



The Gamma Investment Program

It's All About Risk

Before discussing what the Gamma Investment Program is, let's discuss what it's not. It's not a "get-rich-quick" scheme. It doesn't promise 1,000% returns. It doesn't promise to pick the next Apple or Amazon at \$2 a share (except, perhaps, by accident). Advisors who do are either lying to themselves or to you.

Why? Because beating the market is HARD. Millions of investors spend billions of dollars each year looking for an investing "edge." That ensures that markets are generally "efficient" in the sense that unexploited low-risk profit opportunities are quickly taken advantage of and eliminated.

What does "beating the market" mean? Consider two investment managers. Manager 1 makes an average return of 10% a year but also experiences a 10% loss every 3-4 years. Manager 2 makes the same 10% a year but suffers a 20% loss every 1-2 years. All else equal, which is the better manager? Most people would say Manager 1. Why? Because he makes the same return as Manager 2 but with less risk (a 10% loss every 3-4 years vs a 20% loss every 1-2 years). The reason why risk matters is that Manager 2 is more likely making his 10% average return due to luck rather than skill – and luck runs out.

"Beating the market" means generating a higher, statistically meaningful return relative to a passive benchmark (such as the S&P 500) when risk, transaction costs, and management fees are taken into account. This "higher, statistically meaningful return" is called "alpha." Alpha is the goal, but because markets are generally efficient, it's hard to produce. Extensive research indicates that only a very small percentage of investment managers and advisors statistically outperform passive investing when risk and fees are taken into account. And these are the "best and the brightest" of the investment world.

The implication is that risk matters – a lot. Most investment managers and advisors focus on return. But high returns can be generated with concentrated positions, leverage, and luck. All three inflict serious damage on a portfolio when the market turns against you.

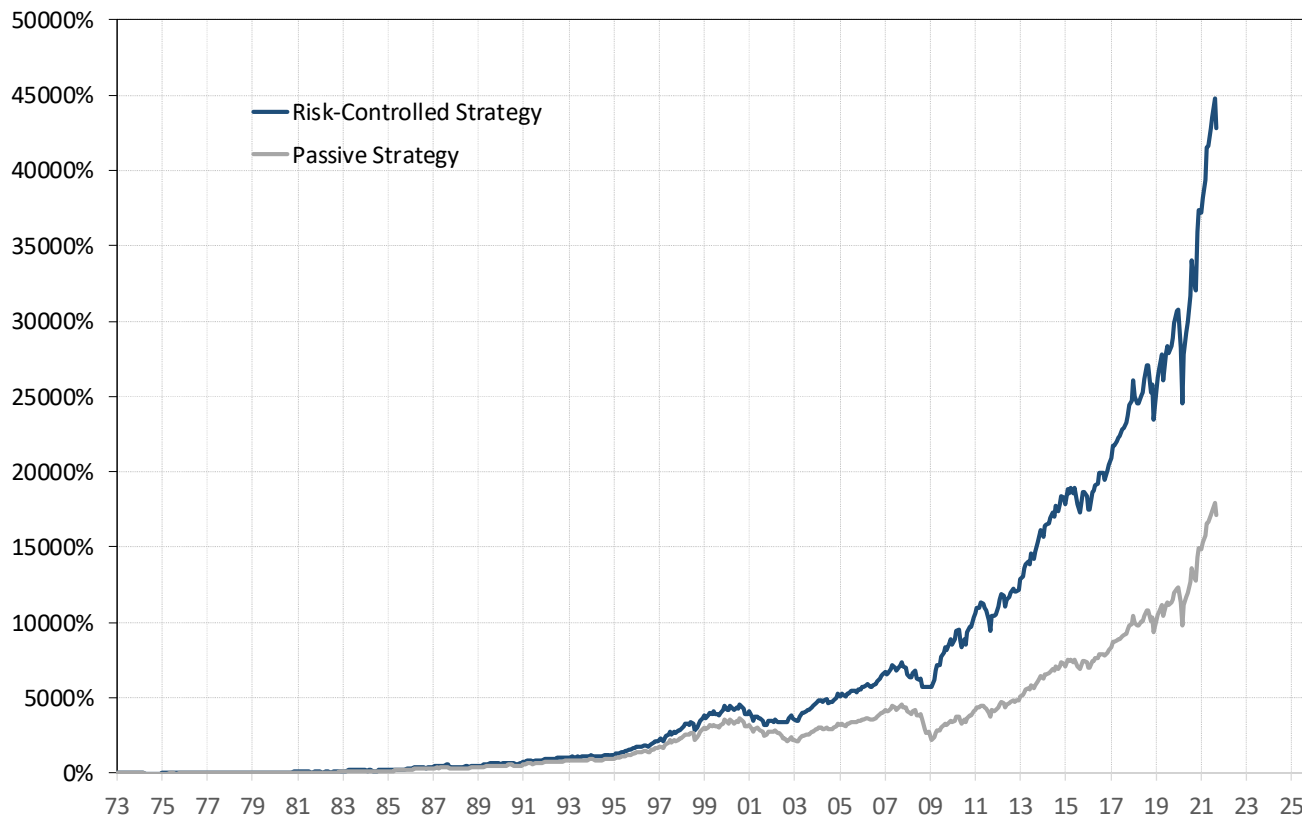
Controlling risk is essential to successful investing for two reasons. First, large losses cost time. Time is the one thing that an investor can't get back, and time is critical to investment success due to compounding. Consider the following table which shows how large a return would need to be made on the remaining capital to get back to a "break-even" after a given loss.

The larger the loss, the greater the gain needed to recover. During the time spent recovering the investment is not compounding new, additional returns. To illustrate this effect the following graph compares the cumulative return of U.S. equities since 1973 (which suffered 45%+ losses in 1974, 2002, and 2009) to a simple active strategy that reduced the 45%+ losses to a maximum of 25%.

Drawdown	% Return Needed to Break Even
-5%	5.3%
-10%	11.1%
-15%	17.6%
-20%	25.0%
-25%	33.3%
-30%	42.9%
-35%	53.8%
-40%	66.7%
-45%	81.8%
-50%	100.0%

By simply reducing the three worst drawdowns of the past 50 years to 25% losses (which for most investors would still be painful), the cumulative compounded return over 47 years would have been 2.5 times higher than the purely passive strategy (which most active managers do not outperform). This 2.5-fold outperformance would have occurred without picking one superior outperforming investment!

Compounded Cumulative Return: Passive vs Risk-Controlled Strategy



The second reason why risk control is so important has to do with emotions and behavioral biases. Numerous studies show that human beings aren't entirely rational when it comes to investing. They're subject to a number of biases that cause them to incorrectly value and time investments. These biases are worsened when losing money. The fear of loss encourages emotional rather than rational thinking which can cause even larger losses and missed opportunities. Avoiding large losses in the first place reduces the risk of irrational decision making.

In addition to helping control market risk, the Gamma program also helps investors avoid indirectly introducing other sources of risk that needlessly reduce returns:

1. **Overtrading.** Short term trading is a highly specialized activity that most nonprofessional investors are rarely successful at when taking into account risk and trading costs. The vast majority of investors are best served by focusing on long-term strategies that emphasize risk control.
2. **Impatience.** True alpha strategies can often take years to prove themselves. Investors should stick to consistent time-proven strategies rather than jumping around between the "latest and greatest."
3. **Simplicity.** Be wary of complex strategies and instruments. There are thousands of factors that potentially drive markets but only a small number have been accurate and reliable over the long

run. Also, options, futures, and swaps have a place in an investment portfolio, but their complexity and potential leverage introduce risk that requires expertise and close monitoring.

4. Diversification. An optimally diversified portfolio of uncorrelated assets can dramatically reduce risk without reducing return. The markets offer diversifying opportunities for free. Use them.

Controlling risk is not “sexy” like picking the next Google, but the Gamma Program understands that it is absolutely essential to investing success.

The Gamma Investment Program

What Is It and How Does it Generate Alpha?

The Gamma Investment Program is a collection of quantitative models and analytical tools for predicting the performance of international stock indexes, bonds, interest rates, exchange rates, and commodities. The Program uses a unique quantitative methodology developed by Mr. Chalupa that has been in use for over thirty years. The Program is based on a key core group of fundamental economic, financial, and behavioral indicators and unique insights into investor behavior that have proven to be highly accurate and consistent in predicting prices.

Why a quantitative approach?

A quantitative strategy makes decisions based on mathematical and statistical analysis of data. The Gamma Program uses quantitative analysis due to certain advantages over more subjective methods:

1. Hypothesis testing. Expressing economic relationships and investment ideas in mathematical terms makes it much easier to test how valid these ideas are over time and under different conditions. It also makes it possible to identify, out of the thousands of factors that affect markets, which have historically been the most accurate and reliable in predicting markets.
2. Handling large data sets. The human mind is well suited for identifying patterns in data, but it is not well suited for analyzing large, complex data sets. The human brain has developed heuristic “rules of thumb” that are useful for “fight-or-flight” decisions but are often useless when faced with complex relationships and huge amounts of data. In contrast, computer algorithms are ideally suited to this type of analysis.
3. Objectivity. Rules and relationships defined by a set of equations can be applied objectively and consistently over time and in different circumstances. This helps remove the negative effect of emotions and other cognitive and behavioral biases on investing decisions.

Why fundamental analysis?

Quantitative analytical techniques are broadly divided into ones that use historical prices (“technical analysis”) and those that use indicators of supply and demand (“fundamental analysis”) to predict prices.

Technical analysis is limited by the fact that that historical prices contain very little information about future prices. Investors constantly analyze thousands of pieces of information in search of a forecasting edge. The end result is an efficient market in the sense that unexploited, low-risk profit opportunities are quickly eliminated. Market efficiency implies that all known publicly available information is quickly built into the market price. It follows then that historical prices should have little or no value for predicting future prices. Since historical prices are available effectively free to everyone, it seems unlikely that historical prices would consistently yield any large undiscovered nuggets of useful information (which tends to be supported by numerous academic studies).

So why is a fundamental data better? After all, many academics make the same argument about economic data as they do about historical prices. The same millions of investors looking for an edge are presumably looking at economic data too, not just historical prices. Shouldn’t that fundamental data also be incorporated into the market price and thus have little or no predictive value? The definitive answer is “maybe.”

Fundamental data differs from historical data in one important respect: it costs a lot more in several ways. A basic database of timely economic and financial data can cost tens of thousands of dollars a year. And the more useful the data, the higher the price. A database covering in-depth company information and more exotic data such as credit default swaps and high frequency data can run hundreds of thousands of dollars a year. For large institutional investors that cost may not be prohibitive, but it is for most individual investors and even many moderate size institutions. As a result, many investors only get pertinent information hours, days, or even weeks after it's released. Page | 5

Getting the data, however, is not the only issue. The bigger question is what to do with it? Markets are complex discounting machines that process and incorporate huge amounts of information. But what information is relevant? How do you know it's relevant? How do the data series interact with each other? Over what time horizon? Our experience is that most nonprofessional investors do not have the time, inclination, or expertise to develop investment strategies that are likely to outperform passive approaches.

That is precisely why fundamental data has value. Its cost ensures that new information is only gradually rather than instantaneously incorporated into the market price. The Gamma Program is designed to quickly access new, relevant information, analyze the information better and faster, and generate useful forecasts that aim to generate meaningful alpha.

Behavioral Bias, Market Phases, and Alpha Generation

The use of fundamental data gives the Gamma Program a forecasting edge compared to many other investment strategies. It is not, however, the Program's primary and most important edge.

Over the last few years, a new study of markets has emerged called behavioral finance. Traditional finance assumes that investors are always rational, that is they behave purposefully to maximize their wealth through the complete, correct, and unbiased discounting of all relevant information. In contrast, a growing number of academic studies highlight cases where prices deviate from their theoretically rational levels more than can be explained by traditional finance.

Behavioral finance suggests that there are psychological and sociological limits to rational behavior. Among these are:

1. Conservatism bias: the failure to rationally update expectations based on new information.
2. Confirmation bias: rejection of new information that conflicts with prior beliefs.
3. Anchoring and adjustment bias: the failure to rationally update expectations due to attachment to an arbitrary initial price.
4. Self-attribution bias: unjustified confidence in one's ability to forecast. A common example of this is emphasizing past winning trades while downplaying losing trades.
5. Hindsight bias: past events are often viewed as more predictable than they actually were. As a result, rules and expectations derived from historical analysis are held too inflexibly.
6. Anchoring to stories: human thinking is generally not quantitative. A story or narrative is often more compelling than the rational analysis of a security.
7. Extrapolation bias: the belief that recent events will persist even in the absence of economically significant news.

8. Small sample bias: the formation of irrationally strong beliefs based on statistically insignificant data sets.
9. Failure to learn: repeating the same mistakes and relying on heuristic “rules of thumb” that cause errors to persist.
10. Herding: the formation of expectations based on the actions of other investors rather than independent analysis of information. Herding behavior slows the diffusion of information which can cause nonrandom persistence in price movements.

These (irrational) behavior patterns imply that that markets may offer exploitable profit opportunities. On the other hand, numerous academic studies also show that markets tend to be efficient, a point that is reinforced by the small number of investment managers that outperform the market over time. So what’s really going on? Is generating alpha a realistic goal or not?

The market price at any time is the collective result of the interaction of rational actors (that correctly discount all relevant information) with the irrational, noneconomic behavior of other investors. There may be times when a market is dominated by rational investors and other times when it’s driven by irrational behavior. For example, the great manias such as the Dutch Tulip Mania, the South Sea Bubble, and the Dot-Com craze are cited by the behavioral finance proponents as examples of extreme irrational behavior. The problem, of course, is that it’s one thing to point out when a market WAS irrational. It’s another to predict when it will be irrational again. Timing is everything.

And this where the Gamma Investment Program “edge” comes into play. The Gamma Program uses a methodology that identifies whether rational or irrational behavior is dominant at a given time and predicts how the forces change over time. This allows the selection of investment strategies that are optimal for that environment.

The Gamma Program has identified three “phases” or “states” that broadly describe a market’s character at any point in time:

1. Rational. The market price trades at a level consistent with the correct, rational discounting of all relevant information. Prices in this phase tend to respond predictably and proportionally to changes in economic fundamentals. Opportunities to generate alpha in a rationally-priced market are limited. Passive strategies (e.g. buying and holding the S&P 500) and security specific strategies (i.e. stock picking) are likely to outperform active directional macro bets.
2. Irrational. These are periods in which price strongly diverges from its rational “fair value” level due to behavioral biases that are often caused or reinforced by extreme expansions or contractions of liquidity (money, credit) or leverage. The irrational phase is characterized by sustained directional movements (“the trend is your friend”) that can drive the price far from its fair value level. These are the markets that are best suited for judicious use of leverage and directional macro bets.
3. Hyperrational. Hyperrational markets occur at the tail end of irrational phases when sentiment has not yet changed but the original factors that triggered the mania are beginning to wane. Hyperrational markets can be very volatile because the extreme valuation makes prices disproportionately sensitive to even small changes in fundamentals. Perversely, the safest AND most profitable trades are on the opposite side of the mania. Hyperrational markets can offer huge alpha opportunities. The problem is that few investors are psychologically suited to exploit them because they invariably involve going against an entrenched trend. How many investors were short the NASDAQ in August 2000 or loaded up on stocks in February 2009?

These states apply to multiple time horizons. For example, the short-term environment may be priced hyperrationally cheap, the intermediate might be rationally priced, and the long-term environment could be irrationally expensive. Markets are constantly transitioning from one state to another as new information arrives. The observed market price is simply the net result of the interaction of all of these states.

Tying it All Together

The Gamma Program's alpha "edge" is its ability to identify the dominant state and apply those indicators that have historically been most accurate in predicting prices in that environment. In addition, the Program is extremely effective in adjusting the weight assigned to these indicators as the market environment cycles through the rational – irrational – hyperrational phases.

The biggest challenge to accurate forecasting is that the relationship between predictive factors such as interest rates and corporate earnings varies depending on the phase that the market is in. For example, in a rational market a 1% drop in corporate earnings might cause a 1% drop in a stock price. In a hyperrational overvalued market, that same 1% drop in earnings might trigger a 10% drop in price. In mathematical jargon, the relationship between factors and price is not always "linear" (proportional). The problem is that mathematical solutions to this problem often produce forecasting models that work well in one environment only to blow up completely in another. Our research has developed an algorithm that overcomes this instability in a way that sharply improves forecast accuracy compared to conventional forecasting approaches.

The Gamma Program uses a unique set of "nonlinear" equations that dynamically adjust the importance of the different forecasting indicators based on the phase that the market is in. This ensures that the model generates the highest risk-adjusted expected return forecasts regardless of phase. Most investment strategies are limited to one style such as technical vs fundamental, value vs momentum, trend-following vs countertrend, etc. The Gamma Program, in contrast, dynamically adjusts so that the strategy in use is optimal for the type of environment that the market is in. It is not limited to one investment style because no one style is appropriate for every market environment.

It is our belief that the Gamma Program comes closest to modelling the dynamics of how actual markets work compared to the hundreds of other models and approaches that we've analyzed over the last 30 years. The rational/irrational/hyperrational concept provides a compelling explanation of the apparent contradiction between evidence supporting efficient markets and behavioral bias. We believe that our analytical framework combined with the Program's ability to adjust strategies dynamically has resulted in one of the best alpha-generating strategies available.