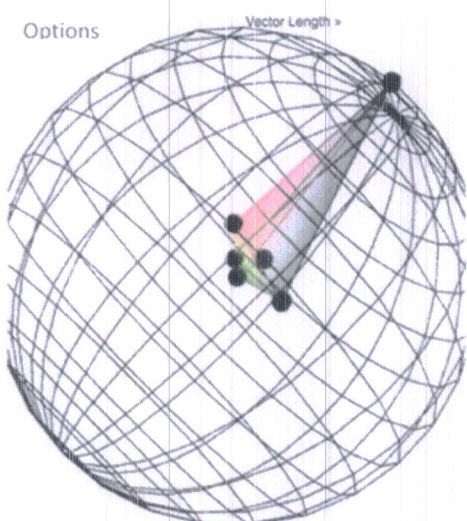


Performance metrics of the new portfolio are shown in Schedules C-1 through C-4, Correlations are shown in Schedule D and a Glossary in Schedule E. We could not resist adding the description in Schedule F of the value of diversification as explained by Allison Schrager in her recent book entitled: *AN ECONOMIST WALKS INTO A BROTHEL* (available on Amazon). Schedule G is information about the authors of this case study and their founding of Precision Fiduciary Analytics and the PORTFOLIO DIVERSIFICATION INSTITUTE Division.

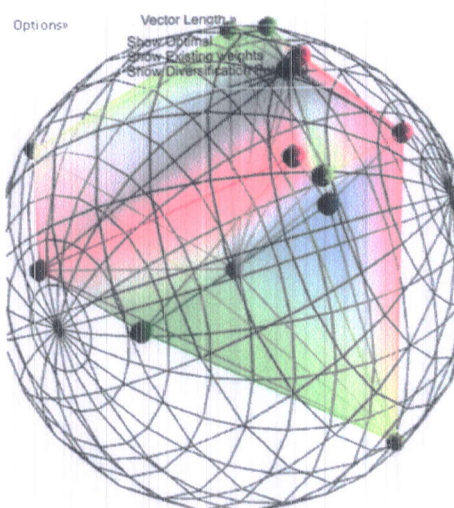
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**Postscript:** These findings are also evident in seven other studies carried out in September 2019. Similar time period evaluations show similar diversification alpha results with the range of rebound advantage of between 600-1,400 basis points. Many diversified portfolios get gains in benefits with only a 10% take-away OPTIMIZATION! It is a good exercise because it gives some additional information that could influence changes in Compensated Risk. There is additional indication that poorly designed diversified portfolios that show of 50-60% take-aways advantages, need to *go back to the drawing board*, adjust their compensated risk assumptions, and then ANALYZE-OPTIMIZE-IMPROVISE - a procedural process and evidence of "prudently and reasonably reducing Uncompensated Risk" as required by Fiduciary Law.

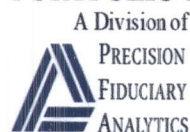
**ANALYZED  
NOT DIVERSIFIED  
DISBANDED PORTFOLIO**



**OPTIMIZED & IMPROVED  
DIVERSIFIED  
PORTFOLIO**



**THE INSTITUTE FOR  
PORTFOLIO DIVERSIFICATION**



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UPDATED TO 4/6/20 & 4/14/20

SCHEDULE A

FOR PORTFOLIO DIVERSIFICATION  
USE ARTIFICIAL INTELLIGENCE TO ANALYZE AND OPTIMIZE & THEN  
ADVISER INTELLIGENCE TO IMPROVISE

Comparative Analysis of Old "Risk Asset Allocation Only" (no fixed income)

Then 30%, 50%, 40% Giveaways Reducing Uncompensated Risk

From September 18, 2019 until March 20, 2020

(note: all portfolios based on knowledge available up to September 17, 2019)

	Old Alloc.	30% GiveAway	50% GiveAway	40% GiveAway Adviser-Driven IMPROVISE	Basis Points Improvised Rebound Advantage
	ANALYZE	OPTIMIZE	OPTIMIZE		
<b>Total Return 9/18/19 to 3/20/20</b>	<b>-29.1%</b>	<b>-25.3%</b>	<b>-26.7%</b>	<b>-23.3%</b>	
Std. Dev.	23.2%	21.0%	22.8%	21.4%	
Semi Variance	21.7%	19.0%	21.0%	19.1%	
Max Draw Down	34.5%	32.0%	33.3%	31.1%	
Ulcer 2 week Draw Down	9.0%	7.5%	7.8%	7.8%	
Sharpe Ratio/Std. Dev.	-1.25	-1.20	-1.17	-1.09	
Sortino Ratio/Semi Dev.	-1.34	-1.33	-1.27	-1.22	
Calmar Ratio/Draw Down	-0.80	-0.79	-0.80	-0.75	
Security Holdings	5	12	23	12	
Independent Moving Holdings	3	5	10	6	
Uncompensated Risk Removed*	12%	19%	22%	23%	

Return Drop - Feb 19 to Mar 20

Total Return 9/18 - 2/19	8.7%	9.7%	10.1%	<b>10.5%</b>
Total Return 9/18 - 3/20	-29.1%	-25.3%	-26.7%	-23.3%
<b>DROP FROM TOP</b>	<b>-37.8%</b>	<b>-35.0%</b>	<b>-36.8%</b>	<b>-33.8%</b>

→% Incr. to Get to **+10.5%** **56%** **48%** **50%** **44% ←** **1,200 bips**

UPDATED TO 4/6/20

Return 9/18/19 to 4/6/20	-18.6%			-11.2%	
Return 3/20/20 to 4/6/20	+10.5%			+12.1%	
→% Incr. to Get <b>+10.5%</b>	<b>36%</b>			<b>24% ←</b>	<b>1,200 bips</b>

UPDATED TO 4/14/20

Return 9/18/19 to 4/14/20	-13.0%			-2.4%	
Return 4/6/20 to 4/14/20	+5.6%			+8.8%	
→% Incr. to Get <b>+10.5%</b>	<b>27%</b>			<b>13% ←</b>	<b>1,400 bips</b>

\*see [www.precisionfiduciary.com/AICPA2019Webcast/](http://www.precisionfiduciary.com/AICPA2019Webcast/) p52+



**FOR PORTFOLIO DIVERSIFICATION**  
**USE ARTIFICIAL INTELLIGENCE TO ANALYZE AND OPTIMIZE & THEN**  
**ADVISER INTELLIGENCE TO IMPROVISE**

Comparative Analysis of Old "Risk Asset Allocation Only" (no fixed income)

Then 30%, 50%, 40% Giveaways Reducing Uncompensated Risk

From September 18, 2019 until March 20, 2020

(note: all portfolios based on knowledge available up to September 17, 2019)

	<u>ASSET ALLOCATION</u>			<b>40% Giveaway</b>
	Existing Alloc.	30% GiveAway	50% GiveAway	<b>Adviser-Driven</b>
	<u>ANALYZE</u>	<u>OPTIMIZE</u>	<u>OPTIMIZE</u>	<u>IMPROVISE**</u>
<u>Existing Portfolio Allocation ANALYZED</u>				
U.S. Core Equity	50%	35.0%	25.0%	30%
International Equity	20	14.0	10.0	12
Tax Managed Equity	15	10.5	7.5	7
Emerging Market	10	7.0	5.0	7
Global Real Estate	5	3.5	2.5	4
Total	100%	70%	50.0%	60%
<u>30% Give-Away Portfolio OPTIMIZED*</u>				
Medical Devices		5.0	4.0	6
On-line Retail		5.0	4.0	7
Nuclear		4.0	NONE	3
Health Care.		5.0	NONE	6
Gold		5.0	6.0	7
Semi-Conductor		3.0	2.0	6
Technology		3.0	2.0	5
		100%		100%
<u>50% Give-Away Portfolio OPTIMIZED*</u>				
Utilities				
Green Energy			5.0	
Aerospace-Defense			3.0	
Materials			3.0	
Timber			3.0	
Social Media			2.0	
Private Equity			2.0	
Asia-Pacific			2.0	
Infrastructure			2.0	
Canada			2.0	
Home Builders			2.0	
Natural Resources			2.0	
Japan			1.0	
			100%	

\* more giveaways optimized before several improvising test-drives.

\*\* An asset allocation decision made by the Member based on their knowledge, experience and understanding of *Uncompensated Risk* utilizing this platform. It would also include Investment Policy Statement or Financial Plan constraints and of the course human bias. In this case the major constraint was to limit the number of constituents to twelve and 40% Give-Away. Changes were also made to the relative weightings of all twelve.

Performance Metrics for IMPROVISED PORTFOLIO  
Year ending September 17, 2019

Schedule C-1 Performance Metrics  
Sorted Alphabetically

Sector:SubSector	SharpeRatio	Sortino	Calmar	Ulcer Ratio	DvDnd	Return	Std Dev	SemiDv	MxDD	Ulcer
Emerging Market	0.089657951	0.121652	0.11556	0.20358587	3.08%	1.34%	14.97%	11.03%	11.61%	6.59%
Global Real Estate	1.268003275	1.900394	1.645807	4.350315133	5.84%	15.54%	12.26%	8.18%	9.44%	3.57%
Gold	2.077489481	3.384513	4.470773	10.58271364	0.00%	23.85%	11.48%	7.05%	5.34%	2.25%
Health Care	-0.01576946	-0.02147	-0.017683	-0.04669847	1.71%	-0.26%	16.79%	12.33%	14.97%	5.67%
International Equity	-0.414395048	-0.601925	-0.279876	-0.39657251	7.94%	-5.95%	14.36%	9.88%	21.26%	15.00%
Medical Devices	0.697420556	0.96354	0.714588	2.224323696	0.29%	14.31%	20.52%	14.85%	20.03%	6.43%
Nuclear	-0.055195707	-0.079654	-0.075077	-0.11030293	4.88%	-0.68%	12.25%	8.49%	9.01%	6.13%
Online Retail	-0.193009402	-0.263528	-0.165503	-0.38859412	0.00%	-5.05%	26.18%	19.17%	30.53%	13.00%
Portfolio 9/17/2019	0.345809423	0.481211	0.29308	0.889079453	3.02%	5.07%	14.67%	10.55%	17.31%	5.71%
Semiconductor	0.597815214	0.85464	0.721598	1.636727455	1.35%	17.89%	29.92%	20.93%	24.79%	10.93%
Tax Managed Equity	0.008583957	0.012014	0.006315	0.012218891	3.44%	0.11%	12.91%	9.23%	17.55%	9.07%
Technology	0.480313714	0.66079	0.451698	1.220020059	1.25%	11.45%	23.83%	17.32%	25.34%	9.38%
U.S. Core Equity	0.025749184	0.035426	0.01969	0.04551903	3.28%	0.45%	17.58%	12.78%	23.00%	9.95%

Note: Optimization uses different time periods for Returns-SemiDeviations-Correlations-SharpeRatio and weights between time periods vary as entered into the Policy Tree.

Analysis of Existing "Risk Asset Allocation Only" (no fixed income)  
Adviser IMPROVISED- 40% to Reduce Uncompensated Risk Based on

Year Ending Sept. 17, 2019

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Performance Metrics for IMPROVISED PORTFOLIO  
Year ending September 17, 2019

Schedule C-2 Performance Metrics  
Sorted by Sharpe Ratio

Sector:SubSector	SharpeRatio	Sortino	Calmar	Ulcer Ratio	DvDnd	Return	Std Dev	SemiDv	MxDD	Ulcer
Gold	2.077489481	3.384513	4.470773	10.58271364	0.00%	23.85%	11.48%	7.05%	5.34%	2.25%
Global Real Estate	1.268003275	1.900394	1.645807	4.350315133	5.84%	15.54%	12.26%	8.18%	9.44%	3.57%
Medical Devices	0.697420556	0.96354	0.714588	2.224323696	0.29%	14.31%	20.52%	14.85%	20.03%	6.43%
Semiconductor	0.597815214	0.85464	0.721598	1.636727455	1.35%	17.89%	29.92%	20.93%	24.79%	10.93%
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Nuclear	-0.055195707	-0.079654	-0.075077	-0.11030293	4.88%	-0.68%	12.25%	8.49%	9.01%	6.13%
Online Retail	-0.193009402	-0.263528	-0.165503	-0.38859412	0.00%	-5.05%	26.18%	19.17%	30.53%	13.00%
International Equity	-0.414395048	-0.601925	-0.279876	-0.39657251	7.94%	-5.95%	14.36%	9.88%	21.26%	15.00%

Note: Optimization uses different time periods for Returns-SemiDeviations-Correlations-SharpeRatio and weights between time periods vary as entered into the Policy Tree.

Analysis of Existing "Risk Asset Allocation Only" (no fixed income)  
Adviser IMPROVISED - 40% to Reduce Uncompensated Risk Based on  
Year Ending Sept. 17, 2019

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Performance Metrics for IMPROVISED PORTFOLIO  
Year ending September 17, 2019

Schedule C-3 Performance Metrics  
Sorted by Return

Sector:SubSector	SharpeRatio	Sortino	Calmar	Ulcer Ratio	DvDnd	Return	Std Dev	SemiDv	MxDD	Ulcer
Gold	2.077489481	3.384513	4.470773	10.58271364	0.00%	23.85%	11.48%	7.05%	5.34%	2.25%
Semiconductor	0.597815214	0.85464	0.721598	1.636727455	1.35%	17.89%	29.92%	20.93%	24.79%	10.93%
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Adviser IMPROVISED - 40% to Reduce Uncompensated Risk Based on  
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Performance Metrics for IMPROVISED PORTFOLIO  
Year ending September 17, 2019

Schedule C-4 Performance Metrics  
Sorted by Semi-Deviation

Sector:SubSector	SharpeRatio	Sortino	Calmar	Ulcer Ratio	DvDnd	Return	Std Dev	SemiDv	MxDD	Ulcer
Gold	2.077489481	3.384513	4.470773	10.58271364	0.00%	23.85%	11.48%	7.05%	5.34%	2.25%
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Analysis of Existing "Risk Asset Allocation Only" (no fixed income)  
Adviser IMPROVISED - 40% to Reduce Uncompensated Risk Based on

Year Ending Sept. 17, 2019

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Both Within and Before the One Year Period Ending September 17, 2019

**X** MIS-MATCHED. SEE 6/17/20 UPDATE



## GLOSSARY

**Alpha** is a measure of the difference between a fund's actual returns and its expected performance, given its level of risk (as measured by beta). Alpha grades an investment's return scaled to the return expected by its benchmark. The amount of Alpha delineates the amount by which the investment has outperformed or underperformed its benchmark.

**Ambient Dimensionality (AD)** is the diversification metric that measures the total numerical count of risk assets (only) held in a portfolio.

**Beta** is the measure of an investment's sensitivity to market movements. The beta of the benchmark is 1.00. So a fund with a 1.10 beta is expected to perform 10% better than its benchmark index in up markets and 10% worse in down markets. Conversely, a beta of .85 indicates that the fund is expected to perform 15% worse than the benchmark index in up markets and 15% better in down markets.

**Absolute Beta** is a stand-alone, holistic metric that measures the correlation composition of all interrelationships within a given portfolio. It quantifies the degree to which the securities held inside the portfolio are expected to move in the same direction and is an academically accepted measure of a portfolio's systematic risk.

**Compensated Investment Risk** is unavoidable. It is the inherent risk assumed when making any investment. Compensated risk is also known as "un-diversifiable risk," "market risk," or "systematic risk" because it affects all investments, and is not limited to a particular investment type, security, industry, etc. and investors expect higher returns when assuming more of it. As a result, every participant in the investment market is exposed to it. This compensated risk is both unpredictable and unavoidable. It cannot be changed or diversified away. It changes only when market conditions change. It is considered to be the "price of admission" paid by everyone who becomes a market participant. Compensated risk is approximately 1/3 of total risk.

**Correlation** measures the extent to which the directions (not the amounts) in which a portfolio's value moves in relation to its benchmark. A correlation coefficient of 1.00 indicates perfect correlation. Alternatively, a perfectly negative correlation of -1.00 means that if either the portfolio or benchmark moves one way the other will move in the opposite direction. If the correlation is 0.00, the movements of the portfolio and index are said to have no correlation; they are completely random.

**Cross-Correlation % (Reciprocal)** is a stand-alone, holistic metric that measures the correlation composition of all interrelationships within a given portfolio. It quantifies the degree to which the securities held inside the portfolio are expected to move in the same direction and is an academically accepted measure of a portfolio's systematic risk (beta).

**Count** is the common name for *Ambient Dimensionality* (see above), one of the 3 quantity factors used to measure a portfolio's diversification.

**Concentration** is the common name for *Spanning Dimensionality* (listed below), one of the 3 quantity factors used to measure a portfolio's diversification.

**Commonality** is the common name for *Intrinsic Dimensionality* (see below), one of the 3 quantity factors used to measure a portfolio's diversification.

**Diversification Return (Estimated).** In *Diversification Returns and Asset Contributions*, Eugene Fama and David Booth (1992) proved how diversification yielded additive portfolio returns, naming the phenomenon "diversification returns." They reasoned that if the correlation of all a portfolio's assets equaled 1, then the weighted average asset variance would equal the portfolio variance. They went on to prove how more diversification increased this incremental return and was a function of the amount of variance reduction, not the actual level of portfolio variance. They estimated a portfolio's "diversification returns" equaled half the variance reduction caused by diversification (e.g. If you start with a portfolio made up entirely of low-volatility assets, their covariance can only reduce the portfolio's standard deviation by a small amount — causing smaller variance reduction and reduced diversification returns). Prudent uncompensated risk management requires focusing on correlations more than standard deviations.

**Down-Market Capture** ratio is the statistical measure of an investment portfolio's overall performance in down-markets. Portfolios that display a down-market capture of greater than 100% have underperformed their benchmark during periods when the benchmark decreased in value by the percentage amount in excess of 100%.

**Fiduciary Score** is a popular name for *Intrinsic Dimensionality* (see below).



**Fixed-income security** is a security that pays an unchanging rate of interest. Fixed-income securities include bonds and money market instruments.

**Intrinsic Dimensionality (ID)** is the companion Diversification Metric to SD and is used to quantify the number of diversification elements available for removal of uncompensated risk from a portfolio. ID is a necessary metric because SD, alone, cannot differentiate between assets that are highly correlated (e.g. a portfolio holding 5 different S&P 500 Index ETFs at 20% each will have a SD of 5, but an ID of 1). The ID metric measures the number of sufficiently asymmetrical and equally weighted equivalent elements that are present in a portfolio. The more of these elements present in a portfolio; the greater is the ability for each element to perform independently, and independent performance by more elements is the hallmark of diversification.

**Maximum drawdown** is a portfolio's peak to trough performance measured from the high point reached prior to the decline's inception until a new high is reached. The drawdown is determined upon completion of the entire cycle, which cannot be known until a new high is reached. Once reached the percentage decline from the old high to the lowest interim point of that cycle is the drawdown. Maximum drawdown is the drawdown having the largest decline during the period examined. It is a metric that measures risk.

**R-Squared (R<sup>2</sup>)** is the percentage of the portfolio's performance explained by the behavior of the assigned benchmark. R-Squared values range between 0 and 100, where 0 represents the least correlation and 100 represents full correlation. The R-Squared of a portfolio indicates whether the index being used to analyze beta is an appropriate benchmark. If a portfolio's R-Squared value is close to 100, the beta of the investment can be trusted. On the other hand, an R-Squared value that is less than 75 indicates that the beta is not particularly useful because the portfolio is being compared to an inappropriate benchmark.

**Risk** refers to an investment's vulnerability to fluctuations in value relative to changing economic or market conditions. Risk is used to define all uncertainty relating to the outcome. The level of risk incurred by a fund varies from fund to fund, depending primarily on the types of securities in which a fund invests.

**Semi-Deviation** is a measure of dispersion for the values of a dataset falling below the observed mean or target value. Semi-Deviation is the square root of semi-variance, which is found by averaging the deviations of observed values that have a result that is below the mean.

**Sharpe Ratio** measures the portfolio's excess return over the risk-free rate divided by the standard deviation of the excess return. It is a measure of the absolute rate of return per one unit of risk. The better an investment's risk-adjusted performance has been, the higher its Sharpe ratio will score. A negative Sharpe ratio indicates that a risk-less asset would have performed better than the investment being analyzed.

**Spanning Dimensionality (SD)** is the companion Diversification Metric to AD and is the number of equally Weighted equivalent risk assets present in a portfolio. Equally weighted portfolios have maximum SD possible for the given number of total portfolio assets and represent the smallest possible concentration structure. Decreases in the SD metric indicate increases to portfolio concentration and less diversification. Real life portfolios are almost never equally weighted, thereby encompassing varying degrees of unknown concentrations. Using the SD metric to learn a portfolio's equally weighted equivalent asset count is an important step for accurate diversification measurement.

**Standard Deviation** is a statistical measure of portfolio risk measured by the variability of the portfolio's return around its average over a specific time period. Unlike alpha, beta, and R-squared which are relative to a benchmark index, standard deviation is an absolute measure. In general, the higher the standard deviation is, the greater the volatility or risk is.

**Systemic Risk**, in finance, is the risk of collapse of an entire financial system or entire market, as opposed to risk associated with any one individual entity, group or component of a system that can be contained therein without harming the entire system. It refers to the risks imposed by inter-linkages and inter-dependencies where the failure of a single entity or cluster of entities can cause a cascading failure, which could potentially bankrupt or bring down the entire system or market. Normally systemic risk is not a great factor, but when it is it becomes a tsunami it overruns all other factors in the market place.

**Important Note:** "systemic" (8 letters) risk is sometimes erroneously referred to as "systematic" (10 letters) risk (compensated risk).



**Tracking Error** measures the divergence between the price behavior of the listed portfolio and the price behavior of the benchmark. Tracking error shows how well the movement of each portfolio tracks the benchmark over the period of time being measured. Even portfolios that display high R-squared values to their benchmark usually behave differently than the benchmark during shorter periods of time within the overall measurement period. Tracking error quantifies this difference.

**Ulcer Index (UI)** is a technical indicator that measures downside risk in terms of both the depth and duration of a portfolio's short-term market value declines. The index increases in value as the value moves farther away from a recent high and falls as the value rises to new highs. The indicator is usually calculated over a 14-day period, with the Ulcer Index showing the percentage drawdown an investor can expect from the high over that period. The greater the value of the Ulcer Index, the longer it takes for a portfolio to get back to its former high.

**Uncompensated Risk** is a risk that can be eliminated with diversification and unlike compensated or systematic risk investors cannot expect added return for assuming more uncompensated risk. Uncompensated risk is also referred to as unsystematic risk and can be reduced by methodically re-balancing the portfolio. Uncompensated risk represents approximately 2/3 of total risk.

**Uncompensated Risk Removed from Portfolio.** Although uncompensated risk measurement is defined by both quantity and quality factors, we use only quantity factors for this metric. Because a portfolio's size causes quantity factors to vary reported risk removal, incorporating quantity factors in a single statistic could prove misleading.

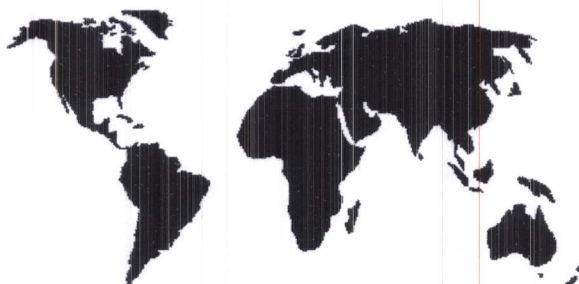
**Up-Market Capture** ratio is the statistical measure of the investment portfolio's overall performance in up-markets. Portfolios that display an up-market capture of greater than 100 have outperformed their benchmark during periods when the benchmark increased in value by the percentage amount in excess of 100.

**Variance** is a measurement of the spread between numbers in a data set. It measures how far each number in the set is from the mean and is calculated by taking the differences between each number in the set and the mean, squaring the differences (to make them positive) and dividing the sum of the squares by the number of values in the set. Variance is a key parameter in diversification management. Along with correlation, the variance of asset returns helps investors prudently manage the risk/return trade-off in investment portfolios. The square root of variance is standard deviation

**Variance Gap.** According to Restatement (3<sup>rd</sup>) of Trusts "...a portfolio's risk is less than the weighted average of the risks of its individual holdings." The variance gap equals the sum of the weighted average variances of the portfolio's individual asset holdings less the portfolio's overall variance. The greater the variance gap, the greater the diversification benefit.

**Volatility** is a statistical measure of the dispersion of returns for a given security, a portfolio, or market index. Volatility can either be measured by using the standard deviation or variance between returns from that same security, portfolio, or market index. Usually, the higher the volatility is, the riskier the portfolio is.

## PORTFOLIO DIVERSIFICATION INSTITUTE



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**Excerpts from *An Economist Walks into a Brothel* (available at Amazon)**  
**by Allison Schrager**

“Financial economists’ separate risk into two broad categories: the first is idiosyncratic risk [UNCOMPENSATED RISK], or the risk unique to a particular asset [or small group of assets]. Suppose Facebook changes management; the future of the company is unclear, and the price of the stock might drop based on factors unique to Facebook that don’t impact any other stock.

The second kind of risk is systematic risk [COMPENSATED RISK], or risk that affects the larger system instead of an individual asset. Systematic risk is when every stock rises or falls together because the entire market surges or crashes, as it did in 2008. Systematic risk events often happen because of a big economic disruption like a recession or an election result that people think will impact business. Systematic risks are harder to manage than idiosyncratic risks, and the downsides are potentially more dangerous. If the entire stock market tanks, you risk losing your job and stock portfolio at the same time. .... but that’s why they offer a valuable illustration of how to spot idiosyncratic and systematic risks and try to manage them. All of us must deal with different kinds of risk in our jobs, our relationships, even our choices of where we eat. Suppose you decide to try the new local sushi restaurant. The idiosyncratic risk is that this particular restaurant has bad fish that will make you sick. The systematic risk is a widespread parasite infecting tuna everywhere. Being able to spot the difference is important because it determines what the best risk strategy is (we’ll cover this topic in later chapters). For example, when you are looking to buy a house, the price might be driven by idiosyncratic risk (a new trendy feature like concrete countertops in the kitchen) or systematic risk (the whole market is hot and driving up prices). Discerning different types of risk can tell you if you are overpaying or if now is the right time to buy.

### **IT PAYS TO KNOW THE DIFFERENCE**

The way to manage idiosyncratic risk in finance is to buy lots of stocks. Owning the stocks of many companies means you’ll barely notice when one corporation whose stock you own goes bankrupt because of bad management since your risk is spread out among many companies. You shouldn’t own stock in the company you work for because you’re exposed to a great deal of your employer’s idiosyncratic risk. For example, if you had worked at Enron and owned stock, you would have lost your job, your income, and your retirement savings all in one fell swoop when a major accounting scandal led to its insolvency. The paparazzi also manage their idiosyncratic risk by spreading it around. This is what they are doing when they form an alliance or work in teams.

Systematic risk is even harder to manage. To measure systematic risk, finance professionals look at the history of stock prices and see how much one stock price moves with the rest of the market. That produces a single number, based on this correlation, called market beta. In the 1960s, the economists William Sharpe and John Lintner developed a theory that market beta can explain why one stock returns more than another. **Idiosyncratic risk can be reduced easily by owning lots of different stocks—any other stock. But a stock that reduces systematic risk is especially valuable, because it is more rare and has the power to reduce risk for your entire portfolio. A stock that moves in a different direction or less strongly than the rest of the market has a low beta, which reduces your systematic risk and makes you safer, so it offers a lower expected return**[Emphasis ours]. Conversely, a stock sensitive to the rest of the market, one that goes up 15 percent when the rest of the market only goes up 5 percent, has a high beta. It amplifies systematic risk in your investment portfolio, so you’d only want to buy that stock if you are compensated for taking on more risk. It should promise you a much higher return. If you want to reduce risk in your portfolio, you need lower-beta stocks; if you want higher returns and are comfortable with lots of non-diversifiable risk, you want high-beta stocks.”



## **TWO (DIVERSE) COLLEAGUES and TWO (DIVERSE) PORTFOLIOS**

Author: Stewart Frank CPA/PFS AIFA

Author: J. Ben Vernazza CPA/PFS TEP emeritus

It all started in September of 2014 when two 'retired' CPAs started a new business. Stewart and Ben knew each other having participated on committees of the American Institute of Certified Public Accountants. Later they organized an international company providing oversight services.

Stewart had built a second career practice specializing as a Subject Matter Expert regarding Prudent Fiduciary Breaches leading to many analyses including testifying numerous times as an expert witness. He became an adept quantitative analyst regarding the removal of Uncompensated Risk in portfolios and specialist regarding the applicable mandates to do so in Restatement of Trusts 3<sup>rd</sup>.

Ben had formed a CPA firm in 1969, sold it in 1975 to become an Investment Adviser and then retired in 2012. His audited client performance from January 2000 until December 2012 was an 8.4% compounded return. Amongst all those goings on he built 17 car washes and self-serve gas stations, 3 deli restaurants, and a nutmeg factory in Grenada.

They crossed paths again in 2014 and decided to form a new company to tackle the much-overlooked need by advisers, trustees, fiduciaries, and others to Measure-Manage-Monitor Uncompensated Risk in order to Prudently Diversify Portfolios. Academia called Prudent Diversification THE ONLY FREE LUNCH IN INVESTING. They named the new company Precision Fiduciary Analytics and its clientele were organizations with large portfolios managed by fiduciaries for investors, non-profits, family offices and their associated advisers.

Most recently they started a new division called THE PORTFOLIO DIVERSIFICATION INSTITUTE. The Institute's Mission is to provide to smaller and medium sized firms and investors an Artificial Intelligence User-Driven platform capable of facilitating the procedural process necessary to measure-manage-monitor-and obtain the benefits of diversification.

They are excellent partners due to their diverse backgrounds in different areas of finance. Stewart is known as the 'quant' and Ben is known as the 'quaint'\*

\*Ben has been a CPA for 59 years and was a Registered Investment Adviser for 40 years, and he is very acquainted with what "quants" do and do not do.

P.S. Being Octogenarians, they are looking forward to expanding with experienced associates soon and look especially to those younger men and women in their profession -- you know, in their 60s!

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