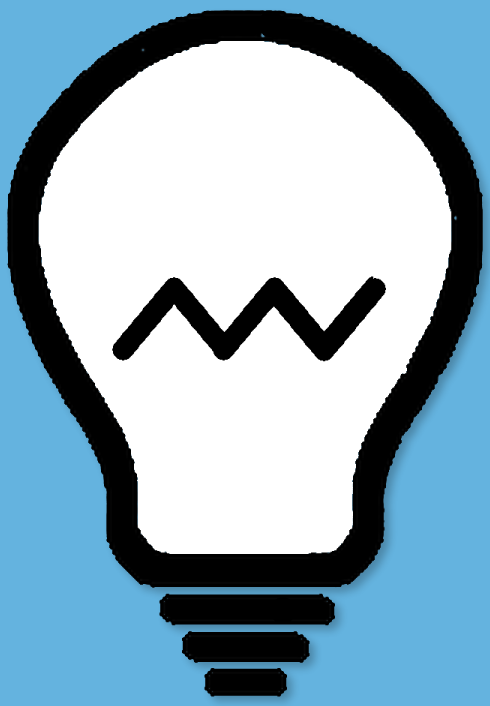


Lume

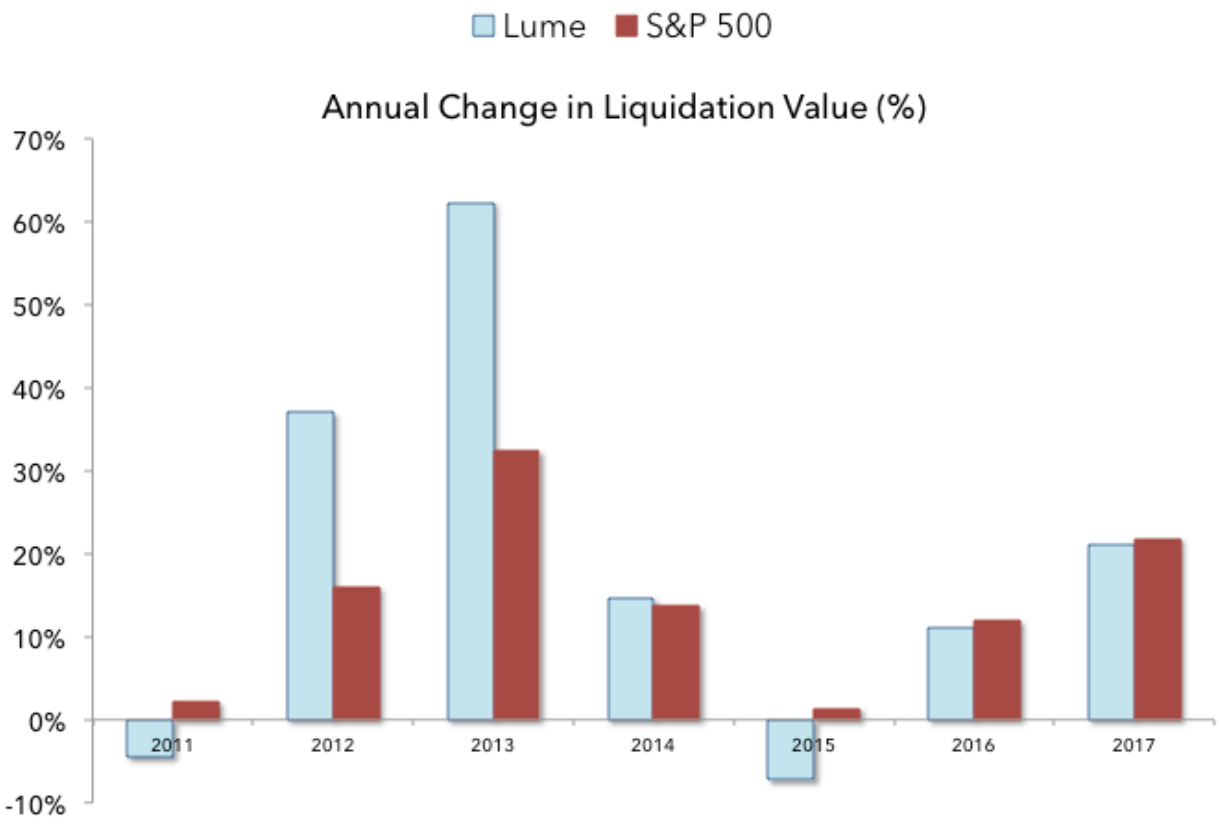
Group

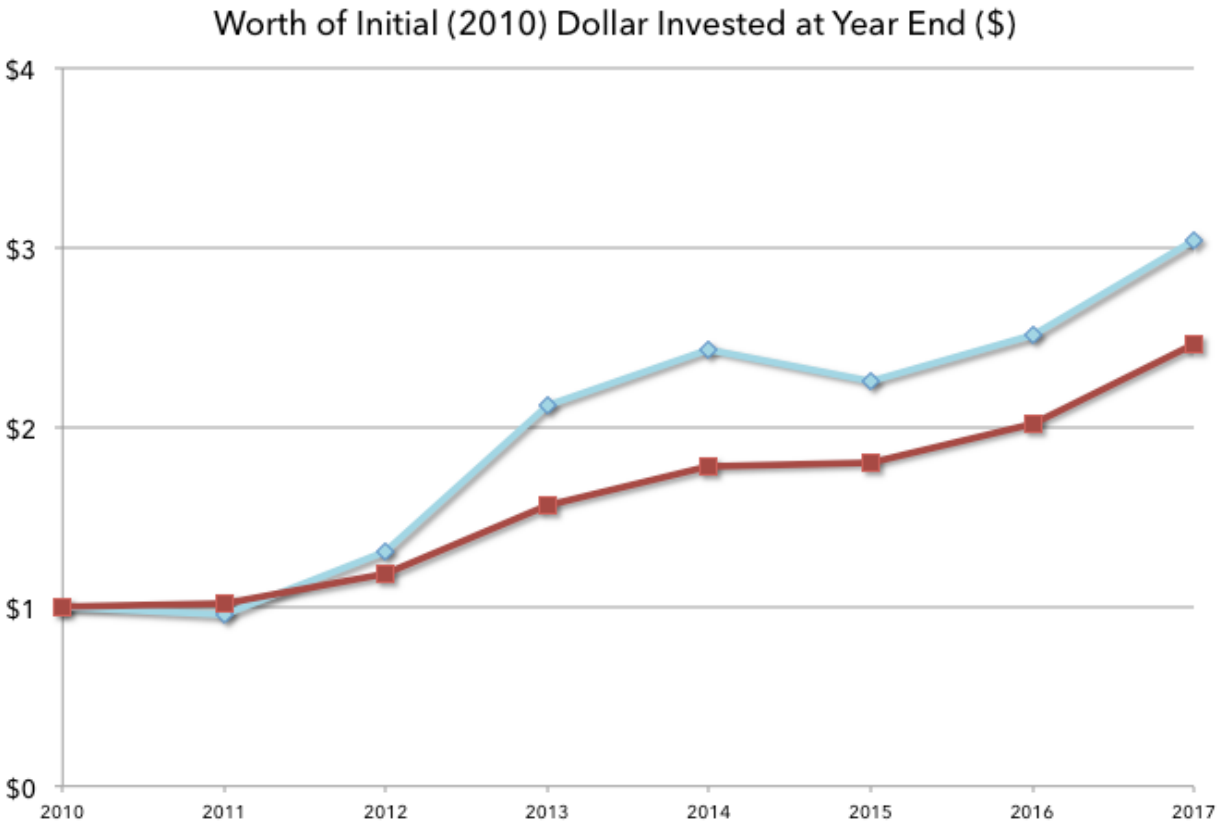
2017 Annual Report

“Get what you can, and what you get hold;

'Tis the stone that will turn all your lead into gold.”

- Ben Franklin





(Excludes effect of taxes. Excludes fees of hypothetical S&P 500 index fund investment)

Lume's net liquidation value rose 21.0% in 2017, compared with 21.8% for the S&P 500.

Three dollars and four cents – that's how much a single dollar invested in Lume at the end of 2010 would be worth at the end of 2017. So, we have tripled the value of dollars under our management over seven years–a CAGR of 17.2% over this time period. We continue to marvel at this phenomenon of first order exponential growth – or "compounding". It is the force that washes away our many errors, provided we continue to avoid larger, more mortal wounds.

Now, one can surely observe that the S&P 500 has lagged not too far behind our own performance over this time, as recent years have been of remarkable rise for U.S. equities in general. We believe that the true test of our investment aptitude will come in not-so-fortuitous (or even *down*) markets for equities. That will be a testament to whether we have truly mitigated the downside with our approach. A revelation of whether we possess any true talent over the market as a whole. When that test comes is anyone's guess (and there is no shortage of guessers).

We can try to pontificate on the macro picture, on markets, interest rates, and such-forth, but we prefer not to waste our time, let alone yours. We will make one observation however: that no matter what the situation of markets or the broader economy, there will always be pundits and forecasters ready to satisfy the needs of those seeking soothsayers.

Our "Philosopher's Stone"

Regardless of what talking heads may think of future investment prospects, we employ a form of Benjamin Franklin's Philosopher's Stone referenced on the front of this report. We work tirelessly to hold (as they

say "HODL") what we've got. Our alchemy is to protect on the downside—that is, seek investment prospects which appear cheap relative to our estimate of future owner earnings. If we cannot find enough of such opportunities, we do nothing but let our pile of dry powder grow (in fact, consistently accumulating dry powder by living a life of relative frugality is really what Ben was getting after).

How to find such investments—large future cash flows relative to the current market price of a business—that's the tricky part. Underpinning this inherently imprecise estimate are the strengths of an enterprise. In other words, many "soft" business attributes which are highly subjective and susceptible to speculation. There are lots of murky odds and probabilities involved in estimating future cash flows—odds and probabilities which must be frequently updated.

Bayesian Inference is the formal name of this process. To learn from the world and update our beliefs ("**prior probabilities**" or simply "priors") as we process new information. We are wary of dogma, or those who do not change their priors in the face of new evidence, as well as those who begin with undesirable priors set to zero. Attempting to be mutually exclusive and collectively exhaustive (MECE) when forming potential outcomes is our aim—the former to simplify analysis and the latter to ensure we account for all possible outcomes.

Often, the problem can be condensed into a few or even just two of MECE outcomes:

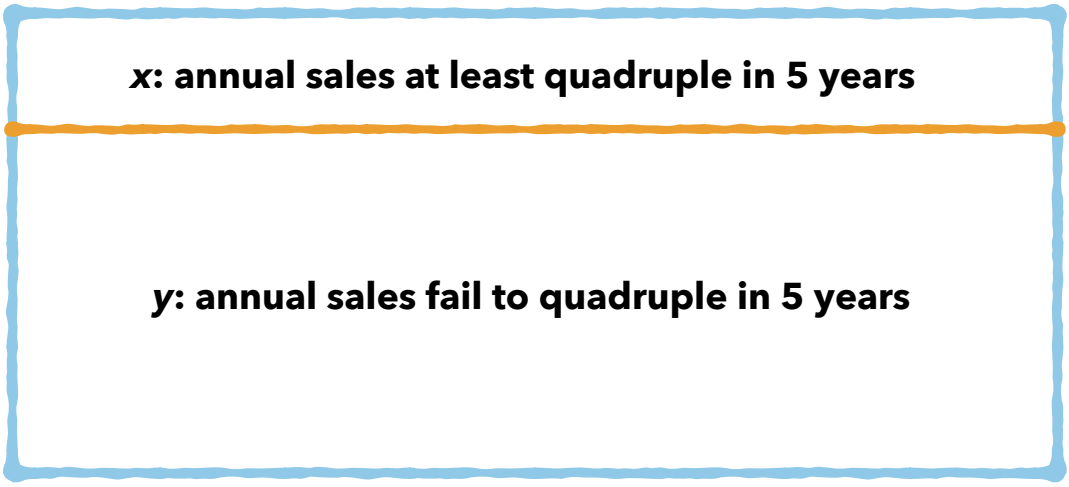
x: investment "success"
y: investment "failure"

Where "success" is meeting a goal set by the individual investor—is it continued return on equity of 20% or more for a set number of years? Is it an earnings per share (EPS) CAGR of 10% or more per year for the next 10 years? Is it the company hitting management's sales or profit targets

by a certain year? Failure (the *y* variable) then becomes anything *other* than achieving this threshold. What these variables are set to is up to what the investor deems critical their investment success. We'll run through an example to review math behind Bayesian Inference.

Assume a hypothetical early-stage restaurant chain with $350M in annual sales growing revenue by 35% per year with a possible long projected runway. The firm does not have much in terms of number of restaurant units at this early stage, so it continues to grow sales by adding new units at about 35% per year. The current share price of the firm vastly underprices future growth and many current concerns (same store sales growth, wage inflation, etc) have weighed on the stock price. If the company can continue at current growth rate for the next 5 years or so, it will more than quadruple its sales to $1.4B (compounding is a wonderful thing). If that occurs, the stock is significantly undervalued today. But that's an if. As time progresses, how will you assess whether whether the business is humming appropriately towards this milestone or if the wheels are coming off the wagon? We divide possible long term outcomes into two MECE scenarios *x* and *y*:

Representation of Two MECE Outcomes



These two rectangular areas *x* and *y* represent your prior probabilities about the business succeeding or failing in the future. These are the only two possible outcomes (collectively exhaustive), so their probabilities (p(*x*) and p(*y*)) must sum to 1 (or 100%) which is represented by the outer (blue) rectangle. How does one estimate these?

You express some conservatism and realize that very few chains will achieve the rapid growth and massive unit base of popular chains like Chipotle Mexican Grill or Starbucks. Where there is one wild success in the industry, there are many, many failures. Expecting 35% per annum growth for 5 years, even for your popular, rapidly growing chain is still pretty optimistic. And in fact, the odds of a *randomly selected* nascent restaurant chain with $350M in sales quadrupling in 5 years is probably less than 1:10; however, based on your subjective assessment of this business which includes management's own projections, you believe this chain is not just *any* chain. In other words, this business was not "randomly selected" by you, but picked based on its strong fundamentals that make it more likely to grow at this rate for 5 years.

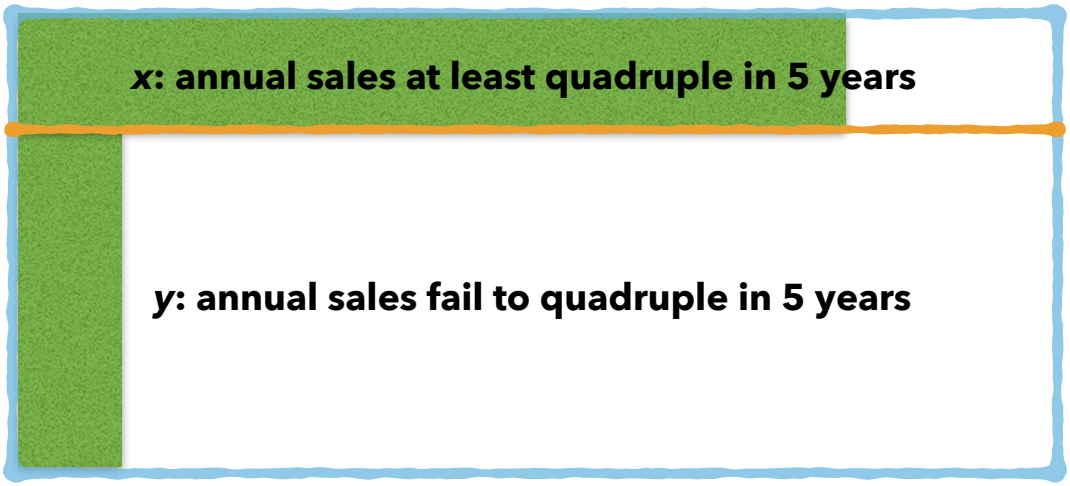
Now, we should note that surely sales exceeding a predefined 5 year target will not by itself guarantee investment success, but in this scenario, it is the key part of your own investment thesis on this business: your analysis indicates that if this threshold is met, today's stock price would be seen as extremely undervalued in hindsight.

You assign what you deem to be a conservative value of 1:3 of odds (our **prior odds ratio**) of *x* to *y* (that is, p(*y*) the probability of failing to quadruple sales in 5 years is thrice that of success, or 75%). That 1:3 you came up with is resembled by the orange line in the figure above that divides *x* into an area one third the size of *y* (or 25% of the area of the outer blue rectangle). Based on your current guess, 5 years from now, the odds that this business lands in space *x* or *y* is equivalent to randomly throwing a dart at this blue rectangle representing all possible outcomes.

So, you task yourself with doing hypothesis testing going forward. Where does that orange line move as the quarters and years go along? Does it move up or down? How do you adjust your prior beliefs in the face of new data? Say that in year one, the company achieves not 35% sales growth, but 40% with unchanged future prospects: that orange line should be moved down and area *x* should grow while area *y* shrinks. Your prior odds ratio is adjusted in that situation.

How does new information mathematically affect these prior odds—whether your restaurant chain ends up in group *x* versus *y*? Say this chain has just succeeded in expanding its units with a viable presence in all major U.S. regions (ie. Northeast, Midwest, South, West). How do your prior beliefs change in light of this new milestone? In researching restaurant chains with about $350M sales in the past ten years, of those that subsequently quadrupled sales in 5 years or less (group *x* types), you find that 80% had presence in all major regions of the United States. Of those unable to quadruple sales in 5 years or less from $350M (group *y* types), you find that only 10% had outposts in all major regions. This is represented by the shaded green areas in the figure below (80% of *x* is shaded while only 10% of *y* is). From this you calculate a **likelihood ratio** of 80:10 or 8:1 in terms of green coverage in each *x* and *y*.

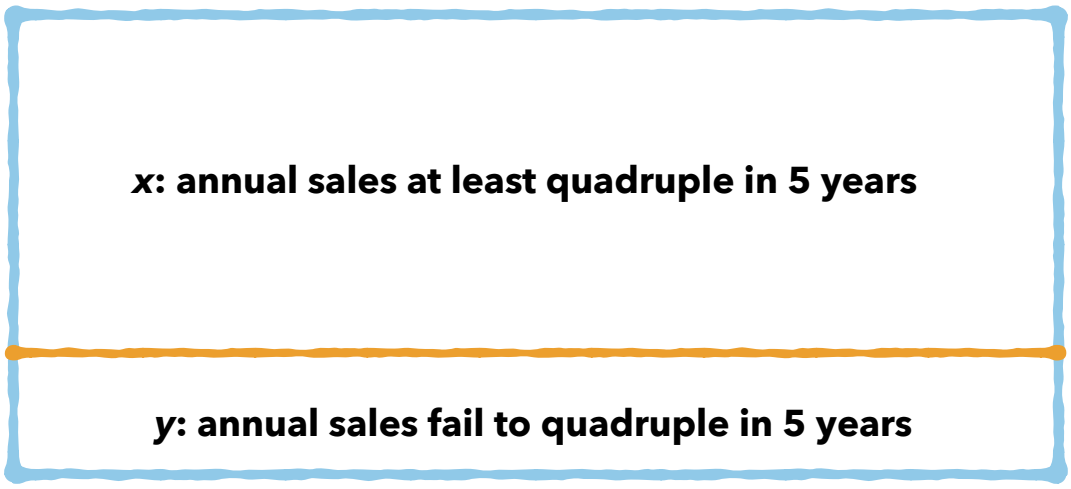
Incorporating Likelihood (Green Areas)



Suddenly, factoring in this new information—that your restaurant belongs in one of the green areas (not white), boosts the overall probability of your restaurant ending up in *x* versus *y* and gives you a new estimate (or "**posterior odds ratio**"): prior odds of 1:3 are multiplied by likelihood odds of 8:1 for a result of 8:3 posterior odds that your restaurant is a member of group *x* versus *y*. Another way to observe this is that the total area that is green is distributed in an 8:3 ratio in *x*:*y*. The posterior probability adjusts our hypothesis given the new information (here, on our restaurant establishing a presence in all major U.S. regions).

Now, we practice an iterative process called Bayesian Inference and set that posterior odds ratio as our new, **updated prior odds ratio**. So now, that orange line must be moved accordingly to account for our new prior odds ratio of 8:3:

Updated Priors



Our orange line has dramatically moved down and now the area represented by *x* greatly exceeds that represented by *y*. And so, incorporating the information that our restaurant has demonstrated success in diverse geographical regions has greatly increased the odds that the company will be able to quadruple sales in 5 years based on past

performance of other chains. We can now take our new prior odds of 8:3 and incorporate new information as it arrives by applying further likelihood ratios, perpetually iterating the updating of our priors.

The above process involved lots of numbers that creates an illusion of precision. Rest assured that this is a mirage. Just as our starting odds of 1:3 for *x*:*y* (**base rates** of 25% and 75%) were plucked from thin air, the absolute numbers are often not what really matter. Furthermore, who's to say that the investment outcome will be unsatisfactory if the company falls slightly short of quadrupling sales (to $1.4 Billion) in 5 years? Say there are $1.2 or $1.3 Billion of sales at the target date—this may by itself provide exceptional investment returns. There is room here to create a third scenario and add complexity to the model—say one that projects $1 to $1.4 Billion in sales. But often, this added complexity is unnecessary. What's far more important is the practice of accounting for all possible outcomes, robust hypothesis testing, and the frequent adjustment of prior beliefs which ultimately protects against dogmatic thinking.

The final prior odds of 8:3 represents the answer to the following question: in a restaurant chain with $350M annual sales and a presence in all major U.S. regions, what are the odds (based partly on historical peer performance and partly on your initial subjective guess) that the business will be able to at least quadruple its sales in 5 years? Those 8:3 prior odds are a guide, but certainly can't be held as sacrosanct in predicting the future as the ratio is derived from your own opinions as well as historical samples (and past performance surely does not guarantee future results). In an extreme case, consider that the entire restaurant industry might undergo some seismic change (such as the changes currently afoot in the retail industry triggered by the likes of Amazon), and so utilizing past data to form likelihood functions will not yield a realistic projection of the future. Also, some likelihood functions might seem impactful but in actuality may provide no real insight, often due to insufficient sample size. For example, many wildly successful American fast food chains started in Southern California. Using this observation to

form likelihood may lead one to conclude that chains started outside of SoCal are less likely to succeed on the same scale. In actuality, this phenomenon may just be the result of some strange coincidence (clustering illusion), or perhaps SoCal really does have some innate characteristics that select for future national chain success stories…

Nonetheless, in an age where an investor is inundated with a constant stream of new information, this process can help sift out signal from noise. What an investor really ought to be after is information that can *significantly* alter one's prior beliefs—or, data that possesses a likelihood ratio significantly less than or greater than 1:1 (or simply, 1). If a certain new piece of information offers a likelihood ratio close to 1, that information should be ignored as it minimally alters prior beliefs. So, while many investors may be hammering shares in your investment of the restaurant chain facing a slight decline in same store sales (SSS), it's important to determine whether that information has real impact as to whether a company will end up in group *x* or group *y* (ie. is a slight decline of same store sales in nascent chains a differentiator in the ability to subsequently quadruple sales or is it mostly growth in unit count that matters? Does SSS decline matter in small chains with already sky high per-unit sales and therefore units which are operating at or near capacity? Does SSS decline mean as much in a persistently low inflation environment?). Routinely, market participants overestimate the impact of certain pieces of information while underestimating others and this is often where major investment edge can be found.

Though we attempt to clearly lay out the process of Bayesian Inference above, its actual implementation is hardly straightforward. And we'd be kidding you and ourselves if we didn't acknowledge that we are far from perfect in hypothesis testing and updating priors. We can only dream of being as precise as we are in the hypothetical example above. We actually expect imprecision and many mistakes; however, this process is expected to at least reduce the magnitude of our errors as opposed to if we stubbornly adhered to our original investment theses. We mainly

use the example above to highlight the mathematics underlying the process, but acknowledge that its real world implementation is hardly precise and quite murky. Amos Tversky and Daniel Kahneman have shown that humans make lousy Bayesian thinkers, so this author's mere aim is to be *slightly better* than lousy (we like low hurdles).

Above all, we strive to always ask: what would cause my hypothesis to be terribly wrong? What would the world have to reveal to negatively affect my prior beliefs in a significant way? We are out searching for that which may destroy us. This is, in effect, a form of inversion—which is a way of thinking often highlighted by Charles Munger: "All I want to know is where I'm going to die so I'll never go there".

Great Expectations

GE and IBM are two companies in which each respective management team recently set easily testable targets for investors (if only we had engaged in hypothesis testing with our foray in IBM years ago). $20 operating EPS by 2015 was proclaimed for IBM and $2 EPS by 2018 for GE. Here, the variables *x* and *y* can be set towards EPS achieving or exceeding these targets versus not. The prior odds of hitting these targets can be updated as one gets closer to the target year. The priors should have clearly become more and more unfavorable as IBM and GE reported results in the years up to target dates despite persistent management optimism. In both IBM's and GE's case, there was ample time to update priors before the writing was on the wall.

In IBM's case, declining revenue would have yielded a likelihood function highly unfavorable to IBM achieving $20 operating EPS in 2015. To the market's credit (and our own folly), this was recognized and resulted in a relatively flat to declining stock price performance in IBM. Despite this unfavorable likelihood function, we persisted for years only to exit with slight profit as we mentioned in last year's letter.

In GE's case, the decline in its stock price began mid-2017, less than a year before its make-or-break year of 2018. Based solely on 2016's annual performance ($1.25 in EPS), it should have been clear that achieving *sustainable* $2 EPS just two years off that base is extremely unlikely (EPS growth of over 25% per year) as this is an already large business involved in long established industries of energy generation and aviation (as opposed to more briskly growing software or technology). This would yield an unfavorable likelihood function to decimate prior odds of GE successfully growing its EPS to $2.

Again, this approach is rarely precise and cannot be used in all scenarios, but in situations where management sets clear performance targets, it can be a robust way to assess whether the odds of success are growing or receding. It is worth noting that Bayesian Inference is pretty much useless in protecting against occurrences such as black swan events: unpredictable events that massively impact prior beliefs across the board (again, the retail industry is an example). It surely is no silver bullet to investing.

Nonetheless, this process forms a significant chunk of our Philosopher's Stone—that legendary item that can transform unremarkable base metals into gold. Its robustness depends on our ability to accurately assess the prospects of our investments and continually adjust our beliefs in the face of new, impactful information. We will do so while assess our investments over forward looking "long term" horizons: 5 years at a minimum, 10 years ideally. Ironically, we find it is much more difficult to invest based on what will happen next quarter versus 5 years from now.

2017: A Look Back

Nintendo: The Walt Disney of Gaming

We bought Nintendo's ADR shares in mid January of 2017 after witnessing its Switch and Legend of Zelda presentation that month. To us, the Switch seemed a very impressive, novel idea for a video game console. However, there were many articles in gaming publications as well as wider news media anticipating a likely failure for the Switch. For one, the console seemed to many to be in a similar vein to the preceding Wii U console (which was a dramatic failure). Others fixated on the fact that the Switch was incredibly underpowered (in terms of processor speed, graphics power, etc) compared to the two dominant players in the arena: the recent Sony Playstation and Microsoft Xbox iterations. Finally, it was lamented that Nintendo, by offering something new (portable gaming) risked *cannibalizing* its successful handheld 3DS product line.

Having been an avid gamer (Nintendo and Sega) in childhood, this author believed these arguments reeked of nonsense. For starters, our feelings towards cannibalization come from Steve Jobs: "If you don't cannibalize yourself, someone else will". We remember the days when analysts lamented the impending cannibalization of the iPod product line by the new iPhone product line Apple was launching—as if this was somehow something to fear for investors in the company (the iPhone was responsible for catapulting Apple to become the world's most valuable publicly traded company—a crown that still adorns it).

Here, the Switch seemed to offer something compelling—something this writer would have loved as a child—the ability to bring his console games on car trips, to shopping malls while mom shopped, to the dentist's office, and a whole host of other places that used to deprive you of your games. So what if you no longer played the Gameboy because you could bring your Super Nintendo on the road as a handheld? So

what if no one really buys iPods anymore because the iPhone has supplanted it? Is Apple really worse off?

Meanwhile, everyone limited the console gaming market to that of Xbox and Playstation—two consoles that mainly cater to "hardcore" type of gamers. Translation: predominantly males in their 20s and 30s. These are the gamers who care most about high level graphics on first person shooters, sports games, 4K resolution, and other stats driven attributes. These are gamers for whom gaming is a lifestyle. This author sees Nintendo's addressable market as actually significantly larger (though also *inclusive* of these hardcore gamers).

We see the potential of Nintendo: not to create the most graphics intensive (or time intensive) games, but to create the most *fun* games. Games you play (perhaps more casually) with family and friends. Games that don't necessarily occupy too much of your life. The Mario Kart, Super Smash Bros, Mario Party titles are examples of *fun* games. The Mario, Zelda, and Pokemon franchises (among others) have incredible staying power, transcending demographics (age, gender) and generations. And Nintendo, as a result, does not need to compete with Microsoft or Sony: younger children, older adults, girls, and women are much more likely to play Nintendo games versus those on Microsoft or Sony consoles. And, as for the hardcore gamer demographic, this group buys Nintendo as well. And that's another major point: while most gamers own *either* an Xbox or a Playstation, a Switch (as well as 3DS) is bought *in addition* to those consoles for access to Nintendo's proprietary franchises. Sony and Microsoft are direct competitors (with largely overlapping titles), while Nintendo is off playing a different game altogether.

A whole letter can be written on the value of Nintendo's franchises (Mario, Zelda, Pokemon, etc) which transcend generations, and like superhero movies, can be "rebooted" every decade or so. The similarity with Disney franchises is there, but with perhaps more ability to renew (and branch out) each franchise over time.

After our Nintendo holdings more than doubled in slightly over a year, we have liquidated our position as of writing. This writer continues to have high expectations for Nintendo and looks forward to owning more games on the Switch.

Jones Soda: Sugary Badness

Jones Soda seemed to be an attractive turnaround prospect with zero net debt and a wide distribution chain and store shelf space to capitalize on. The stock seemed cheap too. While the economics of the beverage industry can be *very* attractive, we unfortunately no longer see such advantages for Jones to justify continued investment. We liquidated our relatively small position for about a 20% loss last year.

Rubicon Project: Caesar's Hail Mary/Our Only HODL

If history were rewritten so that Julius Caesar's experience with this name matched ours, the 13th Legion's fate (and that of Rome's) would have turned out remarkably different.

This is what happens when a company has high margins and cash generation but the industry it operates in suddenly becomes commoditized—the moat (and any pricing power), it turns out, was but a mirage. It seems that Rubicon has at the very least accepted this truth and is attempting to take the Amazon route to commoditized businesses: as a high volume, low cost provider. We hope for their success as we continue to HODL. Given the net cash position on the balance sheet and the significantly reduced prices of shares (and so the small size of our position due to our bearing large losses), we have no problem viewing this investment as little different than a call option at this point.

Prosperity Bancshares & Cullen Frost: Banking in Shale Country

Banks—firms that borrow short and lend long—have been in a zombie state with record low interest rates. Net interest margin and return on equity have been depressed across the board. So, the banks with the most efficiency (lowest costs) and those that earn fee revenue are deemed the strongest. These two Texas banks seemed similarly strong and to possess regional moats. Their shares sold off heavily following the collapse in oil prices. The banks operated primarily in bread and butter Texas banking which we did not foresee bearing much of the fallout from shale's crash. The two investments returned over 50% return in little over the year in which they were held and subsequently liquidated.

Conclusion

We strive to hold what we've got. This approach is of frugality in life and conservatism in investing. Our approach may not reflect that of other market participants, but we believe it will outperform the average over long stretches of time. As for 2018, we continue on our hunt for knowledge in the hopes of improving our process, thereby growing the transformative strength of our own Philosopher's Stone.

Signed,

P. Dalal