

# **MANAGING EXPECTATIONS:** Anticipate Before You Participate in the Market

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Although the world looks messy and chaotic, if you translate it into the world of numbers and shapes, patterns emerge and you start to understand why things are the way they are.

> Marcus du Sautoy, Professor of Mathematics at the University of Oxford



**Frank Holmes,** CEO and Chief Investment Officer, U.S. Global Investors

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Here at U.S. Global Investors, we strive to serve our clients to the best of our abilities by detecting and accounting for trends and patterns not just in the market but also the world at large. That includes everything from changes in monetary and fiscal policy, both domestic and foreign; the weather; lifecycles of mines; and advances in technology. We would be remiss indeed to exclude developments in any of these fields when making decisions about how to manage the funds our clients have entrusted us to grow.

In the following whitepaper, we'll fold back the layers of the "messy and chaotic" and try to understand what makes the market tick.

# The Importance of Cycles in the Investment Management Process

Elon Musk, CEO of Tesla Motors, told the Guardian in July 2013: "The lessons of history would suggest that civilizations move in cycles. You can track that back quite far—the Babylonians, the Sumerians, followed by the Egyptians, the Romans, China. We're obviously in a very upward cycle right now and hopefully that remains the case."

Similarly, financial markets are influenced by relatively predictable cycles, a lesson we at U.S. Global Investors rely on to help us manage expectations and be effective stewards of your money. This is a theme I've frequently written about and discussed during presentations, one of which, "Anticipate Before You Participate," is a classic that I often use to remind investors of these timeless principles.



Like the phases of the moon, all cycles contain their own unique rhythms. A good surfer knows how to manage risk on the tides created by the moon.

Precedent plays a big role in our decision-making process just as it does in our day-to-day lives. I don't know about you, but I know not to wait until the rains have flooded the streets ankle-deep before I buy an umbrella.

A keen awareness of the ebbs and flows of historical and socioeconomic conditions, on both the macro and micro scales, allows our investment management strategy to be more proactive than reactive. Although reacting to sudden and unexpected developments is often necessary—Russia's involvement in Ukraine is a good example—our team tries to mitigate their impact on our funds by leveraging our knowledge of the complex interplay and overlap of important cycles, from the short-term to very long-term.

#### Weather - A Cycle in One Season

Just as the moon's gravitational pull changes the ocean tides, so too does the weather influence the behavior of the market.

Case in point: a strong link exists between El Niño, the weather pattern, and global asset prices. Steady rains are good for Brazilian coffee output, for example, but bad for the Chilean metals industry—the reason being, when the rain is heaviest, access to mountainous mining regions is blocked.

Here in the U.S., an unusually brutal winter at the beginning of 2014 put a damper on consumer spending. Sales were pummeled as many consumers, especially those in the Northeast, were disinclined to go shopping after shoveling bucketsful of snow off their front lawns. Consequently, the ISM Manufacturing Index in January closed at a weak 51.3, below economists' expectations of 56.0. Car sales were way down.

On the bright side, stock trading tends to be more spirited on sunny days than cloudy days. In a thought-provoking paper titled "Reassessment of the Weather Effect: Stock Prices and Wall Street Weather," University of California-Berkeley student Mitra Akhatari finds a significant correlation between sunshine in New York City and a bump in stock prices:

"If it is the case that people tend to evaluate future prospects more optimistically when they are in a good mood than when they are in a bad mood," she writes, "then sunnier days are associated with investors being more willing to take on risky investments."

The reverse also seems to be the case, according to Akhatari. On overcast days, investors' less-than-peachy mood invariably leads to uninspired trading.

Or even calamity, as was the rare case on the morning of October 29, 1929—infamously known as Black Tuesday—when autumn clouds blotted out the sun's warmth and light.

This doesn't mean that every time the sky turns gray, the market suffers. Some people are better than others at separating their emotions from their investment decisions.

In any case, let's all take a moment to appreciate the fact that the U.S.'s main stock exchange is not located in Seattle, which averages more than 200 cloudy days per year.

## Gold Seasonal Trends – One Year Cycle

Gold is a classic example of a commodity that rotates through seasonal cycles year after year. I've written at length on the ways in which gold behaves in response to international festivals and holidays such as the Chinese New Year, Diwali and Ramadan. You can look back five, 15 and 30 years to spot the patterns the precious metal dependably follows, reaching annual highs starting in August and September as gold jewelry demand spikes.

#### **Gold: Annual Seasonal Cycle**

Historical Patterns (1974-2013)



Source: Moore Research Center, Inc. and U.S. Global Investors

Another cyclical indicator—or theory, I should say—we use to track the performance of gold is mean reversion. Mean reversion, which I'll talk about in full detail later, is the idea that a commodity will eventually revert back to its historic value, whether it's currently sailing in the stratosphere or crawling through the weeds.

What goes up must come down, as they say, and we saw this play out last year when gold plunged 28 percent after an exhilarating years-long bull run. Although many traders let go of their bullion and gold stocks, we strongly suspected, based on historical data, that the metal would soon rebound, which it did.

# Presidential Election Cycles – Four to Eight Years

At U.S. Global we like to say that government policy is a precursor to change, and no person in the nation has more control over policy than the president. The decisions he makes and actions he takes have far-reaching consequences in markets both domestic and international, more so than perhaps even he can anticipate.

President Barack Obama began his first term by injecting \$700 billion into the economy. It's still debatable how successful this legislation was. We've also seen several rounds of quantitative easing (QE) to loosen money and facilitate loan-taking.

Largely as a result of these policies, the S&P 500 Index during both of Obama's terms has performed above the average four-year presidential cycle. Early in June, the Dow Jones Industrial Average hit a record high of 17,000.

Just over the horizon are midterm elections, a time when the market historically becomes bullish. According to the most recent Stock Trader's Almanac:

"An impressive 2.7% has been the average gain during the eight trading days surrounding midterm election days since 1934. This is equivalent to roughly 52 Dow points per day at present levels. There was only one losing period in 1994 when the Republicans took control of both the House and the Senate for the first time in 40 years."



Source: U.S. Global Investors, Bloomberg

## Lifecycle of a Mine – Multiple Years

Not only is it important for us to understand the seasonality of the commodity itself, it's equally important to be aware of the stages a mine must proceed through before it becomes operational. As I write in The Goldwatcher: Demystifying Gold Investing:

"We strongly believe in using cycles to better manage risks and expectations, and we see this as a way for others to manage their emotions when it comes to investing. Knowing where a company is on the mine lifecycle can be a tremendous asset to an investor in gold equities who seeks to minimize risk and optimize performance. It's one more tool the investor can use to try to manage volatility and his own market expectations." Take a look at the graphic below. Years can and do divide the time when a mine is discovered and when production begins. It's imperative to know which stage of its lifecycle the mine is in to make a better-informed decision on whether to invest, withdraw or wait.





Source: U.S. Global Research

When a mine is first discovered, excitement raises the price of the stock. This is when investment is most speculative since only one in 2,000 companies finds at least a 1 million-ounce deposit. Once reality sets in and miners are faced

with the notion that the metal or mineral—assuming there is any probably won't be exhumed for some time, prices tumble. Years later, after production finally begins, stocks see another uptick. This is when the equity is at its lowest risk factor.

To manage risk and expectations, it's critical for us to know where we are in the cycle of the mine. Because we prefer to confirm this in person, we often visit projects in locations such as Colombia, Panama, Canada, West Africa and elsewhere.

# Oscillators, Standard Deviation and Mean Reversion

Again, at U.S. Global Investors, we actively monitor both short- and long-term



Every asset has its own DNA of volatility

cycles, from the annual seasonality of gold to four-year presidential elections, in order to manage expectations based on historical patterns.

Among other important cycles and patterns that we use are oscillators, which are diagnostic tools that help us measure a security's upward and downward price volatility. Think of an oscillator as a thermometer; with it, we can accurately take a security's "temperature." The knowledge extrapolated from this reading is materially useful in managing expectations, appreciating the dimensionality of a security's short-term volatility and identifying when to accumulate or trade a stock.

To understand how oscillators work, though, you'll first need to be familiar with standard deviation and mean reversion.

# **Standard Deviation**

Standard deviation, also known by its Greek letter sigma, is a probability tool that gauges a security's volatility. Specifically, it measures the typical fluctuation of a security around its mean or average return over a period of time ranging from one day to 12 months or more.

In the following bell-shaped curve, the center line represents a security's average return over a given period of time—one day, 20 days, 60 days, 12 months or what have you. To the left and right of the line, the darkest blue sections indicate one standard deviation, or sigma, either above or below the mean; the next lightest, two sigma above or below; and so on.



Oscillators are like thermometers: they can take the "temperature" of any security, commodity or index.



#### Standard Deviation (Sigma) Measures Degree of Variance from Average

No matter the security, returns can be expected to trade within one sigma of their mean 68 percent of the time. Ninetyfive percent of the time they will fluctuate within two sigma, and nearly all of the time they will trade within three.

So why should investors care about this? Generally speaking, the higher the sigma, the higher a security's volatility; the probability that it will fall back toward the mean also rises. A speculative tech stock, for example, has a greater tendency to have a higher sigma than a blue chip stock. This tells you that the tech stock's returns will fluctuate more erratically than the blue chip stock's.

But sigma is not as black and white as this comparison might suggest. Rather, it more closely resembles multiple shades of color that help investors manage their emotional reactions to the market's swings and focus instead on the power of using statistics. It's easy to get pulled into market fears or "irrational exuberance"—to use former Federal Reserve Chairman Alan Greenspan's phrase—and this probability model helps us be more objective.

To illustrate how these statistics operate in the real world, let's look at the S&P 500 Index. Over the last ten years, it's had a rolling 12-month standard deviation of 17 percent. This means that if you were to chart its returns over the course of 12 months, you could expect them to stay within ±17 percent from the mean about 70 percent of the time. That's one sigma. You could also reasonably expect returns to rise or fall within ±34 percent, or two sigma, 95 percent of the time.

Knowing this, it probably wouldn't be a huge cause for celebration if the S&P 500 rose, say, 8 percent during a 12-month

period, since this figure falls within the "normal" one-sigma range. Conversely, a loss of 8 percent wouldn't be a total disaster. A one-sigma move is a non-event.

To put this in perspective, the S&P 500 moved up about 30 percent in 2013, its best year since 1997. This is close to a significant two-sigma move from its 12-month average. In 2008, the worst year since 1937, the same index lost 38 percent, exceeding two standard deviations.

While the S&P 500's 12-month standard deviation is 17 percent, its one-day standard deviation is only 1 percent. (The one-day will always be lower than the 12-month.) If we chart the index's one-day percentage changes in 2008 and 2013 side-by-side, you'll see just how much more volatile the former year was compared to the latter. The index in 2013 made "normal" one- and two-sigma moves, whereas in 2008, especially in the second half of the year, we saw nearly unprecedented one-day sigma moves.

#### Side-by-Side Comparison of S&P 500's One-Day Standard Deviations in 2008 and 2013

S&P 500 Has Had a One-Day Standard Deviation of 1% for the Last 10 Years



Source: Bloomberg, U.S. Global Investors

The most important thing to keep in mind is that, just as we all have different fingerprints, every commodity, every stock, every fund and every index has its own DNA of volatility. The S&P 500 might have an annual standard deviation of 17 percent, but over the same 12-month period, the MSCI Emerging Markets Index has a much more volatile 29 percent. Investors must strive to remain objective in the face of emotional factors that move markets and adjust their expectations of how these two indices behave compared to one another.

#### Using Weather Statistics to Explain Standard Deviation

As an analogy, consider the extreme temperature fluctuations in Minneapolis-St. Paul, Minnesota. Minneapolis has an average annual temperature of 45 degrees, which sounds pleasant enough. You might think that in such a climate, all you need to get by is a warm jacket. But the picture changes dramatically when you learn that the Twin Cities' 12-month standard deviation is ±22 degrees. Statistically, this means that for a little over two thirds of the year—68 percent of the time—you can expect the temperature to swing between 23 and 67 degrees. Suddenly that jacket is looking pretty paltry. At two standard deviations, there's a strong probability that the temperature will fall anywhere between a bone-chilling

1 degree—which might very well occur, since the average low in January is 2.8 degrees—and 89 degrees. That's a huge, yawning gap that Minneapolitans must contend with throughout the year.

Compare this to San Antonio, Texas, home of U.S. Global Investors. Here the average temperature is a balmy 70 degrees, with a less-volatile standard deviation of ±13 degrees. Even at two sigma—which, again, occurs 95 percent of the time—the temperature in the Alamo City statistically falls anywhere between 42 and 94 degrees, close to the average high in July.

If we're looking just at temperature fluctuations, Minneapolis resembles the Emerging Markets Index whereas San Antonio behaves more like the S&P 500. Your expectations of "normal," therefore, will need to be different depending on which of these two cities you reside in or indices you follow.



Knowing a security's standard deviation is as important as knowing a city's average temperature: both help you manage expectations.

#### **Mean Reversion**

This leads us to mean reversion. Mean reversion is the theory that, although prices might trend up for many years (as in a bull market), or fall for many years (as in a bear market), they tend to move back toward their historic averages eventually. Such elasticity is the basis for knowing when a security is under- or overvalued and when to buy low and sell high. We have just experienced a bull market with the S&P 500 and a bear market with gold stocks. Within these trends, though, is great internal volatility that we can monitor using oscillators. Even in a bull or bear market, we can measure the 20- and 60-day volatility of any kind of security.

Again let's use Minneapolis as an illustration. We've already established its wide-ranging temperature fluctuations throughout the year, from highs reaching the 80s to lows flirting with zero. This being so, it would be unreasonable to expect the weather to remain freezing indefinitely, as is the case in Game of Throne's aptly-named Land of Always Winter. Eventually it reverts back to its 12-month mean of 45 degrees.

The same goes in the world of investing. Mean reversion applies to everything, in both a micro and macro setting. In an April 2012 Frank Talk, I showed that entire countries have their own means, which they eventually revert back to. After charting Chinese stock performance over a 10-year timespan, a pattern emerged:

"Chinese stocks landed in the top half [of emerging markets] four out of 10 years—2002, 2003, 2006 and 2007. In 2003, China climbed an astounding 163 percent; in 2007, it was the top emerging market again, returning nearly 60 percent. Since then, the country has fallen to the bottom half... If you apply the principle of mean reversion, history appears to favor China landing in the top half during this Year of the Dragon." Indeed, by the end of 2012, Chinese stocks jumped nearly 40 percent from the previous year, placing the country in the top half of emerging markets—just as predicted using the theory of mean reversion.

Look at the two oscillator charts below. They show the up-and-down movements in the price of gold stocks (top chart) and bullion (bottom chart) over the past 10 years. One row above or below the mean, indicated by the black horizontal line, equals one sigma; two rows above or below equals two sigma; and so on. As you can see, mining stocks have recently reverted to their mean for the first time in about three years, while spot gold is gradually working its way back.

#### Year-Over-Year Percent Change Oscillator: NYSE Arca Gold BUGS Index

(Daily, 10 Years Through June 20, 2014 in Standard Deviation Terms)



#### Year-Over-Year Percent Change Oscillator: Gold Bullion

(Daily, 10 Years through June 20, 2014 in Standard Deviation Terms)



Again, every security has a different sigma for a specific period of time, and as such your expectations should reflect these differences. Gold bullion currently has a one-day standard deviation of ±1 percent and a 12-month standard deviation of ±18.8 percent. So if gold's return falls within a range of ±1 on any given day or ±18.8 percent for a 12-month period, it's behaving normally, as this is only one sigma. Anything over 18.8 percent for a 12-month period would be heading toward two sigma, which is when a buy or sell action is advised.

#### Each Asset Class Has Its Own DNA of Volatility

Standard deviations based on 10-year daily data as of 6/30/2014

	Daily	Rolling 12-month
S&P 500 Index	±1%	±17.3%
Gold Bullion	±1%	±18.8%
NYSE Arca Gold Bugs Index	±3%	±35.5%

Source: Bloomberg, U.S. Global Investors

Now compare spot gold to the NYSE Arca Gold BUGS Index, which has a 12-month standard deviation of 35.5 percent nearly double that of bullion. Plus or minus 35.5 percent might sound incredibly scary and volatile, but for gold stocks, a fluctuation of this sort is "normal," occurring 68 percent of the time.

It's all about managing your expectations and emotions.

Look at the following oscillator that charts the S&P 500 and gold bullion's 60-day percent change over the past five years. Like the EKG tracings of a healthy patient, the lines bottom and peak, bottom and peak—but revert back to their mean with regular frequency.

#### **Healthy Heartbeats**

Gold Bullion vs. S&P 500 Index 60-Day Percent Change Oscillator Daily, 5 Years through August 15, 2014 in Standard Deviation Terms



Source: Bloomberg, U.S. Global Investors

Oscillators are vital to identifying the optimal time to buy or sell. When prices exceed two sigma above the mean, it might be a good time to sell because the statistical data suggest the commodity is overvalued and, therefore, prices are due to drop toward their mean. When prices exceed two sigma below the mean, it indicates the commodity is undervalued. Buying the laggards at this time could enable you to participate in a potential rally. No statistical tools are accurate 100 percent of the time, but investors can take ownership in how they use probability tools such as oscillators to manage the emotions of the market. It's when an asset moves more than one sigma that the power of mean reversion raises your chances to capture opportunity. This is part of what makes investing so exciting.

Strap yourself in and enjoy the ride.

# **Picking Mining Stocks in a Bear Market**

This section is devoted to fundamental resource stock evaluation. I'll discuss some of the statistical tools we use to pick quality stocks during a treacherous bear market, such as what we've seen in gold stocks the last three years.

Let it be known, however, that, though our approach might vary slightly depending on the condition of the market, we fervently seek to pick the best stocks for the best price and execution.

### How I Learned to Respect the Bear

The traditional definition of a bear market is when broad stock market indices fall more than 20 percent from a previous high—which sounds like a catastrophe, but is in fact "normal" market behavior. According to self-professed "investing nut" Ryan Barnes, a contributor for Investopedia, "bear markets… are a natural way to regulate the occasional imbalances that sprout up between corporate earnings, consumer demand and combined legislative and regulatory changes in the marketplace."

Think of bear markets, then, as the gradual transition from warm summers into frozen winters. Trees lose their leaves, snow and ice blanket the ground, many animals—the bear the most notable hibernate for the season. All life seems to take a breather. But just as you can always count on spring to emerge and, with it, new life, you as an investor can count on the market to rebound with fresh vigor.



As you might have known, the tail end of "winter"—or "trough," as it's known— is when you want to take part in the inevitable recovery. If the market never had a winter season, if it were perpetually trapped in an endless summer, investors would be hard-pressed to find an ideal entry point.

"No need for alarm folks. This is all part of the natural order of things."

"I'd be a bum on the street with a tin cup if the markets were always efficient," billionaire investor Warren Buffet once wrote.

It's easy to determine when winter becomes spring. But what about the end of a bear market? How do you know when it's bottomed and the optimal buying time has been reached?

CLSA consultant Russell Napier, in his 2009 book Anatomy of the Bear, describes the determinants of the end of a bear market:

"The bottom is preceded by a period in which the market declines on low volumes and rises on high volumes. The end of a bear market is characterized by a final slump of prices on low trading volumes. Confirmation that the bear trend is over will be rising volumes at the new higher levels after the first rebound in equity prices."

Look at the next chart. You'll see that, in three decades, the Philadelphia Gold & Silver Index (XAU) has never had a losing streak for more than three years.

#### In 30 Years, the XAU Never Experienced a Losing Streak of More Than 3 Years

Philadelphia Gold & Silver Index Annual Returns



Source: Bloomberg, U.S. Global Investors

Historical precedent suggests that gold stocks were due for a jump in 2014, and just as expected, the XAU has returned close to 20 percent year-to-date (YTD) after an abysmal 2013, the "final slump of prices on low trading volumes."

The following line graph illustrates just how dramatically gold and silver stock performance has rebounded. As you might remember from our discussion in the previous section, what we see here is an example of mean reversion, which occurs when the price of a security reverts back to its historic average.

This data exemplify the notion that you should remain patient during downturns, avoid getting discouraged and allow the security—in this case, precious metal stocks—to revert back to its long-term mean. When it does, you'll find that the wind is suddenly at your back instead of in your face.

Spencer Johnson, author of the 2009 book Peaks and Valleys: Making Good And Bad Times Work For You—At Work And In Life, writes, "You cannot always control external events, but you can control your personal peaks and valleys by what you believe and what you do."

Likewise, we might not have any control over how the market behaves,





but we can control how we respond to it: with grace, intelligence and levelheadedness.

## Value Drivers for Superior Performance

One of the tools we use to navigate around volatility, regulate emotion and focus on facts and fundamentals is an invaluable model we call the portfolio manager's cube. It helps us separate the weak from the strong, evaluate a company's attractiveness and pick the best GARP-y stocks. "GARP" stands for "growth at a reasonable price," which is an investment strategy that aims to identify companies with superior growth and value metrics.

The cube allows us to sift, sort and prioritize. It draws attention to the intersections among a resource company's production, cash flow and reserves (rows) and relative value, momentum and event drivers (columns). Using this model, we compare stocks on a relative basis in production per share to find attractive opportunities and overpriced

risks. We also identify events that could increase reserves and/or production per share over the next 12 months.

More than anything else, the cube affords us the framework for conducting relative valuation of a stock. Relative valuation is a method that compares a security's value to that of others to determine its financial worth.

For example, we evaluate mining stocks in the same way you or I might compare cars using multiple metrics before making a purchase. On this topic, I urge you to check out one of my favorite websites, Dennis Boyko's GoldMinerPulse, for a look at the type of fundamental analyses and relative evaluations that go into comparing and contrasting mining stocks.

The following is an example of how we might use the cube. Suppose a young mining company has just discovered a gold deposit. This event might excite potential investors and compel them to enter when the stock is undervalued, expecting it to skyrocket. But it's important to con-



Value Drivers for Superior Performance

The key success factor to superior performance is growth on a per share baiss in the 3 value drivers, Production, Cash Flow, Reserves. Source: U.S. Global Investors

duct a cross-sectional analysis of this discovery in terms of production, cash flow and reserves. How much gold does the company expect to produce in relation to others? The average concentration of gold in the earth's crust is 0.005 parts per million, making a substantial yield very rare.

Other questions might include: Does the company have ample cash flow to finance the costly yet necessary infrastructure, equipment, geological analyses and manpower to extract the metal, not to mention pay dividends? Has it kept up with its cash reserves to remain solvent during development of the mine and subsequent excavation? Many years, after all, typically go by before ounce one is plucked from the ground.

Besides using models such as the portfolio manager's cube to determine a mining company's or asset's relative value, we also rely on "boots on the ground" experience. Members of our investment team and I routinely visit domestic and global projects to gain tacit knowledge and ensure that operations are running smoothly and management is knowledgeable and has a firm handle on things.

To see photos of what these visits look like, check out our slideshow, On a Quest for Copper.

#### The Five Ms

A mine's lifecycle is the perfect segue into what I call the five Ms to picking the best mines. Most of what follows can be found in the 2008 book I co-wrote with London-based financial writer John Katz, The Goldwatcher: Demystifying Gold Investment.

One of the five Ms is Mine Lifecycle, which I previously covered. The other four Ms are Market Cap, Management, Money and Minerals, detailed below.

#### Market Cap

Market cap is simply the number of shares outstanding multiplied by the stock price. The gold sector is broken down into three sectors by market cap: seniors (market caps >\$10 billion), intermediates (between \$2 and \$10 billion) and juniors (\$2 billion).

If a gold company has 10 million shares outstanding at \$1 per share, the company is valued at \$10 million. The question any investor should ask is, "Is this company really worth \$10 million?" If the market pays \$25 per ounce of gold in the ground, the company should be valued at \$25 million (one million ounces in reserves X \$25 an ounce). If the company's market cap is only \$10 million, it may look undervalued. Accordingly, if the company's market cap is \$50 million, it may appear to be overvalued.

For larger gold companies, an investor can measure a company's market cap against its production level, reserve assets, geographic location and/or other metrics to establish relative valuation. For junior mining companies, we look for balance sheets with ample cash for exploration and development of prospective reserves, but we resist paying more than two times cash per share.

#### Management

Essentially, management of mining companies must have both explicit and tacit knowledge to be successful. Explicit knowledge is academic. How many PhDs or masters in geology/engineering does company management have?

Tacit knowledge is more personal in nature and much more difficult to obtain. It is acquired over time through first-hand observation, experience and practice. How many years have they worked in the industry? Has management ever successfully completed a project with similar geopolitical or environmental constraints?

Success in the mining sector, especially the juniors, relies on the ability to raise capital and communicate with investors. Often the heads of junior companies are geologists or engineers who have no relationships in the brokerage business. This lack of relationships impedes their ability to generate market support. Historically, companies with the highest number of retail shareholders have the highest price-to-book ratios and carry higher valuations than peers.



"As a geological engineer. it's been immensely rewarding to assess the upside of a mine and know that you are backed by the financial strength to acquire that mine and see that upside manifest itself."

Randy Smallwood, president and CEO of Silver Wheaton

Some of the most successful company builders in the gold-mining industry are what I call the "financial engineers"— people who have the relationships and understand the capital markets and who know how to hire the best geological and engineering teams. We tend to have more confidence investing in them.

#### Money

Mining is an expensive business. Often, companies burn through substantial amounts of capital before generating their first dollar in cash flow. A gold exploration company has to deliver reserves per share to have a chance at another round of financing. It has to convince the capital markets that it is an attractive investment on a per-share basis.

We call this the "burn rate"—how long will the company's current cash levels last before it has to return for additional financing. If a junior exploration company has \$15 million in cash reserves and is spending \$3 million a month, it has five months to deliver enough reserves per share to convince capital markets it is worth the risk.



This calculation can be done quickly. Exploration reserves are generally valued at one-third the reserve values of a producing mine—if producing reserves are valued at \$150 an ounce, exploration reserves would be \$50 per ounce.

The gold-equities market is generally efficient at judging reserves per share, so if the exploration company doesn't come up with the results necessary to get an evaluation—find gold for less than \$50 an ounce—investors quickly lose confidence. There is an old rule when it comes to exploration companies: don't pay more than two times cash per share if there are no proven assets in the ground.

#### Minerals

Compared to the rest of the mining sector, gold companies have the highest industry valuations based on price to earnings, price to cash flow, price to enterprise value and price to reserves per share.

Companies operating mines that produce gold as well as industrial metals tend to have lower valuation multiples. For example, the current price-to-earnings ratio for Freeport-McMoRan Copper and Gold, is eight times forward earnings. Investors can use the low relative valuations of copper/gold producers to increase their margin of safety in anticipation of an upward move in gold prices.

I must stress once again that these relative valuation techniques apply whether we're in a bull or bear market. In Peaks and Valleys, Spencer writes, "Have you ever noticed that your life is filled with ups and downs? It is never all ups or downs."

Neither is the market. As active money managers, we have learned to adapt to an ever-changing climate—from "summer" to "winter"—to select what we believe are the best, most reasonably-priced mining stocks for our investors.

# **Patterns in Trading**

The primary unit of time measurement for high-speed traders might be the microsecond, but for normal retail traders, it's vital to know the best months, days and even half-hours of the day to make market transactions. Humphrey B. Neill, author of the 1931 classic Tape Reading and Market Tactics: The Three Steps to Successful Stock Trading, said it best: "Never mind telling me what stocks to buy; tell me when to buy them."

Consider Black Friday, the most active shopping day of the year. Let's say a top-of-the-line 60" 1080p plasma HDTV normally goes for around \$950 but on Black Friday is discounted to \$500. That's a 44-percent savings. If you had a desire to own this TV and were somehow guaranteed a way to bypass the rabid mobs, you'd be a fool to spend \$950 on it the day before or after.

Likewise, you'd be at a disadvantage to buy or sell a security without first conducting some level of research to determine the optimal time, statistically speaking, to make a transaction. At the very least, you should know when



Yale Hirsch (left) and Jeffrey Hirsch (right)

not to make a transaction.

Fortunately, much of this research has already been conducted. My friend Jeffrey Hirsch, following in the footsteps of his late father Yale Hirsch, has for years edited the invaluable Stock Trader's Almanac, which is updated annually. The book is notable for finding reliable patterns in market trends and behavior, on both the micro and macro scale. It also gave birth to such well-known investing adages as "Sell in May and Go Away" and the "January Barometer."

Thirty-five years ago when I was just getting started in the securities business, I asked Yale how he managed to arrive at his findings. He told me that his background in music composition enabled him to "hear" melodies, if you will, in four-year presidential cycles, seasonal cycles, weekly cycles and more. This interdisciplinary approach of combining music and finance should inspire all investors to leverage their own unique skills, talents and backgrounds to seek patterns in the market that others might overlook.

If you don't already own a copy of the Stock Trader's Almanac, I urge you to make a special trip to the bookstore. You can also visit the book's website and sign up for a free seven-day trial. The site provides a wealth of helpful and fascinating information for investors to peruse.

# The Best Statistical Times to Trade

Previously I discussed market patterns in four-year presidential cycles and seasonal cycles. But now let's look at months and work our way down to half-hours of the trading day.

#### Months

October: This is one of the peculiarly dangerous months to speculate in stocks. The others are July, January, September, April, November, May, March, June, December, August and February.

Mark Twain

"Sell in May and Go Away" is more than a clever expression. The Stock Trader's Almanac has over six decades' worth of data to support this strategy. Based on the S&P 500's monthly closing prices, the worst-performing months of the year fall between May and October. Mark Twain's witty remark about October, made close to 100 years ago, still holds somewhat true today.

The Dow Jones Industrial Average has been up four of the past five Septembers, but the ninth month has still been the worst-performing since 1950 for all of the major indices and exchanges, including the Dow, S&P 500, NASDAQ and Russell 1000 Index.



## Average Month-to-Month Percentage Changes in S&P 500 Index

Based on Monthly Closing Prices, January 1950 to April 2013

Source: Stock Trader's Alamanc 2014, U.S. Global Investors

What this shows is that, in August, September and October, it's time to "nibble" on stocks, as prices are dropping. In March, April and May, it's time to trim.

As I said, the Dow has been improving slightly in September over the last few years. Its 20-year return has risen to -0.51 percent from its 50-year return of -0.77 percent return.

Theoretically, investing from November 1 through April 30 and then switching to fixed-income products for the rest of the year seems to be a safe and effective strategy. If you backtest this to 1950 with an initial \$10,000 investment, you would have gained an estimated 6,740 percent. Investing the same \$10,000 from May through October would have cost you \$1,024. What a difference six months makes.

I must stress, however, that this chart, and those that precede and follow it, shows only probability. Like a basketball bouncing down a rocky mountainside, nothing is certain, and actual behavior varies. Macro events such as presidential elections, midterm elections and changes in fiscal and monetary policy have a dramatic effect on the outcome of the market.

For further data, check out the Almanac's best and worst S&P 500 entry and exit dates, separated into the five best months (November through April, excluding February) and seven worst months (May through October, including February).

#### Weeks

Many events can affect the market from a weekly standpoint, including holiday and triple-witching weeks, which occur when stock options, stock index options and stock index futures all expire on the same day. Four such days occur on the third Friday of March, June, September and December—the end months of each quarter.

You might think that the market would become chaotic during triple-witching weeks, but in fact volume and activity has often been positive. As of this writing, the Dow has been up 17 of the last 23 witching-weeks that fall in March.

Below you can see what the Almanac says are the best and worst weeks in general for the Dow, ranging from 2008 to 2012.

# Best and Worst Weeks for the Dow Jones Industrial Average

Best 20 Weeks		Worst 20 Weeks		
Week Ending	% Change	Week Ending	% Change	
10/31/2008	11.29%	10/10/2008	-18.15%	
11/30/2011	7.25%	09/23/2011	-6.41%	
11/28/2008	9.73%	08/05/2011	-5.75%	
07/17/2009	7.33%	05/07/2010	-5.71%	
03/13/2009	9.01%	01/24/2014	-3.52%	
10/14/2011	4.88%	11/25/2011	-4.78%	
04/18/2008	4.25%	02/08/2008	-4.40%	
09/16/2011	4.70%	07/29/2011	-4.24%	
07/09/2010	5.28%	10/03/2008	-4.84%	
03/27/2009	6.84%	05/23/2008	-3.91%	
06/30/2011	4.02%	01/18/2008	-4.02%	

2008 through 2014

## Best and Worst Weeks for the Dow Jones Industrial Average

2008 through 2014

Best 20 Weeks		Worst 20 W	Worst 20 Weeks	
08/26/2011	4.32%	06/27/2008	-4.19%	
12/20/2013	2.96%	02/20/2009	-6.17%	
09/13/2013	3.04%	10/24/2008	-5.35%	
01/31/2008	3.63%	06/20/2008	-3.78%	
06/08/2012	3.59%	01/04/2008	-3.50%	
09/03/2010	4.33%	08/19/2011	-4.01%	
12/23/2011	3.60%	05/18/2012	-3.52%	
10/28/2011	3.58%	11/21/2008	-5.31%	
11/23/2012	3.35%	11/14/2008	-4.99%	

Source: Stock Traders Almanac 2014, U.S. Global Investors

What's interesting here is that, even though September is historically the worst month to trade in, it had three of the best weeks and only one of the worst weeks. Conversely, December, one of the best months to trade in, had only two of the best weeks. No week in December fell in the "worst" category, however.

#### Days

Which day is the best to buy? Which day is the best to sell? That depends on whether we're talking about days of the week, days of the month, days preceding or following holidays—there are innumerable contexts and implications to consider, all of which have already been carefully studied and scrutinized by Yale and Jeffrey Hirsch.

According to Hirsch, the best day to trade was once the last trading day of the month, followed by the first four trading days of the next month. Front-runners who noticed this trend, however, took advantage of it, leading to a shift in 1982. Since then, the strongest days tend to fall on the ninth, tenth and eleventh trading days of the month.

To the right, you can see what Hirsch's research says are the days of the week when the greatest likelihood that performance will rise in the Dow will occur. Between 2008 and 2014, Mondays have been the weakest, climbing less than 50 percent of the time-the only trading day to fall more than it rises, in fact.

As a special case study, let's focus just on the three days before and after a holiday, specifically Labor Day. Historically, how does the market react to this particular day?

#### **Best Days of the Week**

Likelihood That Day Will Rise From Previous Day Dow Jones Industrial Average, 2008 Through 2014



Source: Stock Trader's Almanac 2014. U.S. Global Investors

The following chart tracks the historical 33-year performance of four major indices three trading days before and after Labor Day. As you can see, investors tend to be bullish on the Friday preceding the weekend (-1) and bearish starting Tuesday, the first trading day of the week (+1). The NASDAQ does slightly better than the other three both before and after the holiday, leading into the rest of September.

#### **3 Days Before and 3 Days After Labor Day**



There's plenty more research on the best days on which to trade—and which to avoid—in The Stock Trader's Almanac.

#### Hours and Half-Hours

Canada is the largest natural resource market in the world. The TSX Venture Exchange, with a market capitalization of over \$37 billion, represents approximately 2,250 small-cap companies, many of them in the mining and metals space.

#### **Intraday Market Performance of the TSX Venture Exchange**

January 2012 to August 2014



Past performance does not guarantee future results. **Source:** Bloomberg, U.S. Global Investors What you see in the previous chart is the intraday market performance of the TSX Venture. I chose it as an illustration because mining, metals and gas are some of our specialties here at U.S. Global Investors. It's imperative that our portfolio management team is cognizant of these exchange-specific intraday trends to buy and sell stock for the best possible price and execution.

With the TSX Venture, it's generally smarter to sell rather than buy in the morning. Over the last two and a half years, this is when prices tend to be high. There's heavy volatility as the market is reacting to what might have happened since the previous trading day's closing bell. Unless you really know what you're doing in this particular market, if you buy in the morning, you can often expect to see your shares sink as the day unfolds.

The "safest" time to buy would be in the late afternoon. The market has cooled somewhat and traders are gauging where things might be headed. The challenge during this time, however, is that volume has dipped and, as a result, bid-ask spreads have widened.

A similar pattern emerges, a little like the shape of a waterslide, if you chart the intraday performance of the Market Vector Junior Gold Miners ETF, which gives investors exposure to small and intermediate gold and silver companies. Prices are highest in the morning, decrease throughout the afternoon and then get a final boost starting around 3:00. Making a trade at 9:30, then, will have a vastly different outcome than making one at 1:30.



#### Intraday Performance of the Market Vectors Junior Gold Miners ETF

Now compare the TSX Venture and Market Vectors Junior Gold Miners ETF (GDXJ), both of are considered volatile, to the NASDAQ 100 ETF—or "the Qs"—which tracks the 100 largest and most active non-financial and international companies listed on the greater NASDAQ. In other words, blue chip stocks.

Past performance does not guarantee future results. **Source:** Bloomberg, U.S. Global Investors

#### Intraday Performance of the NASDAQ 100 ETF (QQQ)





Past performance does not guarantee future results.

**Source:** Bloombera. U.S. Global Investors Over the same timeframe as the previous indices, the pattern here has almost reversed. Relative lows in the morning. Modest improvement throughout the trading day. You could, in this market, reasonably buy in the morning and sell in the afternoon.

Again, these charts are imperfect and show only probability. Trading activity can fluctuate widely, especially prior to and after earnings and economic announcements. And there will always be the unforeseen event—a workers' strike, a CEO's termination or resignation, civil unrest—that shakes up the market.

You don't have to be as obsessed and intuitive with statistics and patterns as Yale or his son Jeffrey Hirsch, but it pays to "Anticipate Before You Participate." Research must be conducted on the market you're planning to trade in before you enter.

# **The New Challenges of Price Discovery**

### Investing in the Age of High-Frequency Trading, Falling Volumes and Widening Bid-Ask Spreads

As investment managers, one of our most important fiduciary responsibilities is buying and selling stocks for the best possible price and execution. We do this by using the statistical strategies I've previously covered, from monitoring short- and long-term cycles; implementing probability models such as standard deviation, mean reversion and oscillators; and identifying the relative valuation of stock with the portfolio manager's cube.

#### If only it were that simple.

In the past few years, price discovery—or the act of finding the "right" price for a security—has become much more challenging because of falling stock volume and widening bid-ask spreads. These challenges are directly attributable to the infiltration of high-frequency traders into the market, not to mention the expansion of dark pools and non-exchange trading.

Simply put, when stock volume is high and transactions increase, the bid-ask spread narrows. Brokers and dealers accordingly price shares to move, and investors have a pretty good estimation of what they're going to spend on a security.

But when there are fewer transactions and volume is down, the bid-ask spread widens. Price discovery, then, becomes difficult because stock valuation has a broader range in which to move. I previously discussed this using the intraday

performances of the TSX Venture and GDXJ as examples: in the afternoon, after volume and activity tend to decrease, spreads widen.



Think of this in terms of real estate. If volume is up and homes are selling rapidly in Neighborhood A, both buyers and sellers have a good idea of what a fair price is, based on the dollar amount of square footage of nearby homes sold within a certain timeframe. Price discovery, therefore, is reasonable.

But if homes in Neighborhood B languish on the market for lengthy periods of time, relative price comparisons begin to dissolve. Who knows what the homes should go for? Closing deals becomes tough because, in such a scenario, a buyer's bid might come in way under what the seller is willing to accept. As a result, the price of homes, even those in adjacent lots, can fluctuate wildly.

#### Volume Drops, Volatility Rises—But Opportunity Remains

To see these concepts in action, look at the chart below. The TSX Venture, which lists about 500 Canadian micro-cap venture companies, has seen a drop in volume of more than 60 percent since mid-2011. This has widened the bid-ask spreads of individual equities in the index—not the index itself—complicating price discovery.





S&P/TSX Venture Composite Index, 8/19/2009 – 8/19/2014

Despite the challenge, we try to take advantage of the volatility that other investors might flee from. Decisions to buy or sell a company are first fundamentally driven, and then trading is based on statistical analysis of fund flows, volatility over different time periods and relative performance to the gold indices we strive to beat.

Our style resembles that of the Navy SEALS, in that we prefer to be nimble, surgical and tactical. During the bear market that ran from mid-2011 until February 2014, we nibbled rather than munched on inexpensive companies that were lagging in relative performance over one day, one month and one quarter. And when these companies showed a surge in price and volume, we often trimmed our holdings rather than sold outright. This incremental "nibbling" strategy is a little like investment reconnaissance, enabling us to test our conviction in a company before taking a weightier position.

Another disruptive factor to price discovery has been the proliferation of exchange-traded funds (ETFs). Accounting for more than 30 percent of trading volume in the markets, some ETFs are influencing the markets they track and impacting their underlying holdings. A study by Goldman Sachs confirmed that ETF trades influence stock prices. The study looked at which individual stocks move more with the dynamics of the ETF than on their own fundamentals and found that those stocks most affected by ETF activity are in the Russell 2000, probably because of their lower levels of liquidity, lower volume and cheap prices.

We've witnessed this same phenomenon with some junior gold stocks in the GDXJ. A gold stock can have a significant price move based not on changes to its fundamentals or a corporate event but rather shifts in sentiment toward gold that is compounded by fund flows. The inclusion or exclusion of a stock in the underlying index can result in a flurry of disruptive trading unrelated to changes in the company's fundamentals.

Just as one man's trash is another man's treasure, one man's fear of volatility is another man's opportunity. Part of successful active management is not getting discouraged, learning to adapt to a changing climate and coming to terms with the market's often erratic behavior.

But the erratic behavior has only ramped up in recent years.

## HFT: Trading at the Speed of Greed

As I said earlier, price discovery has become much more difficult in recent years because of growing high-frequency trading

(HFT), dark pools and non-exchange trading—all of which have changed, perhaps irreversibly so, the formation of capital in the investment industry.

HFT is a controversial practice whereby automated computers using sophisticated algorithms transact orders at lightning-fast speeds. In a process called latency arbitrage, high-speed traders are able to gain access to crucial order information and other market data milliseconds before "normal" or "slow" traders. They manage to do this through a number of means, including setting up their computers as close as possible to stock exchanges and using best-of-the-best fiber optic cables.



Man vs. machine: high-speed computers and sophisticated algorithms have changed the investment business playing field.

After acquiring the information, such traders can get in front of other buyers' purchases and, almost instantaneously, turn around and scalp the shares within less than a blink of an eye. Often gains are less than a penny per share, but because they trade so frequently and rapidly, it's easy to make fast money.

This new form of legalized front-running became the talk of Wall Street after the March 2014 publication of financial writer Michael Lewis's critical book on the matter, Flash Boys: A Wall Street Revolt. In one passage, Lewis deftly re-

#### counts the infamous Flash Crash that occurred at 2:34 on May 6, 2010:

"[F]or no obvious reason, the market fell six hundred points in a few minutes. A few minutes later, like a drunk trying to pretend he hadn't just knocked over the fishbowl and killed the pet goldfish, it bounced right back up to where it was before. If you weren't watching closely you could have missed the entire event... Shares of Procter & Gamble, for instance, traded as low as a penny and as high as \$100,000. Twenty thousand different trades happened at stock prices more than 60 percent removed from the prices of those stocks just moments before."



"All of a sudden the market is all about algos and routers. It's hard to figure this stuff out." *Michael Lewis, from his book Flash Boys* Image source: Tabitha Soren

A spread of \$99,999.99. If that doesn't give a trader pause, I'm not sure what will.

The chart on the next page shows just how dramatically HFT has heightened intraday volatility in the SPDR S&P 500 ETF, the largest and most popular of its kind in the U.S. Up until 2007, daily price changes had a relatively steady heartbeat. But in 2007, when HFT as we know it today emerged, the average intraday volatility more than doubled. In August 2011, the peak volatility climbed to one that was 10 times higher than in 2006.

Lewis's book has created a much-needed awareness of what HFT has brought to the market: disruption, unsettlement and a loss of trust and transparency. Like thieves in the night, high-speed traders can swoop in to a market that you

#### High-Frequency Trading (HFT) Affects the Relative Intraday Volatility of the SPDR S&P 500 ETF

#### January 2005 - August 2012

120 - Thousands of National Best Bid and Offer (NBBO) Price Changes, Daily



Source: Nanex, U.S. Global Investors

created and take advantage of it.

Michael Matousek, head trader at U.S. Global Investors, has experienced this unpredictability firsthand. On numerous occasions he has put in a buy order, based on up-to-the-second liquidity information, but received only a fractional amount.

As for liquidity, Michael says that HFT might increase it, "but when an order is 'sniffed,' [high-frequency traders] cancel. So the perceived liquidity is gone within fractions of a second."

Not only does the liquidity disappear, but because transactions often come with a flat fee, costs increase when orders are only partially filled.

Fellow U.S. Global trader Mike Ellingsen notes how HFT has also affected depth of market, or the measure of the liquidity of open and, I should add, transparent buy and sell orders.

"True depth in the equities market has become hard to gauge," he says. "Trust is key in this entire conversation."

This trust, however, has been tarnished in a system dominated by HFT, which currently accounts for approximately 70 percent of all market activity in the U.S.



U.S. Global Investors traders Michael Matousek (left) and Mike Ellingsen (right).

#### **Trading in the Dark**

So what do you do if you're a large institutional trader who has a million shares to move but doesn't want to be preyed upon by high-speed front-runners? The solution for many is to use not a conventional exchange, where market information is publically shared, but a private exchange. In such exchanges, known as "dark pools," transactions are conducted secretly and anonymously. There is no trading floor, no orders visible to the public and no transparency.

Dark pools aren't anything new; they've been around since at least the 1980s, mostly to reduce market impact and lower transaction costs. But an increasing number of large investors are using these exclusive pipelines to (allegedly)

hide and protect their transactions from high-speed traders. In recent years, non-exchange trading has surged, accounting for close to half of all stock trades today.

The problem, as you might guess, is that stock volume in the U.S. is being usurped from the trading floors and drying up faster than the Aral Sea. Again, when volume drops, bid-ask spreads widen, which complicates price discovery.

According to TabbFORUM, whose Equities LiquidityMatrix<sup>™</sup> consolidates monthly exchange data, industry volume dropped 1 percent in July. That doesn't sound like much, but when you're dealing with more than 5.5 billion shares in the U.S. market alone, a decrease of 1 percent is huge. And every month seems to tell the same story.



Because of the increased use of dark pools, stock volume in the U.S. is drying up like the Aral Sea.

In the last decade and a half, the greatest loss of volume occurred in 2012. The S&P lost 27 percent; the Dow, 28 percent; the NASDAQ, 20 percent; and the Russell 2000, 22 percent. Since 2000, a whopping 70 percent of NASDAQ volume has evaporated.

Two years years ago, a headline for a Bloomberg BusinessWeek article asked: "Where Has All the Stock Trading Gone?"

#### The Case of the Disappearing Stock Volume

As More Large Investors Turn to Dark Pools, Stock Volume in the U.S. Drops



Source: Bloomberg, U.S. Global Investors

The answer: dark pools.

#### Fair Games Call for Fair Rules and Referees

Lewis's book has convinced many in the securities industry that the rulebook has not just been amended but also put through the shredder. Regulators have also taken notice. Back in April 2014, U.S. Attorney General Eric Holder announced that the Justice Department is looking into the legality of HFT. His department is joined by the Federal Bureau of Investigation (FBI), the Commodity Futures Trading Commission (CFTC) and the Securities and Exchange Commission (SEC).

We welcome the regulators to explore ways to manage these issues better and create both a fairer playing field and more transparent trading arena.

It's not just the high-speed traders themselves that need refereeing. The "real black hats," as New York Times financial columnist Andrew Ross Sorkin points out, are the big stock exchanges.

"These exchanges don't just passively allow certain investors to connect to their systems," Sorkin writes. "They have created systems and pricing tiers specifically for high-speed trading. They are charging higher rates for faster speeds and more data for select clients. The more you pay, the faster you trade."

The U.S. has a lot of catching up to do to level the playing field and soften the deleterious effects of predatory trading. Some of the SEC's proposals—registration of all high-frequency traders, an increase in market transparency, among others—are still months and perhaps even years away.



"The exchanges have a financial incentive to create an uneven playing field," Sorkin writes.

Canada, on the other hand, already has many such regulations in place. Germany's High Frequency Trading Act, which became effective in May 2013, mandates that all high-frequency traders apply for a Federal Financial Supervisory Authority license and imposes fees on traders who make "excessive use" of HFT. In Italy, a 0.02 percent tax is levied against all HFT transactions.

However you feel about HFT, you cannot deny that it has greatly affected the investment industry and changed how easily price discovery is conducted and capital is formed. Despite the added challenge, our investment team at U.S. Global Investors continues to believe in and use the time-honored strategies that have served us well in the past.

## Be Nimble, Yet Nibble

So what do we do as active managers? We use statistical models to try and sniff out both value at a reasonable price and accumulate at attractive relative prices, even when there are so many new factors to consider. We remain confident as we adapt to changes in the landscape, taking a nimble approach while nibbling on opportunities we find.

Curious investors recognize that we navigate all of the complexity and intensity of constantly changing landscapes by using patterns in trading, from standard deviation moves to daily patterns to broader, seasonal patterns.

We are confident in our use of these analytical tools to manage expectations, enthusiastic in our approach and optimistic about the future.

Happy investing!



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The S&P 500 Stock Index is a widely recognized capitalization-weighted index of 500 common stock prices in U.S. companies. The ISM manufacturing composite index is a diffusion index calculated from five of the eight sub-components of a monthly survey of purchasing managers at roughly 300 manufacturing firms from 21 industries in all 50 states. The Dow Jones Industrial Average is a price-weighted average of 30 blue chip stocks that are generally leaders in their industry. The MSCI Emerging Markets Index is a free float-adjusted market capitalization index that is designed to measure equity market performance in the global emerging markets. The NYSE Arca Gold BUGS (Basket of Unhedged Gold Stocks) Index (HUI) is a modified equal dollar weighted index of companies involved in gold mining. The HUI Index was designed to provide significant exposure to near term movements in gold prices by including companies that do not hedge their gold production beyond 1.5 years. The Philadelphia Gold and Silver Index (XAU) is a capitalization-weighted index that includes the leading companies involved in the mining of gold and silver. The Russell 1000 Index is a U.S. equity index measuring the performance of the 1,000 largest companies in the Russell 3000 Index. The Russell 2000 Index is a U.S. equity index measuring the performance of the 2,000 smallest companies in the Russell 3000. The Russell 3000 Index consists of the 3,000 largest U.S. companies as determined by total market capitalization. The Nasdaq Composite Index is a capitalization-weighted index of all Nasdaq National Market and SmallCap stocks. The S&P/TSX Venture Composite Index is a broad market indicator for the Canadian venture capital market. The index is market capitalization weighted and, at its inception, included 531 companies. A quarterly revision process is used to remove companies that comprise less than 0.05% of the weight of the index, and add companies whose weight, when included, will be greater than 0.05% of the index. The Market Vectors Junior Gold Miners Index is a market-capitalization-weighted index. It covers the largest and most liquid companies that derive at least 50 percent from gold or silver mining or have properties to do so. The NASDAQ-100 Index includes 100 of the largest domestic and international non-financial securities listed on the Nasdaq Stock Market based on market capitalization. The FTSE Gold Mines Index Series encompasses all gold mining companies that have a sustainable and attributable gold production of at least 300,000 ounces a year, and that derive 75% or more of their revenue from mined gold. The NYSE Arca Gold Miners Index is a modified market capitalization weighted index comprised of publicly traded companies involved primarily in the mining for gold and silver. The index benchmark value was 500.0 at the close of trading on December 20, 2002.

Holdings may change daily. Holdings are reported as of the most recent quarter-end. The following securities mentioned in the whitepaper were held by one or more accounts managed by U.S. Global Investors as of 12/31/2015: Market Vectors Junior Gold Miners ETF, The Procter & Gamble Co., Freeport-McMoRan Inc.

Fund portfolios are actively managed, and holdings may change daily. Holdings are reported as of the most recent quarter-end. Holdings in the funds mentioned as a percentage of net assets as of 6/30/2014: Market Vectors Junior Gold Miners ETF (0.55% in Gold and Precious Metals Fund, 0.55% in World Precious Minerals Fund); SPDR S&P 500 ETF (0.00%); Proctor & Gamble (0.00%); Goldman Sachs Group, Inc. (0.00%); E\*TRADE Financial Corporation (0.00%); Virtu Financial (0.00%); Tesla Motors, Inc. (0.00%); Nasdaq-100 ETF (0.00%); Freeport-McMoRan Copper & Gold, Inc. (0.00%); Silver Wheaton Corp. (1.18% in Gold and Precious Metals Fund, 0.39% in World Precious Minerals Fund).

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Standard deviation is a measure of the dispersion of a set of data from its mean. The more spread apart the data, the higher the deviation. Standard deviation is also known as historical volatility.

