

# IN OR OUT?

IS IT **CRAZY** TO BE IN THIS  
MARKET?

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AN IDEAL CAPITAL INVESTMENTS WHITEPAPER

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As of January 2018 there are increasingly vocal concerns about the levels of numerous markets, both domestic and international- stocks, bonds, real estate. There appears to be extended bull markets in everything and worry is rising. Often cited sources of worry are the CAPE ratio for equities, cap rates for real estate, and the central banks artificially propping up asset prices with an inevitable unwinding coming. Added to these are the very potent, current geopolitical realities. These overvaluation concerns are legitimate points, yet they are all “whats” and do little in the way of addressing the real conundrum that always dictates this discussion- the “whens”. Perhaps most important and problematic, is that the way which most of these worries are expressed, either openly advocating or subtly implying an “in-or-out” mentality. History, however, does not support an in-or-out strategy as being a successful one.

At bottom what is being described is our human penchant for market timing. Many, if not most, investors seem to have concluded that market timing is unfruitful. Yet it is unrelentingly seductive, especially to smart people.

The discussion in this essay will focus on two specific U.S. markets: public equities and private commercial real estate. The main question to be addressed: With varying indicators saying these markets are expensive and pundits publicly worrying, is it time to be “out”?

### **Is it time to time the market because this time is different?**

The first issue at hand is the all-or-nothing approach that is espoused by much of the talk of corrections and crashes. Within those conversations what receives little attention is the truth that you are always “in” something when investing. To be out of one thing, means to be in another.

We need to answer this question: Is it wise to liquidate to cash, hit the sideline, and sit out the market when you think it's expensive? This is what being “out” typically suggests. If you really knew that a crash was coming, isn't that what you'd want to do? A basic element of successful investing is choosing exposure to things that will do well and avoiding exposure to those that won't. Here's the issue: a crash *is* coming, with 100% certainty. Not just a correction, but a crash. Yet something that no expert, algorithm, or indicator can reliably tell us is its arrival date, and that piece of information makes all the difference. Given this reality, we have no choice but to think in probabilities.

### **What happens in Vegas doesn't stay in Vegas**

Let's take a quick flight of fancy together to a place in the desert where people travel thousands of miles to do mathematically unintelligent things, a place where probabilities reign. As a shrewd investor you wouldn't consider this a strategic destination for making a good return on your money, but let's indulge in this imaginary trip and say that you're here with a substantial portion of your net worth in chips and must decide on which game to play them. Scanning the floor, the roulette wheel is settled upon.

Roulette is a bad investment-as are just about all casino games- because the odds (on an American wheel) are 37:1 against landing on a single number while the payout is only 35:1. Because of this, over time, the house is guaranteed to make money and continuous playing is a losing proposition for the bettor. The so called “house edge” in roulette (which is a less disturbing name for the player's expected

loss) is 5.26%. In other words, every player at that roulette wheel mathematically deserves to lose \$5.26 for every \$100 they bet, over time. This is the unpleasant probability every player accepts, knowingly or not.

Now, this is a make-believe scenario. What real-world investor would seriously view the arrangement that roulette offers as an investment, let alone one deserving a meaningful amount of their net worth? Well... it seems quite a few might, based on behavior in more “sophisticated” markets.

In commercial real estate the odds are 10:1 against a negative return year occurring (based on the 1984-2016 NCREIF returns) and the payout (the average negative return of down years) for the investor who is short is 1.0872:1. You have a situation where the reward of 8.72%, on average, is not enough to cover a single year of the annual opportunity cost, on average, of a positive 11.11% return. At least in roulette you can afford to lose on 34 turns before a payout no longer represents a gain. <sup>[1]</sup>

For the S&P 500, looking at the period 1928-2016, the odds are 2.71:1 against a down year (a 26.9% chance of a negative return year) and the payout is 1.1369:1. Here the odds look better, yet the cost of playing this game is even uglier than in the commercial RE market. The reward of 13.69%, on average, for successfully sitting out a bad year covers even less of the opportunity cost of a single positive year’s return, on average, of 20.68%.

House Edge <sup>[2]</sup> (player expected loss) for:

**Keno:** 25%-29%

**Blackjack:** 0.28%

**Slot Machines:** 2%-15%

**Roulette** (American wheel, double zero): 5.26%

**Commercial RE short:** 9.21%

**S&P 500 short:** 11.52%

The take away for those tempted to be timers in the public equities and private commercial RE markets is that you need to know within two years of when the negative returns will materialize or you’re worse off being “out”. In these markets, down years are neither frequent enough nor severe enough, on average, to warrant playing this game very much. In fact, our imprudent roulette wheel “investor” should expect to fare better than the scared market timer.

## Why does Market timing remain so enticing despite the ugly math?

Market timing's use (closet or otherwise) persists as a misapplication of our strong loss aversion and of graphs like this:



As of 6/30/17

Source: Robert Shiller dataset

We understand fairly well that most investors have a greater desire to avoid losses than they do to make gains. Within this psychological framework, the drops on the backside of the little mountains in this graphs water our dormant seeds of fear. The perversity lies not in the presence of the fear or the loss aversion bias, but that the action it stimulates in most investors that's meant to avoid losses is what creates them.

Let's dig into the above chart a bit and examine one of the most influential timing indicators and most cited sources of worry for the public equity market, the CAPE ratio (cyclically adjusted price to earnings ratio). To begin, let's first see how its co-creator describes it.

Robert Shiller Explains How To Use CAPE

<https://eur03.safelinks.protection.outlook.com/?url=http%3A%2F%2Fwww.businessinsider.com%2Frobert-shiller-explains-how-to-use-cape-2013-11&data=02%7C01%7Cgregpicone%40hotmail.com%7C2f184b79222c43bc4a8708d5258cb123%7C84df9e7fe9f640afb435aaaaaaaaaaaa%7C1%7C0%7C636456208549858419&sdata=KiRB2ScWbYMTvHnPP7nQq%2B74v7or14NnTegoWwPTBZA%3D&reserved=0>

“John Campbell, who's now a professor at Harvard, and I presented our findings first to the Federal Reserve Board in 1996, and we had a regression, showing how the P/E ratio predicts returns. And we had

scatter diagrams, showing 10-year subsequent returns against the CAPE, what we call the cyclically adjusted price earnings ratio. And that had a pretty good fit. So I think the bottom line that we were giving – and maybe we didn't stress or emphasize it enough – was that it's continual. It's not a timing mechanism, it doesn't tell you – and I had the same mistake in my mind, to some extent — wait until it goes all the way down to a P/E of 7, or something.”

It's clear that Robert Shiller didn't intend to create a timing measure. Nevertheless, a well-worn timing indicator it has become. The above historical charting of the measure presents a powerful image, one from which drawing market timing conclusions is almost inevitable.

What would be the effectiveness of using it to avoid those steep line graph cliffs? Quite good. Employing an in/out strategy based on the CAPE, specifically getting out of the market (into cash) when the CAPE hit 2 standard deviations above its average and buying back in when it fell below its average starting from 1871 to October 2017 (1,750 months) you would have looked like a market magician, getting out in August 1928, avoiding most of the Great Crash. You would have hit the sideline again in June 1997 and have masterfully dodged the dot com crash. You would have gotten back in during January of 2008 and avoided most of the housing spurred crash of 2007. All-in-all you would have turned \$1 invested at the beginning into \$129,708.09.

How about the other guy, the guy who just did nothing and absorbed the crashes? Let's say he was in a coma for 146 years. The \$1 belonging to that poor sucker turned into \$345,122.47. Let's be clear, his dollar saw CAPEs as high as mid 40's. It saw irrational buying based on nothing but the hopefulness of a greater fool. It suffered through multiple bouts of reckless selling and a protracted, generation-altering Great Depression.

When we possess the opinion that the market is overvalued, what action should that opinion be expressed through? Said differently, if you think the market is expensive and the idea is to be “out” than what are you going to be “in”? The two most common “in” choices in this in/out scenario are cash and treasuries.

Hold on to your seat and fight the urge to tune out: The historical data tell us the hard to hear story that, over time, crash is better than cash. That is truly an intellectually offensive statement, but highly defensible. Let's begin by defining “over time”. Shown below are the summary statistics of 5, 7, and 10 year forward annualized returns in the S&P 500 for every month going back to February 1871 through October 2017.

## S&P 500 Annualized Returns

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	5 Year	7 Year	10 Year
<b># of Months</b>	1703	1679	1643
<b>Avg.</b>	9.31%	9.21%	9.16%
<b>Median</b>	9.29%	8.71%	8.45%
<b>Worst</b>	-17.31%	-6.18%	-4.02%
<b>Best</b>	33.66%	25.57%	21.17%
<b>% Negative</b>	10.86%	3.69%	3.10%

Source : Ideal Capital Investments Research

We'll consider the return to cash as 0% (although it can be less than 0% when there's inflation, and there usually is). The review of the data shows us that the investor whom doesn't need liquidity for five years and could be invested for that time frame but instead expresses an opinion of the market's expensiveness by moving to cash over that period has about an 11% chance of that being a winning action. An investor with a 7-year horizon is trying to thread the needle with a 3.69% chance of cash being the better choice. Said in another way, on a randomly chosen month over the last 140 years the 7-year investor faced a 96.3% chance they'd fare worse in cash.

The obvious critique to a randomly chosen month is that it wouldn't be randomly chosen; it would be intentionally picked based on a signal that informed the worried investor about the market's expensiveness. This would be a fair rebuttal. Let's use the CAPE ratio again as that signal, which seems logical given its popularity plus the fact that it's accepted as being a decent predictor of future returns, something we're specifically looking at here.

## S&P 500 Annualized Returns

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### 7 Year (after high CAPE triggered exit)

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<b># of Months</b>	56
<b>Avg.</b>	2.18%
<b>Median</b>	2.28%
<b>Worst</b>	-3.49%
<b>Best</b>	5.61%
<b>% Negative</b>	8.93%

Source : Ideal Capital Investments Research

In this case, the 7-year future results for the investor who moved to cash at a time when the CAPE ratio was at or above 30.19 (2 standard deviations more than its average) had an 8.93% chance of their money doing better under the mattress than in the market (or alternatively, a 91.07% chance of being worse off in cash) despite picking their exit time at very high CAPE ratios. What this does tell us, however, is that these very high CAPE ratios portend reduced (but still positive) returns ahead for the overall equities market and although moving into cash is still not a winning strategy at these times, allocating to uncorrelated assets with expected returns above say, 6%, could be, however.

## What Can We Learn From History?

The CFA Institute Research Foundation recently published a work entitled *Financial Market History, Reflections On The Past For Investors Today* which examines bubbles in stock markets around the world over the last 115 years. In this work, a bubble is defined as a boom followed by a crash. They define a boom in two ways: (1) a single year in which a market's value (or cumulative return) increased by at least 100%, and (2) a period of three years over which the market increased by 100%. A crash is also defined in two ways: (1) a drop of at least 50% in the following year, and (2) a drop of at least 50% over the next five years. Summing up their findings:

- **Intuitively, the probability of a crash is greater after a boom, but is still rare.** A rapid boom (within 1 years' time) is not a strong indicator of a bust; probabilities move from 2% of a market halving unconditionally to 4% following a boom at the one-year horizon (1 year after the doubling) and from 6% to 15% at the five-year horizon.
- **The likelihood of *another* doubling is about twice that of a halving.** From the point above, after a boom the probability of a crash is 4% one year later and 15% five years later. However, the probability of another 100% increase one year later is 8% and 26% five years later.
- **A 100% increase that takes 3 years has less favorable probabilities (compared to a single year boom) but a crash is still a longshot.** A more slowly developing boom taking 3 years to rack up a double (more analogous to what we're experiencing today), has a lower chance of doubling again at both the one and five-year time horizons but a crash is still a low probability (about 5% chance of a crash one year after the doubling and 10% five years later).
- **Economists tend to focus on a handful of well-known booms that have become most memorable, yet there are numerous others.** Those booms that did not bust are just as important a part of financial history as those which did and including them presents a more complete picture. The data provide insight into the rarity of bubbles, showing that the overwhelming proportion of price increases in global markets were not followed by crashes.

That publication defined a boom as a 100% increase. As of the 4<sup>th</sup> quarter 2017, the previous three years (Q4 2014 through Q3 2017) have produced a total S&P 500 increase of 36.07%.

## Buying Insurance

If attempts at timing the market are motivated by a defensive mindset seeking protection from a crash or major correction, then given the above realizations of how costly it is to exit the market, perhaps a smarter form of protection could come in the form of buying insurance or otherwise hedging against the drivers of the correction.

Here, the general thought is that the cost of the “insurance” protection would need to be less than the estimated cost of exiting the market altogether. From the menu of possible insurance schemes, put options are the most straightforward. Their main problem, however, is decay of value with the passage of time. The purchaser makes time their enemy, just as the investor who takes the extreme position of abandoning the market does. Whereas for the owner of a reasonably attractive security/asset/market, time is friend not foe.

An insurance strategy stands to make the most sense for index investors as they lack the ability to make value-based judgments on individual companies (selling appreciated holdings and avoiding the most overvalued businesses) and that type of investor is in mind here. Historical return data on the S&P back to the Great Depression tells us that the vast bulk of down years have a magnitude of a 14% loss or less. Therefore, an intelligent strategy might be to put off the first 15% of losses and retain deeper loss risk (much less likely).<sup>[3]</sup> This would entail purchasing a put option on the index at the current pricing and simultaneously selling another put option at a level 15% below current pricing, leaving the investor with the risk of decline greater than 15%. The sold put option would generate cash which would reduce the cost of buying the more expensive option. Here again, though, we need to think in probabilities to determine what is a fair price for the protection- protection that is decaying with the passage of time and would need to be continually repurchased upon expiration.

Concerning insurance costs, some insights from Warren Buffet: “At bottom, a **sound insurance operation needs to adhere to four disciplines**. It must (1) understand all exposures that might cause a policy to incur losses; (2) conservatively assess the likelihood of any exposure actually causing a loss and the probable cost if it does; (3) set a premium that, on average, will deliver a profit after both prospective loss costs and operating expenses are covered; and (4) be willing to walk away if the appropriate premium can’t be obtained.” These same disciplines, with slight adjustment, are equally applicable to a *buyer* of insurance and are instructive for this idea of purchasing insurance for a stock market downturn. The four disciplines again, with the adjustments: **(1) understand all exposures that might cause a policy (the stock market) to incur losses;** This is the heart of the issue. For the overall stock market, this knowledge is incredibly elusive. Further, and more importantly, unlike a property insurance exposure where a bad event like a fire, car accident, or hurricane, equals a loss almost simultaneous with the event, a market valuation red flag does not reliably usher in a loss: a stretched P/E ratio or a bloated federal reserve balance sheet might be legitimate causes for concern but don’t provide you with insight into when you should be concerned exactly. **(2) conservatively assess the likelihood of any exposure actually causing a loss and the probable cost if it does;** The probabilities we can derive from long periods of history tell us the likelihood of a loss and the probable magnitude when it does happen. Neither of these are supportive of jumping in and out of the market under hazy (at best)

estimates of “when”; **(3) set a premium that, on average, will deliver a profit after both prospective loss costs and operating expenses are covered;** This is the main obstacle to the purchaser of this type of insurance. The cost of the insurance usually exceeds the expected benefit, and, on average, the buyer should expect a worse result than simply absorbing the market losses that will come from time to time; **and (4) be willing to walk away if the appropriate premium can’t be obtained."** Self-explanatory.

Similar to the plight of the roulette player, generally the expected return for the purchaser of insurance, over time, is a negative one relative to remaining in the market “unprotected”.<sup>[4]</sup>

## **Confessions of a value investor: The Anti-Value Trap**

The philosophy we use to manage investments is based on an asset’s value. It’s this intrinsic value that gives meaning to price - according to our philosophy. As a value investor it’s tempting to shun markets when prices start to rise, dismissing things as expensive. Usually this is true, but not always. A value trap is defined as a situation where an asset’s price drops and looks cheap but, in reality, its value has also dropped, perhaps more than its price. What I’m calling an anti-value trap is the opposite, whereby both value and price rise. Some value investors may have a wholesale dislike for rising prices and ignore the (albeit less likely) possibility that something is not overpriced despite the rise. Perhaps the best illustration of this in the equities markets is persistently low interest rates. The hard to swallow truth is that low rates equal higher valuations. This seesaw with discount rates on one seat and values on the opposite is hard to escape.

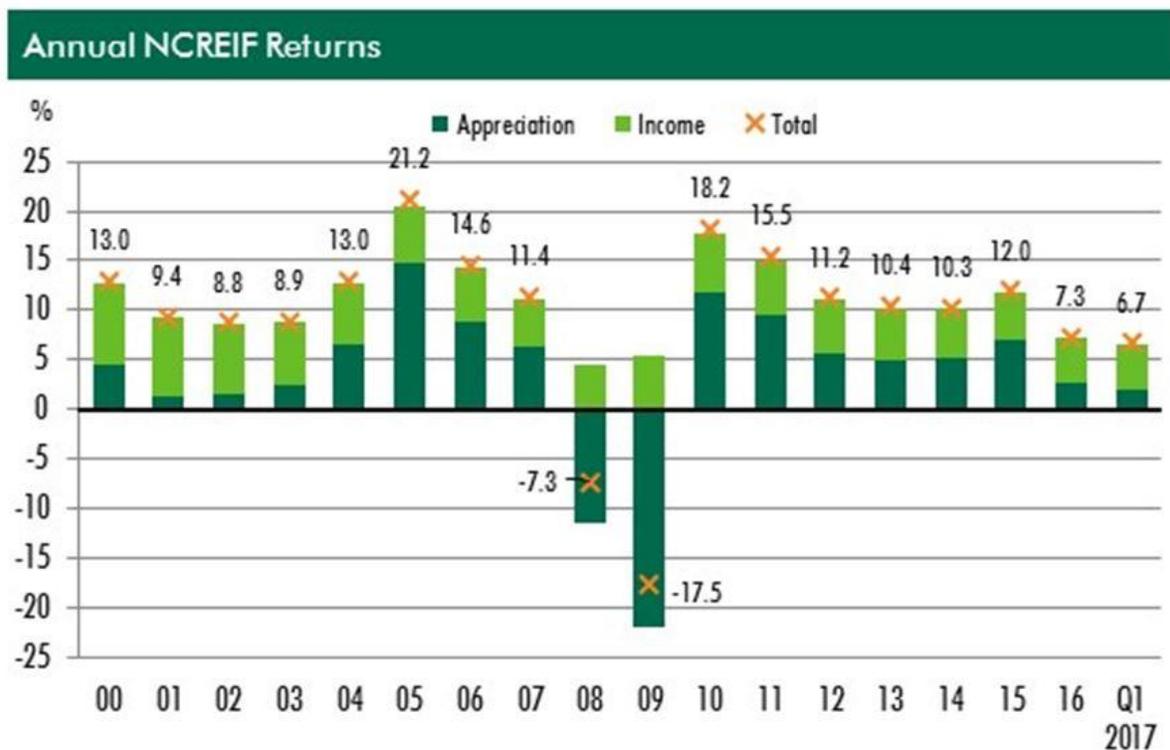
In the commercial RE market this has taken form in fundamental changes that have led to continued rent growth despite supply additions. If you were looking only at the supply side of the equation for apartments, for instance, which in many locations are above historic levels, you may have (incorrectly) chosen to be “out” of the market.

In both cases there are foundational reasons that must be factored into valuation models and, reluctantly, can lead to justified higher prices.

Value investors sometimes consider themselves at a disadvantage when markets are rising because we get priced out of investments. This, again, is usually correct, however, if you are knowingly handicapped on the upside (believing that the market will outperform you when sentiment is zealous) than you must be planning to make it up on the downside because, if not, and you’re handicapped on both the upside and downside, you’re just simply handicapped- a hopeless underperformer. Expecting poorer results than an index during times of growth means that you’re taking a defensive position that is penalizing you. The expectation of that defensive position to reward you in times of negative index returns is problematic first because negative index returns (S&P 500 1928- 2016) happen only about 27% of the time. Second because an account’s relative underperformance during positive index years (again, the index has been positive 73% of the time historically) compound as more years go by, requiring an ever-larger negative index year (that you successfully avoid) to wash away the previous underperformance. In other words, an account that underperforms its index by 5% each year over 3 years requires a down

year in the 4<sup>th</sup> year whereby the index loses 13.6% <sup>[5]</sup> (and the account does 0%, thereby outperforming by the full 13.6%) in order to make the 4-year period a breakeven with the index. There's only about a 10% chance of a correction of that magnitude happening. <sup>[6]</sup> This means that since it's very difficult to know when to move fully out of the market based on an expectation of a market correction, the most logical approach would be to maintain participation in the market as most of the time it will be positive and, most importantly, truly be greedy after a correction has created strong values. The purchase of those well-chosen, discounted names during the hard times will pave the way for outperforming when the tide rises.

This idea is applicable to commercial real estate. Looking at NCREIF returns from 2000-Q1 2017 (below) the same dynamic emerges that only in a small minority of the time are returns negative and the longer someone sits on the sideline during positive returns in anticipation of a negative return, the greater the negative return they successfully avoid must actually be to compensate them for the lost positive returns.



Source: CBRE Research, NCREIF, Q1 2016. The most recent data represents the year ending Q1 2017.

Naturally, the larger the negative return requirement becomes, the less likely it is to happen, making the probability higher that timing the market and sitting it out is a losing proposition. Judicious continual participation is the most probable win. Additionally, a benefit in the RE market is the ability to pick and

choose geographies, each which carries its own supply/demand picture. Also, as shown in the graph above, the few down years are negative *appreciation* years, not income, and the income return from most commercial RE is a terrific consolation during those times. On this last point, important to note is that it's generally optional to realize the negative appreciation in those times (with the exception of a loan maturity combined with inability to refinance or some other forced sale condition).

I said earlier that smart people feel a stronger temptation and are more susceptible to market timing. I'll refine that statement to include two groups of investors who are most at risk: those who know nothing and those who know everything. The know-nothing group is understandable, but the highly educated "smart" group? Most people want to use the assets that they possess to the fullest. Rarely, especially in highly competitive industries, will you find a business that prefers to let a competitive advantage lie dormant. This is a problem in the business of investing: Intelligence is simultaneously an asset and a liability. It is certainly a source of competitive edge in investing, however, it is distinct from rationality and can become the trojan horse by which irrationality finds its way into the fortress. The data show us that occasionally it's most profitable to flip the adage and "Don't just do something, sit there". Making more decision increases the likelihood of making more errors. An interesting illustration of that point comes from the medical field. A John Hopkins research paper pegs medical mistakes as the number 3 cause of death in the U.S. and the author cites the increased amount of "stuff" (diagnoses and treatments) that doctors do now relative to the past as the main reason. <sup>[7]</sup> The clear analogy here is that a market timing decision is likely an unnecessary investment decision and one that carries difficult odds against success. Knowing what will happen is very different from knowing when. Foreseeing a market correction is a distant matter from profitably exploiting one.

## In Practice

We can all agree with 100% certainty that there will be a market correction, regardless of what particular market we're talking about. What is far less certain and agreeable is when, and that, of course, is the key information that is needed but cannot be known. It is tempting at various times, in various markets, based on various metrics to feel a high degree of confidence about the when, yet history shows that the only times acting on this temptation doesn't look like a fool's errand in hindsight is when a great deal of luck was involved. What, then, is an investor to do during times when the market appears rich to them? Should they ignore what they consider to be warning signs?

One course of action is to abandon the market. This is an extreme measure and I've shown above why the expected return to this decision is worse over time than absorbing market corrections.

The course of action that most likely results in the best returns over time is to remain an investor during these periods, yet with an increased measure of "fear". Warren Buffett tells us to "be fearful when others are greedy and greedy when others are fearful". This advice and his personal example shows that this is a dial, not a switch, and involves degrees of caution ranging from "fearful" to "greedy". Investors

should consider a market's realities (the metrics they use to inform their opinions of valuation) and turn up or down their defensiveness dial. However, because it's not given to man to know with any useful amount of certainty when a market will do something, that dial should not have a "full exit" setting.

Some practical way for investors to adjust that dial:

For the retail/passive investor.

Slowly buying the market over time, dollar cost averaging, is one of the best methods of reducing exposure to a market correction. If an investor who is already doing this finds themselves concerned about the overall market's valuation, they can consider the following:

- Take inventory of emotions, if a 50% decline did happen would you become a panicked seller? If yes, consider taking some gains off the table and leave an amount invested that you can be emotionally detached from then resume your incremental buying program.
- With the cash freed up from the above, consider other assets classes with low correlation to what you sold. Holding money that is not needed for 5+ years in cash is ill advised.
- The passive investor buying the index won't be able to selectively sell individual companies they feel have reached or exceed intrinsic value as a way of reducing exposure. Yet, if the money they have invested in the index is considered to be long-term in nature, probability tells us that the winningest bet is to stay the course and continue dollar cost averaging into the index. However, when the investor can't shake their worry about the market level, a compromise would be to take out their last year's gains from the market. This would essentially convert compound into simple interest. The new cash position, if it was part of the long-term bucket would then ideally be invested into an asset that provides good purchasing power growth and low correlation.

For Professional/Active investors.

- Within the long-term bucket, cash is not something to hold much of other than in transition to new investments, a sort of "attack capital". If individual securities are being chosen, then there should be a reasonable prospect of deploying cash in new ideas. If not, then either the index should be purchased, or the capital should flow into another market that shares the characteristics described above of 1) a high probability of increasing purchasing power over time and 2) attractively low correlation with the market that is considered overvalued and therefore generating the cash.

Concerning asset allocation: How much should you have in equities how much in bonds? Cash? Real Estate? Enter subjectivity. Unfortunately, the most dazzlingly elegant and precise rebalancing tool won't provide the answer. It depends on two things 1) the investor's liquidity needs and 2) their definition of risk.

- Regarding liquidity needs. My position is that 100% of capital you don't need sooner than 5 years should be invested in assets that adequately grow purchasing power. You only accept the risk of losing or stalling purchasing power when you require liquidity. This leads to two general buckets for allocation: short term and long term. The short-term bucket should be filled with an amount that will be needed within the next 3 years. Its contents include cash and well-chosen bonds that are intended to be held until maturity with durations matched to the investor's liquidity needs. The long-term bucket contains equities and private real estate investments. These are two assets with attractively low correlations to each other and the sales of holdings in one can potentially be redeployed in the other as available.
- Pertaining to the investor's definition of risk. Regardless if an investor has very little liquidity need, if they perceive volatility in asset prices as risk, they will be emotionally uncomfortable holding all of their long-term capital in equities. This is a very real emotional barrier and should not be underestimated because it can lead to selling at a bad time and result in permanent loss of purchasing power. The suggestion that this bucket be shared with private commercial real estate alleviates this concern, but nonetheless, this reality may make it necessary to incorporate bonds into the long-term bucket.

When pundits and news headlines touting favorite overall market metrics stoke fear, the mathematical reality is that it would be better, much better, for your financial health to buy a plane ticket to Vegas and pull up to a blackjack table than to try to time a market correction.

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Notes:

[1] There are, of course, imperfections with this analogy, the most important being that unlike a game of chance there is information flow (market data on supply/demand) that participants in the commercial RE market may believe gives them reason to think that a negative year is more likely than not) Another meaningful point is that, assuming that RE gains are reinvested in that market (and the appreciation portion of returns most likely will be by virtue of holding) compounding affects the size of the benefit from avoiding a down year. For example, the average gain of 11% compounded over 10 years equals 2.83 and it could be argued that at that point the person who has experienced those gains and avoids the average 8.72% loss would actually avoid a  $2.83 \times 8.72\%$  loss or a 24.75% loss. Even still that equates to a little more than a 2-year tolerance for being out of the market before the gains you'd miss will cost you more than the correction you successfully avoid.

[2] The calculation for house edge, or the expected value of a game over time, is: [winning payout x probability of winning] – [cost to play x probability of losing]. For example, assuming the following: the payout for correctly avoiding a market crash is 30%, the cost of sitting out is 10%, the probability for a crash is 1/9 and the probability of earning the average return being in the market is 8/9, then the “house edge” against sitting out is:  $.3(1/9) - .1(8/9) = -.056$ .

The house edge analogy in markets like stocks or real estate requires some modification. The first modification to the analogy allows for the fact that sitting out most likely incurs compounded, not simple costs, this is especially true in real estate where transactions are less frequent and costlier than the stock market. The second modification recognizes that there are cues, albeit deceptively difficult to intercept and successfully use, that may narrow the time frame for when the crash will take place. The first modification takes into account a compounded cost of sitting out over a set number of years. For instance, if the average return of the market (and therefore the cost of being out of the market) is 10% as above and you use a 3-year span as the period for sitting out, then the cost to play would be  $[1.10^3]-1$  or .331. The second modification can increase the probability of being right and successfully shorting the market.

House Edge (player expected loss) for:

**Commercial RE short** (sideline):  $.0872(1/11) - .11(10/11) = 9.21\%$

**S&P 500 short** (sideline):  $.136(24/89) - .208(65/89) = 11.52\%$

[3] Since 1928 the chance of a single year decline in the S&P 500 of 9% or more was 14.6%. The chance of a 14% decline or more was 7.9%

[4] For instance, to execute this strategy in October 2017 would have involved buying a put “at-the-money” (which was \$257.71 at the time) expiring in slightly more than 2 years and costing \$21.47, then selling a put 15% below that level generating \$10.83 income for a net cost of \$10.64 per contract. The expected benefit (probability of a 15% or smaller loss multiplied by the average loss amount if it were to happen) was 1.57% to the buyer of this insurance. However, the cost of this insurance was 1.92% resulting in an expected result of negative 0.35%.

[5] The calculation is  $1.05(1.05)(1.05)(x) = 1$ , where 1 is the breakeven

[6] The probability of a downturn and its severity is arguably affected by the current fundamentals and even length and magnitude of the preceding bull market, but this is the relative frequency overall.

[7] For those interested in more on this, listen to the Freakonomics podcast entitled “Bad Medicine Part 3”.