BROWN SUGAR

BENIGN NEGLECT; ENERGY POLICY CRASHES THE GRID; AND – BERKSHIRE: CHARLIE IS MY DARLING

2021 LETTER TO CLIENTS

February 22, 2022

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Gulf Coast crude ship bound for oil fields
Sold in the market down in New Orleans
Oil refiner know he's doin' all right
Hear him crack the petrol just around midnight
Brown Sugar, how come you frack so good?
Brown Sugar, just like the carbon should, oh no
Coal runnin' cold, kerosene runs hot
European Greens wonderin' when it's gonna stop
LNG guys know they are doin' all right
Compressin' all the gas just around midnight
Brown Sugar, how come you burn so good?
Brown Sugar, just like the carbon should, yeah
Brown Sugar, how come you frack so good?
Oh, got me plastics
Brown Sugar, just like the carbon should, yeah
Now, I bet your mama was a midstream queen
And all her pipelines were sour sweet
I'm no battery but I know what I like
You should have fracked them, just around midnight
Brown Sugar, how come you burn so good? Oh, no no
Brown Sugar, just like the carbon should
I said yeah, yeah, yeah, woo
How come you, how come you crack so good?
Yeah, yeah, yeah, woo
Just like the carbon should
Yeah, yeah, yeah, woo

IN THE LETTER – INTRODUCTION

Blackjack is the only casino game where the player can wield an advantage over the house. For this, the casino is trained to spot those playing with an edge. Once spotted, the card counter is politely, or not so politely, excused from the game. Despite being played in a casino, played properly, there is no gambling or speculating when counting cards. The counter adjusts bet size and method of play at rare moments when the deck is flush with high cards, particularly when the dealer is in position to go bust. In those otherwise less than advantageous moments, which is most, basic strategy involves minimum wagering and non-deviant basic play.

I learned several things spending far too much of my early 20s in casinos counting cards and observing human nature. First, gambling is speculating and involves hope, greed and fear. Second, gamblers delude themselves into thinking they have an advantage over the casino. Third, casinos know this and take advantage of that knowledge. Only when I began to understand value investing did I realize the stock market is also a casino. Promoters know this and prey upon the delusion of the speculator's hope and greed.

Speculation and promotion run rampant at secular peaks. One requires no map to spot a bubble. When the populous embraces the casino, you are here. The last two years saw a proliferation of speculative excess and charlatan promotion. SPACs, brokerages encouraging option and cryptocurrency trading, meme stocks, promises of impossible returns, research reports grounded in pixie dust and lacking understanding of accounting or reason, billionaires launching themselves into space and selling their shares to the speculator the next day, outright frauds operating as public companies with "legitimate" boards of directors – we saw it all. Similar behavior and promotion pervaded the late 1990s leading up to the tech bubble and subsequent collapse. Having invested through the earlier bubble and navigated both it and its aftermath well, it appears to me that 2000 has nothing on 2021.

Our approach to investing can be described as boring, at least by those who don't live to scour financial reports and footnotes. The process of getting and staying rich should be boring. Investment returns follow the fundamental economics of businesses. It's the casino and its speculator participants that ultimately create value for the patient investor. Money always chases what's hot and flees what's not. Until very recently, you would have been hard pressed to find investors interested in cyclical businesses, particularly those operating in the oil and gas industry. Others selling value to chase growth introduces opportunity for those with capital that can take advantage of bargains. The fool sells the out of favor. Inside of the last two years we paid prices at less than one times the cashflow some companies are earning today.

Brown Sugar is a nod to departed Rolling Stones' drummer Charlie Watts, RIP, and as the headline theme of the letter drills into energy, from the evolving way it is both produced and consumed. Opportunities exist in electricity generation, distribution and in the production and use of *both* carbon and renewable energy. The globe is clearly moving rapidly to lower use of carbon-based power. The transition has not been smooth, and dislocations create scarcities. We are at the point in the classical capital cycle where supply typically comes out of the woodwork. Genuine scarcities, combined with seldom-seen rational behavior, presents a most interesting, opportunity-rich climate. Prepared capital meets the law of unintended consequences. This section became more and more timely with rising energy prices and mounting trouble in Russia and Ukraine. Buckle up and get out your wallets.

Despite outsized returns in our stocks last year, the portfolio ended the year more fundamentally undervalued than it was at the outset. *Intrinsic Value Update – Getting the Most Bang for the Buck* contrasts portfolio fundamentals and expected returns against the S&P 500. A discussion of investing first

in Dollar General and now in Dollar Tree is an example of using opportunity cost as a cornerstone of the Semper approach. The S&P 500 just ended one of its best-ever ten-year runs. An attribution analysis highlights the degree to which margin and multiple expansion, sales growth, share repurchases and dividends drove returns. The analysis continues with an illustration of how significantly lower returns are apt to be for the next decade. The section ends with an evaluation of the degree to which the same components drove the five mega-caps at the top of the stock market and hypothesizes on the decade to come.

Benign Neglect supports the belief that we are at a secular stock market and economic peak rivaling 2000, 1966 and 1929. A walk across the past century of financial history is explored through the lens of two investing giants, one known widely, both in and outside investing circles, and the other not at all. If Benjamin Graham is the father of value investing, I introduce a mentor and dear friend as its godfather. Both investors could not have better navigated all the secular peaks and troughs they collectively faced from 1929 to 2000. I am grateful for a link to both.

Last year's letter introduced some wonderful things happening on college campuses. Real-world investing is taking place now more than ever with students managing portions of their schools' endowments. I asked student fund sponsors and participants to complete a survey, which we placed on our website. The responses were terrific. *Student-Run Endowment Funds* summarizes the survey results and suggests a series of what might be called best practices and guiding principles. The motivation here is by no means conclusive, but to raise awareness of the opportunity for students to gain genuine hands-on experience, share practices undertaken at other schools for adoption or refinement to current methods, and help foster a network for peer-to-peer and student-to-student sharing of practices. Schools or clubs with well-run funds see heavy recruitment by employers; create a deep, involved alumni network; and provide an environment in which to learn the joy of investing. The fact that endowment funds have evolved to permit some student-led management is among the best learning and career-building developments I've seen for young investors. I'd encourage anyone interested in what your alma mater is doing to inquire and find out. If you are inclined to donate or leave money to your school, consider directing your gift to the student fund. If you are an investment professional, you may be surprised how welcome your involvement and volunteered time are back on campus. "Just do it."

The final section of the letter is reserved for an ongoing analysis of Berkshire Hathaway. *Charlie is My Darling* was a documentary of the Stones' 1965 tour of Ireland, coincidentally the same year current management took control at Berkshire. Thus, randomly, a nod to *both* Charlies, past and hopefully present for a long time. Berkshire's shares were up 29.6% in 2021, beating the S&P 500, and are up so far this year by nearly as much as the market is down. Out of step with many in the media and elsewhere, Berkshire, as a business, is performing better than should be expected of the conglomerate. While record profits for the year will be *reported* in the next few days, record *operating* profits were more importantly earned. Per-share intrinsic value grew by 17.5%, several points ahead of a conservative expectation for annual growth. Capital allocation continues to be masterfully executed. The company is a fortress. Investors are hard pressed to find businesses managed with more integrity and for the benefit of the shareholders and employees. Expected returns over the next decade are far ahead of realistic expectations for the index.

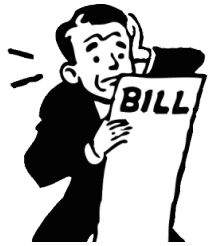
I typically dread letter-writing as the holidays approach. Once in process, however, I love the immersion. Last year's letter was fourteen pages shorter than in 2019. I mentioned my goal was to shrink the letter prospectively by 2.6 pages per year so when I'm in my early 90s the letter will match Berkshire's current Chairman's letter in length. I failed badly this year, even cutting some sections with interesting data that I now intend to come back to next year. I hope you enjoy this year's effort. It's a labor of love and I'm grateful for the response and feedback.

INTRINSIC VALUE UPDATE – GETTING THE MOST BANG FOR THE BUCK

"I think the biggest single thing that causes difficulty in the business world is the short-term view. We become obsessed with it. But it forces bad decisions." – Jim Sinegal

"If you recognize you're really a fiduciary for the customer, you shouldn't make too much money." – Sol Price

"If I control my expenses better than the competition, I just have to buy as well as he does, and I got him." – J.L. Turner



Mr. Hand: Mr. Spicoli, what's your reason for your truancy?
Jeff Spicoli: I just couldn't make it on time.
Mr. Hand: You mean you couldn't or wouldn't?
Jeff Spicoli: Well, there's like a full crowd scene at the food line.

At the precipice of Hell, which on March 18, 2020 a known hedge fund manager passionately suggested was coming, few would expect stock prices to soon more than double, making the underworld but a distant afterthought. From the fiery depths, which occurred five short days following that impending arrival of doom, the Standard & Poor's index of 500 companies would more than double, from 2,237 to 4,766 by year-end 2021. "Capitalism does not work in an 18-month shutdown" continued the 'one-point-five and sixteen' man. Perhaps not, but some 21 months into some iteration of lockdown, if the free-market economy has not worked, the stock market most certainly has. Believe it.

Semper closed pre-pandemic 2019 with its aggregate stock portfolio trading at 13.5 times earnings (an earnings yield of 7.4%) and 1.7 times sales, with a 1.4% dividend yield. Two years on, despite our equity gains of 11.9% in 2020 and 27.3% in the year most recent, portfolio valuations *declined*, resulting in even higher expectations for future returns. The portfolio is now valued at 10.7 times earnings (a 9.3% earnings yield) and 1.3 times sales and with a now higher 1.7% dividend yield. With investment returns outpacing underlying gains in sales and earning power, how can this be?

When stock returns run ahead of company fundamentals, typically multiples expand faster than sales and profits while earnings yields and dividend yields both fall as a result. When performed correctly, active management—but not too active—affords opportunities to trim and sell the dear; and likewise, to boost and initiate positions on the cheap. Opportunity presented itself often during the past two years, creating an enormous amount of value, earnings power, and expected return in terrific businesses only occasionally available at opportunistic prices.

Opportunity cost measures what's sacrificed at the expense of what's chosen. An example: The business owner, having invested $1 million of life savings in the company, finally earns annual "profits" of $50,000 and lives on those. Economically we have a 5% annual return, but only if the owner *also earns a salary*. If $50,000 can be earned working at Costco (it can), the profit should more logically be deemed salary. If, on the other hand, the thought of "working for the man" is so dreadful that joy can be had either by earning nothing on an investment, or by working for free, then we are getting to the concept of opportunity cost. Better yet is the business allowing for a salary *and* profit exceeding opportunity cost as measured against equity. Better still is the business earning enough for salary *and* producing a profit that can be *reinvested* each year in the business at a good return. This is our game. It's likewise the game of the dollar store guys.

Dollar Store Follies

The history of the dollar store originates in 1737 Colonial America, when Poor Richard, in his Almanack, declares, "A penny saved is two pence clear." Not one to rest on the wild success of a clever maxim, Poor

Richard, again, in 1758, and by then far less poor, spruced up his catchphrase to, “A penny saved is a penny got.” This will all make sense when Poor Richard, more famously known as Benjamin Franklin, imparts his legacy on retail. It seems that this co-draftsman of the edited version of Thomas Jefferson’s original draft that thumbed the collective colonial nose at George III would occasionally say something he didn’t say, at least in the original. Maybe Franklin was related to Yogi Berra. Turns out one Edward Ravenscroft, in 1695, remarked in his work, *Canterbury Guests*, “This I did to prevent expences, for…A penny sav’d, is a penny got.” Maybe Edward was related to Thurl Ravenscroft, the voice of Tony the Tiger and vocalist of “You’re a Mean One, Mr. Grinch.” Unfortunately, as you can imagine, Ravenscroft pinched his now famous expression from a Thomas Fuller, who in his weighty, *The Histories of the Worthies of England*, observed, “By the same proportion that a penny saved is a penny gained, the preserver of books is a Mate for the Compiler of them.”

As surely as Franklin massaged Ravenscroft who in turn pilfered Fuller, no doubt on some cave painting somewhere, a spouse pleasantly suggests that Dum Dum not eat *all* the mammoth jerky because it needs to last the winter and “I’m not going out in the cold back to the store to spend another pterodactyl egg of our savings. Geesh!” Or something like that. Just as with Poor Richard, so it is in discount retail. Those in merchandising know there are really no original concepts, just borrowing and successful copying of concepts. It’s like coordinating offenses and defenses in the NFL. If Jeopardy had a category for Famous Discount Retailers, surely Sam Walton would go for $200. Recently retired Jim Sinegal of Costco merits a clue, as would his mentor, Sol Price, from whom countless retailing initiatives were adopted.

The modern-day dollar stores tell of their histories. Dollar General began back in 1939 as J.L. Turner and Son in Scottsville, Kentucky, founded by James Luther (the J.L.) Turner and, of course, his son Cal. They would rebrand, opening their first Dollar General in 1955 and take the company public in 1968. Old Leon Levine, a then-young 22, launched his first Family Dollar store in Charlotte, North Carolina, buying merchandise from factories during slowdowns and passing through the savings. Dollar Tree hit the scene in 1953 when K.R. Perry opened a Ben Franklin store in Norfolk, Virginia, later naming it K&K 5&10, a less-than-subtle play on the old five and dime. After several subsequent sales, expansions and name changes, the then Only $1.00 was rebranded as Dollar Tree.

Even Sam Walton cut his teeth in the small-store discount world. Following a stint at J.C. Penney and then the Army during World War II, now veteran Walton opened a successful Ben Franklin variety store in Newport, Arkansas. It seems young Sam was too successful, as his landlord forced him out of a lease renewal. Unswayed, and to the detriment of the landlord, Walton moved to Bentonville, Arkansas, where he famously opened the first of a series of Ben Franklin franchises, the first with a 99-year lease. He was a quick learner. The first Wal-Mart Discount City store opened in Rogers, Arkansas, in 1962, and the rest, as they say, is history.

What can we learn from these histories? First, all the stores were birthed in the Southeast United States, where they are fond of using initials in place of given first and middle names. Second, Ben Franklin was certain to play a part in the story. Indeed, the first store of K.R. Perry, of Dollar Tree fame, was a Ben Franklin store, as were all of Sam Walton’s first stores. Same for the Michael’s craft stores – founder Michael Dupey converted a Ben Franklin store in 1973 to his eponymous empire. All these founders began as franchisees of Ben Franklin, of which Butler Brothers, in Boston, opened the chain in 1927. It was only when Ben, the franchisor and not Poor Richard, tried running its own company-owned stores did the company fail in 1996. Well before then, the founders of the dollar store chains all moved on to their own concepts, innovating on and copying each other along the way.

You see, in successful discount retail, a penny saved really is a penny earned.

The 2018 annual letter detailed several painful mistakes (there are plenty) and recapped our experience owning, and then selling, Ross Stores. Cheap in 2000, we made roughly a 150% return on Ross through 2002, when the S&P 500 declined by half and the NASDAQ by 80%. Finding the shares "expensive" following the abrupt gain and thinking it easy to just buy them back later, I made the worst investment decision in the history of Semper by selling the entire position. Never coming back to the shares, whether anchored to the outright earlier cheapness or the opportunity to do other things with the money, I watched and watched the shares grow another 25x *after* selling the position. What's the opportunity cost of a known, predictable growing business that you walk away from because it's slightly overvalued?

Roughly at the time of the Ross sale, we managed into a position in Costco. Like Ross, we understood the unit economics of Costco's stores and system very well and appreciated the long runway to open stores. Profitability is masked in such a system where several years are required for a single warehouse to grow to full profitability. When selling memberships, store capacity is not fully utilized immediately, and takes about eight years. Paying what was really a mid-teens multiple for a business that would predictably expand returns on capital from the teens into the twenties, the shares now trade for nearly 50 times earnings. They have been sold in our non-taxable accounts; old positions with a very low basis remain in some taxable accounts. Paying an implied $13 billion for Costco at cost, the company paid a like $13 billion in special dividends between 2012 and 2019, another $10.5 billion in cumulative regular dividends, and sported a market cap of $230 billion at year-end 2021. At the current bid, the stock is far too expensive. Growth in systemwide sales per square foot cannot come close to matching the former pace, with more than 800 stores now versus 350 then and opening no more than 20–25 per year, then and now. But as with Ross, every decision to sell a Costco share would have been a mistake—until now, in our estimation. We never would have expected the shares to trade at today's price. However, as some shares do still reside in some client accounts, we will deliberately scale back in at more reasonable price points. Borrowing from a former seven-time Mr. Olympia, "We'll be back."

We owned Walmart and Home Depot over the years, as well as an early investment in 99 Cents Only, a dollar-only retailer based in California. By 2017 it was obvious to the world that Amazon would crush all in its path, even Walmart. The Amazon Effect replaced the Walmart Effect. For that, the share prices of everything retail weakened, bringing cheap share prices and opportunity to the few retailers who could not only survive, but thrive. No doubt many corners of traditional retail would need to adapt or die. Well-run discounters with low overhead, cheap land or leases and too-difficult geographies and basket sizes were not in harm's way.

Lots of work on both Dollar Tree and Dollar General led to the conclusion that Dollar General was, and is, a far better company, top to bottom. A stake was taken in 2017 at $69, roughly 14 times then-current year earnings and 11.5 times what the company would earn the following year. Profit grew by $360 million in 2018, with more than half of the gain the benefit of the decline in the Federal tax rate from 35% to 21%. The tax benefit proved durable, at least so far. Dollar General operated 14,000 stores, with the likely opportunity to grow by 1,000 units yearly for at least a decade. In addition, another 1,000 stores were, and are, remodeled or relocated at an annual pace that continues today. Myriad initiative-driven retail strategies drove profitability to mid-twenties returns on capital.

Following a KKR-led buyout of Dollar General in 2007, a perfect case study in private equity doing what private equity does, a previously debt-free enterprise (excepting the capitalization of operating leases) reemerged as a public company less than two years later, highly encumbered, and somewhat operationally mismanaged during the short private tenure. By the time of our purchase, the company was on strong footing and, with ongoing initiatives underway, was driving down SG&A expenses and thus increasing operating margins. Manager tenure was up, thanks to an understanding that higher pay and lower turnover is better than a low-pay, high-turnover, and very high-training-cost model. Those interested in more of a

deep-dive analysis can find a presentation in the Interviews and Podcasts section of the Semper website that I'd given on Dollar General for MOI Global in early 2018.

Fast forward to the pandemic. While much of business and industry stopped, and a large swath of the workforce was either working from home or not working, those whom our elected officials deemed essential (aren't we all?) manned the ship of the economy. Where airlines and movie theaters collapsed, Amazon and its suppliers thrived. Grocery stores thrived. Well-run dollar store concepts, those selling perishables and goods needed for everyday living, were open for business. Dollar General saw an enormous gain in sales over 2019. While the pace of new store openings slowed, naturally, same store sales advanced by 16.3%. At the March 23 low in 2020, with the S&P 500 down 31%, Dollar General had fallen by less than 13% and finished the year up 35%.

Opportunity came with volatility throughout 2020. Shares in Dollar General closed in on our appraisal of fair value. Had no attractive alternatives presented themselves, we never would have trimmed the position, but trim we did, reducing the holding by 75%, and with the proceeds found some dollar bills trading for way less than a buck. The decision to trim the position was weighed against the likely scenario whereby five years from the time of the sale, the company could be reasonably certain to be operating somewhere near 21,000 stores and earning probably $3 billion, twice 2019's level, and on a greatly reduced share count at perhaps $15 per share. Trading at 20 times current profit and not much more than 12 times expected earnings in 2025, the shares weren't overvalued, but far cheaper opportunities developed with far higher expected returns. To date that's proven to be the case.

Continuing with the rationale for trimming Dollar General, there are several considerations. One, the replacement asset was not a permanent investment in cash, which by March 2020 was back to a near 0% rate of interest, a yield likely to exist for most years to come. Despite the Fed telegraphing a series of rate hikes this year, once the economy proves durably fragile and equity and real estate markets invariably weaken, then back to the zero bound it goes, but that's not our discussion for the moment. With the proceeds, we made sizable investments in the energy patch and elsewhere at extremely attractive prices during the fall of 2020. Next, by not eliminating the Dollar General position, we remain keenly interested in scaling the position back up when prices become more favorable, either due to decline or due to the passage of time. A flat stock price for a period of years as an underlying business grows will see a share price migrate from fully or overvalued to undervalued, presuming a durably optimistic runway for growth, or a low enough share price. Decision making as to portfolio activity is not made in a vacuum but involves an assessment of alternatives immediately available or expected to develop over the short-to-intermediate horizon. It always comes back to opportunity cost!

Dollar Tree

Jump to late September 2021. Ongoing research involves not only staying on top of portfolio holdings but also on competition and the competitive landscape. Disruption evolves quickly in the modern economy, but discount retailing doesn't change overnight. One of the big motivations for investing in Dollar General instead of Dollar Tree centered on Dollar Tree's 2015 costly $8.5 billion mostly debt-financed acquisition of competitor, Family Dollar. In fact, Dollar General was involved in the bidding for Family Dollar, a move not unlikely made with the motive of driving the price up, and up it went. The result? Dollar Tree was bestowed with the proverbial winner's curse.

Post-merger, despite being under the same corporate roof, Dollar Tree and Family Dollar are uniquely operated and managed concepts, and not necessarily efficiently. At the time of the deal, Family Dollar was the larger by number of stores but less profitable by margins and return on invested capital. Paying a premium in the acquisition didn't help things. Dollar Tree maintained its near-religious, dogmatic at least, strategy since its 1986 founding of selling almost all merchandise at the one-dollar price point. Family

Dollar operates more like Dollar General, selling a growing number of SKUs (stock keeping units, or distinct items) at higher price points. The number of Family Dollar stores remains flat since the 2015 acquisition, though under the surface, management works to offset the closure of less profitable and geographically competitive locations with new ones. Despite an improving mix, unit profit remains stagnant. Dollar Tree, under the hand of original management, grew its store count from roughly 5,500 to 8,000 today. Same store sales growth was likewise better at Dollar Tree, averaging 2.5% per year versus less than 1% on average (less than the inflation rate) prior to 2020. The pandemic drove strong 11% same store sales growth, largely from increasing basket sizes, at Family Dollar. As with competitor Dollar General's whopping 16% same store sales gain during 2020, both Dollar General and Family Dollar predictably saw negative comps in 2021, Dollar General's first in years.

Maintaining two separate retail concepts under one umbrella has proven less than optimal. Dollar Tree and Family Dollar operate close to the same number of units at 8,000 apiece, for a combined 16,000 stores. Dollar General operates about 2,000 more stores and does so utilizing one distribution center for each 1,000 of its 18,000 stores; Dollar Tree and Family Dollar utilize 15 and 11 distribution centers, respectively. Furthermore, the combined operation employs 200,000, whereas Dollar General has only 150,000 on its payroll and operates with operating and net margins more than two percentage points higher than Dollar Tree, with much higher returns on unit stores and on capital.

Supply chain issues and a scarcity of labor harmed Dollar Tree throughout 2021. Faced with dramatic increases in merchandise and operating costs, the inflation finally forced Dollar Tree to "break the buck," moving to raise the sacred $1.00 price point on nearly all merchandise by 2022. Over the years, unit and package sizes grew ever smaller in the fight to maintain the price point. Two decades ago, a $1.00 package of Tootsie Pops contained 25 delicious pops, a decade later it was 15, and today 7. Had management not relented, at some approaching point a single pop would have been sold by the lick. In other words, even without the great inflation of 2021, whether transitory or not, change was a comin'.

In addition to the breaking of the buck, which introduces $1.25 price points on merchandise and small sections of $3 and $5 merchandise (which they had already incorporated in small scale), we wonder why not fully integrate the two systems, close unprofitable, redundant stores and distribution centers, and even go so far as to kill one of the store brands entirely? Where Family Dollar operates more like Dollar General, albeit way less profitable and efficient, at least they understand having cooler doors, and more of them, drive larger basket sizes and repeat customer visits. Dollar General now has fully at least 17 cooler (not Jeff Spicoli but refrigerator/freezer) doors in all stores. Because Dollar Tree lived at the $1.00 bound, you don't get milk, for example. Who would buy a thimble of it?

Thanks to struggles with shipping, inflation and tough comps at Family Dollar, Dollar Tree shares slid throughout the first nine months of 2021. We got *very* lucky to initiate a 2% position in the shares on September 27. Who would have known that two or three short days later would come the announcement of the breaking of the buck, and with it a surge in the share price from our cost of $87 to $140 at yearend? Should management go down the path of driving down unnecessary costs, increasing operational efficiencies, eliminating redundancies, pricing with more of an eye toward what the customer needs (more coolers!), and driving higher sales per square foot, there remains significant upside in Dollar Tree shares. At minimum, from today's base of 16,000 units, current management believes they can operate at the 25,000-store level, with 60% of those being Family Dollar. Whether eliminating one of the concepts or not, just simplifying redundant supply and distribution chains could shave loads of overhead.

In the world of retail, as in the world of coopting famous historical quotes, nothing is original. It all boils down to blocking and tackling. Walmart even tried its hand at the dollar store game not many years ago with their Walmart Express concept, leaving the arena, tail between legs. It's just different. The best, Dollar General, is immensely profitable with room to grow. They are absolutely more efficient. Ben

Franklin et al. were 100% correct about a penny saved. The next best, Dollar Tree, even without adopting more best practices, is a good enough company, likewise with room to grow. Returns on capital are good. They can be great, and as investors, this is where opportunity cost comes to the fore.

Fundamentals Versus the Market

The results of portfolio activity can be observed in what should now be a familiar table. The side-by-side fundamental comparison of the Semper portfolio with the unmanaged S&P 500 on a common-size basis includes figures for the most recent four years. Studying a progression over time is useful.

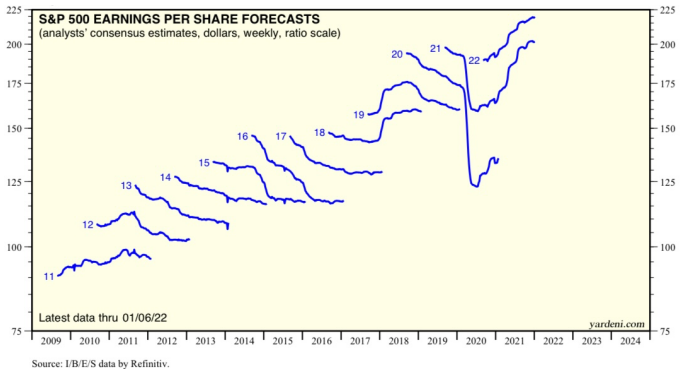
Our portfolio holdings are aggregated as though they are a single business through common-size balance sheet and income statement figures, leverage and profitability ratios, and finally some valuation measures. Our "company" is presented side by side against the S&P 500, similarly consolidated as though all 500 businesses were a single entity. I've always found common size analysis extremely useful by referencing all measures against a unitized $100 in sales.

Comparing these four year-end periods demonstrates the impact of surging stock prices on valuation and prospective earning power when business fundamentals trail investment returns by a wide margin. This has certainly been the case of late, for the Semper portfolio and for the market. The S&P 500 was up 28.7% last year, 18.4% in 2020 and 31.5% in 2019. Sales per share grew by 5.4% in 2019 but then declined 5% in 2020. The common size analysis pits all measures against a constant $100 in sales. With sales likely growing 10.9% in 2021 (reverting to trendline) you won't see the large recovery using common size. Measuring dollar results for 2021, the analyst is better to measure the two years from 2019 to 2021, allowing for the snapback and logically measuring a more linear progression of growth. To wit, sales per share from 2019 to 2021 will have grown probably 5.9% and an average of only 2.9% annually, below 3.9% annual growth over the past two decades.

Earnings on the S&P 500 advanced on a per share basis by 3.6% in 2019 (having been way up in 2018 thanks in large part to changes in the tax code under 2017's Tax Cuts and Jobs Act, or TCJA). Earnings fell precipitously in 2020, by 22% on an operating basis and 33% using GAAP reported profits that are net of sizable write-offs [Since the late 1980s write-offs and write-downs have averaged 15% annually and are high during weak years and muted during strong. They were huge in 2020 and will only be perhaps 5.3% this past year. Rest assured they will return en masse during the next downdraft.] When measured against depressed 2020 earnings, an 80% surge in operating profit and 103% gain (doubling) in reported profit give the appearance of an economy on fire. Again, that's from a very depressed, distorted base. For the two years 2019 to 2021, operating earnings growth from $157.12 to an expected $201.86 is a 28.5% rise over the two years, an impressive 13.3% annual clip.

If sales per share grew for the past two years at only 2.9% annually, how did earnings grow by 13.3%? We witnessed an enormous increase in profit margins, not only over the past two years, but over the past decade. More on this later, but the ongoing dominant gains in sales and profits among the handful of companies atop the market, certainly the fabulous five of Apple, Microsoft, Google, Amazon and Facebook (using old-school names), plus a handful of others, should come as no surprise. The third quarter of 2018 reached a record 12.13% net operating profit margin for the index, a level I thought might not be eclipsed. With the onslaught of the pandemic, numerous industries ground to a halt, and companies slashed costs, in some cases deeply. Record-low interest rates also allowed the refinancing of debt at lower rates, lowering interest expense and boosting profits. While sales and profits fell in 2020, profits surged in 2021 to record margins never seen in any economy. Margins for all four quarters will exceed 13% and likely average 13.4% for the entire year. Investment returns not only followed the surge in record profitability but rewarded shareholders via massive multiple expansion.

One interesting observation – emerging from plagued 2020, Wall Street analysts expected operating earnings of $164.41 for 2021 at this time last year. It is extremely rare for Wall Street to miss on the low side but when they do, it is always following a deep decline. When profits are at normal or elevated levels and all is rosy, forecasts are invariably rosier and ratchet down during the year as reality sets in. Ed Yardeni has tracked this "phenomenon" over the years.



Here's the fundamental common-size analysis of the Semper portfolio and the S&P 500. All income statement and balance sheet figures are in proportion to $100 in constant sales. The valuation figures in the lower portion of the table are multiples and yields.

Key Common Size Figures for the Semper Portfolio and S&P 500

	2021		2020		2019		2018	
Income Statement Figures	**S&P 500**	**Semper**	**S&P 500**	**Semper**	**S&P 500**	**Semper**	**S&P 500**	**Semper**
Sales	$100	$100	$100	$100	$100	$100	$100	$100
Earnings Before Interest and Taxes	17.2	16.3	14.9	15.5	15.4	17.5	15.6	17.3
Interest Paid	1.6	0.8	1.7	1.6	2.4	1.3	2.2	1.1
Pre-Tax Profit	15.6	15.5	13.2	13.9	13.0	16.1	13.4	16.3
Tax Rate	18.7%	22.8%	21.6%	21.6%	21.6%	20.0%	21.0%	22.5%
After-Tax Profit (reported income)	12.7	12.0	10.4	10.9	10.1	12.9	10.6	12.6
Dividends	4.1	2.2	4.4	2.4	4.2	2.4	4.1	2.4
Retained Earnings	8.6	9.8	5.9	8.5	6.0	10.5	6.5	10.2
Balance Sheet Figures								
Equity (Book Value)	$64.7	$75.7	$66.9	$82.4	$64.1	$101.2	$63.0	$102.0
Debt	78.1	38.8	86.4	47.6	79.0	43.7	74.6	35.0
Cash	25.3	31.3	29.2	51.3	19.1	28.5	18.6	30.7
Net Debt	52.8	7.5	57.1	-3.7	59.8	15.3	56.0	4.3
Total Capital (Equity + Net Debt)	117.5	83.3	124.1	78.7	123.9	116.4	119.0	106.2
Leverage Ratios								
Debt / Equity	120.7%	51.2%	129.1%	57.7%	123.2%	43.3%	118.5%	34.3%
Net Debt / Equity	81.6%	9.9%	85.4%	-4.5%	93.4%	15.1%	88.8%	4.3%
Net Debt / Total Capital	44.9%	9.0%	46.1%	-4.7%	48.3%	13.1%	47.1%	4.0%
Profitability Ratios								
EBIT / Total Capital	14.6%	19.6%	12.0%	19.6%	12.4%	15.0%	13.1%	16.3%
Return on Equity	19.6%	15.9%	15.5%	13.2%	15.9%	12.8%	16.8%	12.4%
Return on Total Capital	11.9%	15.1%	9.5%	15.4%	9.6%	12.0%	10.4%	12.7%
Key Valuation Figures								
Price (Market Value)	$317	$128	$279	$136	$232	$174	$189	$155
Price / Sales	3.2	1.3	2.8	1.4	2.3	1.7	1.9	1.6
Price / Book Value	4.9	1.7	4.2	1.7	3.6	1.7	3.0	1.5
Price / Earnings	24.9	10.7	26.9	12.5	23.0	13.5	17.9	12.3
Earnings Yield (Earnings / Price)	4.0%	9.3%	3.7%	8.0%	4.4%	7.4%	5.6%	8.2%
Dividend Yield	1.3%	1.7%	1.6%	1.8%	1.8%	1.4%	2.1%	1.5%
Retained Earnings Yield	2.7%	7.6%	2.1%	6.3%	2.6%	6.0%	3.5%	6.7%
Dividend Payout Ratio	32.2%	18.3%	42.3%	21.9%	41.8%	18.6%	38.7%	19.0%
Enterprise Value / EBIT	21.5	8.3	22.6	8.5	19.0	10.9	15.7	9.2

Figures are rounded and may appear off; Index data are estimates for 2021.
Sources: Semper Augustus; Standard & Poor's; Bloomberg

I like to say that price matters so let's begin there (Market Value). We know sales on a per-share basis advanced 5.4% in 2019, were down 5% in 2020 and likely rose 10.9% last year. Coincidentally, the unit figures of 100 by which the entire table is derived aren't far off the mark over the two years! But look at the increase in Price in the "Key Valuation Figures" in the bottom section. As you would expect, the 28.7%, 18.4% and 31.5% total returns for the index over the past three years, which include dividends, can be approximated in the increase in price per $100 of sales, from $189 to $317 over three years. Balance Sheet Figures reveal an increase in debt during 2020 but also in cash, as many companies borrowed to increase liquidity during the crisis. The surge in profitability to record levels during 2021 allowed retirement of considerable debt to healthier levels than we've seen in several years. Debt remains uncomfortably high among the broad index, which should be obvious against the Semper portfolio, but we'll get to that.

Interpreting the Income Statement Figures section at the top, the figures for Earnings Before Interest and Taxes, Pre-Tax Profit and After-Tax Profit are the margins for each because we are using a common-size method for analysis. With margins at a record, it's worth remembering the 1929 bubble came with an 8.9% margin, a record that would stand until 2007, when, at another not-great time for equity ownership, the new record 9.4% margin was coupled with a 22 multiple to those earnings. High margins capitalized at high multiples is a bad prospective combination, a lesson learned during the ensuing Global Financial Crisis, which chopped nearly 57% from share prices. At the earlier 2000 market peak, the profit margin rose to 7.4%, the second highest on record, only topped by 1929 at the outset of the Great Depression, which led to the fateful 89% market decline and ensuing many years when profit margins were negative or measured in nanometers. Warren Buffett famously wrote an excellent article in Fortune Magazine in 1999 suggesting, correctly, that good times wouldn't last, a prophecy supported by profits being range bound by economic truths. He was correct on the immediate level of earnings, and stock prices by extension, but couldn't have predicted the capital-lite behemoths to come, with nearly unimaginable near-monopolistic positions, scale, and Godzilla-like profitability. The upper bound theorized by the Oracle would double by 2021.

Stock prices outpacing sales and profits drove all valuation yardsticks not only substantially higher but, in many cases, to record highs. Price-to-sales and to book value are both now at records (as they were last year). The P/E multiple, at 24.9 times reported earnings, coupled with this record margin of 13.4%, has stocks trading at an unheard of 317% of sales, a record well above any other time. When you pay a multiple to earnings of 24.9, a puny 4.0% earnings yield results. Not much when margins are at records. How much future return was pulled forward by the recent strong advance, not only during the last three years but over the last decade, which took the index from arguably very undervalued at the end of 2008 during the financial crisis to significantly overvalued today? We'd argue a lot for the index.

The change in Price (Market Value) per dollar of sales is a different story altogether with the Semper portfolio. The price figure *declines* over three years from $155 in 2018 to $128 at year-end 2021. At first glance you may think that our stocks declined. Rather, remember this is a common-size analysis and we are *active* investors. The stock portfolio earned 23.6% in 2019, 11.9% in 2020 and 27.3% in 2021, a compound average annual gain of 20.7% over the three years. Despite the gains, with the exceptions of market lows in 2020 and 2009, the portfolio has never been more fundamentally undervalued and at the same time more profitable!

Portfolio activity, the ability to sell and buy, to trim and add to positions, works to keep the portfolio price low and earnings yield high. There are scores of investors with high levels of portfolio turnover, but one must wonder to what end. By contrast, our turnover is typically low, averaging 15% annually over 23 years. Modest activity over time added considerably to returns.

Despite earning returns that exceed both underlying portfolio fundamentals and our long-run expectation for total returns, activity has not pulled forward future portfolio returns – unlike with the index. Fundamental yardsticks demonstrate the degree to which the portfolio is significantly undervalued and strongly capitalized. At 9.3%, the earnings yield is more than double the index yield. Of the 9.3% earnings yield, 1.7% is earned as a dividend yield, with the 7.6% balance retained and reinvested by portfolio companies. The businesses are reinvesting at an aggregate 15.9% return on equity, and with only very modest net debt employed at 9.0% of total capital (versus 44.9% for the index). Of the 4.0% index earnings yield, 1.3% is distributed to shareholders as dividends with 2.7% thus reinvested. For the first time since probably March 2000, when the S&P 500 dividend yield was only 1%, the Semper portfolio dividend yield over the past two years is higher than the index dividend yield. Considering that portfolio anchor Berkshire Hathaway pays no dividend, this is somewhat extraordinary. It reflects the very high valuation in the index. We are getting a higher cash dividend yield than the index, on roughly half of the payout, and our retained earnings yield of 7.6% approaches triple the index's 2.7%.

The portfolio, again with a now-higher dividend yield, only receives 18.3% of profits as dividends. This is most definitely not a bad thing. The balance of 81.7% of profits are reliably being reinvested at the portfolio return on equity of 15.9%. Arguably the most important aspect of our work is determining how well our managements reinvest profits. Actively sought are managements that wield good capital allocation skills. That portfolio businesses reinvest at 15.9% on a *nearly net unleveraged* basis is such a favorable element, particularly in a world of low or no interest rates. Compare again the difference here with the index. The index payout is nearly double, at 33.1%. Almost twice the payout rate but less dividend income? That's the degree to which price matters. But it's more telling considering that only 66.9% is being invested *theoretically* at a higher 19.6% return on equity versus our 15.9%.

Four things worth mentioning here. First, it takes nearly as much net debt (debt minus cash) as equity in the capital structure of the index companies to produce the higher return on equity. When comparing returns on total capital, our 15.1% is fully 3.2% higher than 11.9% for the index. Second, ask whether the profits reinvested by index companies are really earning the return on equity. The answer is no. After paying dividends, *more* than 100% of retained earnings are used repurchasing shares at high multiples to earnings and thus low earnings yields. Share reduction on the index was a modest 0.7% per annum for the past decade because the majority of the repurchases were merely offsetting shares given to management as options and restricted share units. Retained earnings are NOT reinvested at the return on equity. Repurchases made at high multiples to book value are driving book value per share lower and lower, overstating returns on equity by an increasing margin every year. Third, returns on equity are overstated thanks to equity that, like repurchases-to-book-value, is driven down by ongoing annual write-offs and write-downs. As mentioned earlier, since the late 1980s these annual charges have averaged 15% annually. Finally, Berkshire Hathaway "only" earns 10% on equity as we measure it (higher if cash is netted). More on this in the Berkshire section, but because Berkshire, for good reason, earns 10%, know that the balance of the Semper portfolio of companies earns more than the aggregate 15.9%.

2020 and early 2021 were exceptions to egregious repurchase behavior thanks to the pandemic. Many companies suspended repurchase programs to preserve capital and in certain cases even reduced or suspended dividend payments. They did the same thing in 2008. Isn't this always the case? When shares drop to genuinely attractive prices, it's often the decline in share prices that compels companies to *not* purchase shares. Share declines often come with some fear-inducing external shock. It's the most backward game of buy high and sell low that you can find, and it's what so many investors are stuck with by passively investing in indices or overdiversified portfolios of companies all practicing the same capital destroying behavior. The investor aware of these expensive oddities can work to keep them out of a well-constructed portfolio. Alas, we are back to old times. While the overall share count for the index rose throughout the second half of 2020 and the first three quarters of last year, in the fourth quarter of 2021,

the share count declined. 2021 will set a record for aggregate dollar share repurchases once we are through with earnings releases. I'd guess at least $850 billion was spent on the cause, more than 50% of total profits, but not a record as a percentage of earnings. If supply and demand set the movement of share prices, then a portion of the rocketing of prices higher is thanks to repurchases. If more than all profits not paid as dividends have gone to repurchases over the past decade, then on balance is zero being reinvested for the long-term? Insiders get the shares cheap. Companies offset the eventual insider sales at higher prices to offset the dilution. If share repurchases were made at healthy earnings yields, that would be something different (and admirable).

Forward Expectations

Expected returns can be viewed two ways. Providing that the profits of the Semper portfolio prove durable, we should earn the earnings yield on the portfolio, today at 9.3%. As stated, 1.7% is earned as a dividend yield with the remaining 7.6% retained and reinvested by the managers of the portfolio companies. If we've likewise done a good job measuring and estimating the prospects our companies have for reinvesting capital, then that portion of our profits should earn the portfolio return on equity of 15.9%. A 10% to 12% long-run expected return becomes a realistic target from today's valuations.

There exists a drag on returns, and that's the rate at which dividends are reinvested. New capital, or the proceeds from portfolio sales and trims, suffer the same fate. If we are having to pay premium prices, to book value at least, then paying 10.7 times earnings (and far higher with some of our investments) takes the return on that portion of our capital back to the starting point, to the "go" of the earnings yield if you will. We are far better off if our investees retain and reinvest the great majority of their profits at good returns than if they dividend it out to us, forcing us to pay the premiums typically involved in acquiring new fractional shares of companies in the stock market. The luxury is choosing the businesses and prices paid upon our reinvestment of dividends, new capital, and portfolio process cash. In a sense, it's the lack of portfolio sales and trims by index investors that never have to be reinvested at premiums that is a genuine advantage to indexers. Portfolio activity must be of enough value added to overcome the drag of always having to pay the multiple to earnings with the proceeds from any portfolio sales. I think we do this well, but it's very difficult for most active investors to do so. In my experience, few investors even contemplate or understand this hurdle when selling a position. Opportunity cost, remember? There exists the alternative to not sell. It's this understanding that contributes to Semper's generally low but opportunistic portfolio turnover.

I've long described a second, but similar, way to view expected returns. Beginning again with the earnings yield, today at 9.3%, if we've done our homework and measured profitability reasonably well, as long as estimated profits prove durable, we should earn the earnings yield. On top of the earnings yield, the eventual accretion of any discount to intrinsic value that exists at the time of purchase should be earned (if Mr. Market, between fits of mania and depression, occasionally offers up businesses for less than value). A purchase made at 75 cents on the dollar will see an additional 33% return over whatever period it takes to close the discount gap. A purchase at 80 cents on the dollar yields 25% upside, added of course to the earnings yield. The portfolio discount typically is seen around that level. The portfolio was valued at 65% of intrinsic value at yearend, suggesting 54% upward accretion to fair value, earned over time. Outside of moments of washout, February 2009 and March 2020 for example, the portfolio has never been more undervalued.

Expected returns for the index can be similarly approximated. We find the index presently overvalued, so an investor can expect to earn the 4.0% earnings yield plus some *decline* to intrinsic value over some period. Our estimate of intrinsic value for the index is far below the year-end closing price of $4,766. Fifteen times the most optimistic operating earnings estimate for 2022 profits of $201.86 produces a price of $3,028 – 36.5% lower than at yearend. This presumes profit margins remain at or above today's record

level. Even at a robust 20 times bullish earnings, allowing for low interest rates, gets fair value to $4,037, or 15.3% below the year-end close. Combining the earnings yield with a decline to fair value produces at best a low-to-mid-single-digit 10-year expected return with splashes of losses in the interim. Typically, when markets are overvalued, they don't work it off in linear fashion. Many point to the period of no price return between 1966 and 1982 for the S&P 500 as simply moving from overvalued to undervalued. Check the chart. Myriad declines of 25% to as much as 50% (1973-1974) coupled with high and rising inflation throughout made for what our hedge fund friend would have likely described as Hell, had he navigated that period. But not a sudden fire burning everything to the ground. A slow burn. Green shoots squelched, again and again. Business schools were not packed with armies of young, aspiring investors in 1982. It was a loser's game. At the bottom, naturally.

From the absolute market low in August 1982 through its March 2000 top, the S&P 500 compounded trough to peak at 20%. By the late 1990s, investor surveys revealed expected annual returns of 16 to 17 percent. These were surveys of not only individual but institutional investors. The army of value investors had been reduced to a skeleton force, bleeding, many dead, badly lagging not only the ripping returns posted by the S&P but most painfully by the NASDAQ, which in the final four years of its ascent had quintupled from 1,000 to 5,000, culminating in an 86% blistering gain in 1999 followed by its last non-stop 24.1% spike up through March 10, 2000. Typical 401(k) investors received monthly statements and liquidated the stupid small cap value guys to climb giddily aboard the momentum train. This went on and on. By the end, during the last six months of the bubble, the Janus fund complex was getting nearly half of all the money pouring into mutual funds. Janus itself was crowded into the same narrow slate of expensive, low-float and in many cases profitless companies. Nearly all of the money came in at the top, and the vast majority of dollars invested at that time were wiped out in the subsequent three-year bear market. An oddly similar family of ETFs exists today, seemingly repeating the Janus playbook (each new generation of investors must learn the X's and O's of the playbook under the watchful eye of the unforgiving Mr. Market).

Despite earning 29% in our first year, the world clamored for tech. They demanded all things Internet. We refused to participate in what was utter nonsense. Day traders, doctors, lawyers all glued themselves to "Finance TV," boasting of their wins and investing acumen at cocktail parties, the social media of the day. I suggested to doctors that with little training I could perform brain surgeries. Obviously I couldn't, but investing is easy. Then, like now in many circles, the lonely voice of reason fell on deaf ears. Semper was only recently hatched, the firm name chosen to reflect our belief that we were indeed in a bubble, certainly a tech and debt bubble. We needed a tool to demonstrate that all our companies and our portfolio as a whole produced durably reliable, growing profits, and traded at immensely reasonable prices. Hence our Intrinsic Value report was born, itemizing the price paid for each holding, current earnings and dividend yields and our appraisal of intrinsic value, and accordingly, what yields and returns would be realized upon attainment of fair value. Contrasting these data points with the lunacy of the market seemed necessary and proved itself so. Updated since, the report is reliably demonstrative of valuation and predictive of future return. It served to keep at bay any clients frustrated at not making 86% in 1999. Having navigated the bubble and the subsequent bust remarkably well, those anxious clients have now seen enough cycles to understand that short-term performance chasing leads to difficult and disappointed outcomes.

The first Intrinsic Value report, run on March 31, 2000, showed the Semper portfolio at 15.6 times earnings, thus a 6.4% earnings yield. The S&P 500 traded at 40 times and a 2.5% earnings yield. The report suggested the portfolio traded at 84% of intrinsic value, giving it 19% upside over some period. The intrinsic value of the index was approximated at $590. Against a March 31, 2000 price of $1,499, such sentiment was deemed delusional on the cocktail party circuit of the day. The anons on Twitter would have had a field day. Barely in our early 30s we'd have been maligned as #boomers for sure. Given

the immediate market decline, and the index having spent the better part of the next 12 years underwater, it never did become much of a welcome topic.

Expected returns couple the earnings yield with the purchase of stocks at a discount to intrinsic value. Accretion of the discount over some period, added to the yield becomes the return. The process seems to stand the test of time. Since running the Intrinsic Value report for the first time in 2000, the portfolio earnings yield averaged 7.5%, a 13.3 multiple to earnings. At an average 75 cents on the dollar of fair value, the presumed 33% accretion to value earned over a period of years should add perhaps 2% to 3% to the earnings yield. A 9.5% to 10.5% expected return range compared to an 11.9% average actual return over 23 years seems to get us to roughly right. Recent results are skewed higher by aberrantly high returns over the past six years, as well as by our opportunistic trims and adds.

Year	SAI Equities Only	CAGR from 2021	CAGR from 1999	Beginning Earnings Yield	Beginning P/E Ratio
1999	29.1%	11.9%	29.1%	7.7%	13.0
2000	30.7%	11.1%	32.9%	6.4%	15.6
2001	23.1%	10.2%	29.4%	6.6%	15.2
2002	-22.0%	9.6%	13.4%	7.4%	13.5
2003	38.2%	11.6%	18.1%	7.9%	12.7
2004	16.3%	10.2%	17.8%	7.7%	13.0
2005	7.4%	9.9%	16.2%	8.2%	12.2
2006	18.4%	10.1%	16.5%	7.3%	13.7
2007	3.1%	9.5%	14.9%	7.0%	14.3
2008	-21.6%	10.0%	10.5%	7.5%	13.3
2009	27.9%	12.9%	12.0%	10.0%	10.0
2010	14.4%	11.7%	12.2%	8.4%	11.9
2011	7.1%	11.5%	11.8%	8.3%	12.0
2012	6.8%	11.9%	11.4%	8.7%	11.5
2013	17.3%	12.5%	11.8%	8.9%	11.2
2014	5.2%	12.0%	11.4%	8.0%	12.5
2015	-10.3%	13.0%	10.0%	7.7%	13.0
2016	27.7%	17.4%	10.9%	8.1%	12.3
2017	18.0%	15.4%	11.3%	7.6%	13.2
2018	-1.4%	14.8%	10.6%	7.2%	13.9
2019	23.6%	20.7%	11.2%	8.2%	12.2
2020	11.9%	19.3%	11.2%	7.4%	13.5
2021	27.3%	27.3%	11.9%	8.0%	12.5

Inception Date 2/28/1999

A steadiness in returns over time is apparent. Single-year equity returns are listed by year. Working backward in the "Reverse CAGR From 2021" column, the 1-year return is 27.3%, the 2-year return is 19.3%, and so forth from the 3-year, all the way through the nearly 23-year return of 11.9% in the top row. In comparing the compound returns to the beginning earnings yield and adding 2-3% of additional return, allowing for the closing of the discount gap, you get to a proxy for expected return compared to what was earned over the subsequent years from that point.

Outside of our recent 20.7% 3-year return (skewed higher by 2019's 23.6% gain and 2021's 27.3% runup) and a 17.4% 6-year return (pulled up by recent high return years 2021, 2019, 2017 and 2016), the remainder of the compound annual periods ranges from 9.5% to 13.0%. Similar tables seen later in the letter for the S&P 500 and various yardsticks for Berkshire Hathaway indicate much higher volatility and dispersion of returns in their compound period returns. With a historically high 9.3% Semper earnings yield and a sizable discount to intrinsic value heading into 2022, we believe we are in good shape for the road forward.

Decades and Decades

During short and intermediate intervals when returns are well in excess of (or below) the long-run expectation, one should expect some mean reversion. We most definitely don't expect to repeat last year's 27.3% going forward. Half that is beyond the very upper bound of the long-run expectation. For the past ten years, Semper's stocks, excluding any cash in client portfolios and before fees, earned 11.9% annually. At the outset of the decade-long stretch on January 1, 2012, the 8.7% earnings yield suggested long-term total expected returns of 10.7% to 11.7% by adding the closing of the discount to intrinsic value. Whether at the low end of the expected return range, or at the high, over long intervals returns should closely match the underlying returns of the businesses in the portfolio plus (or minus) any value added via our active management. At extremes of aberrantly high or low returns, unless from an overvalued or undervalued beginning point, the long run result will deviate, but much of that deviation should be largely captured in the beginning earnings yield. Excessively high earnings yields (low P/Es) often follow periods of low returns while the opposite, low earnings yields (high P/Es) often follow bull markets.

"But the market," protest watchers of the S&P, which for the past ten years compounded at 16.6%. Yes, the market. The market, certainly the S&P 500, has been a crushing competitor to the value crowd over the past decade, really for the 13 years since the Global Financial Crisis, which sent the index down 37% during 2008 and by more than half from the peak to the early-2009 trough.

An examination of Semper's 23 years of returns contrasted with the S&P over a series of illustrative intervals lends some perspective to the degree to which long periods of high or low returns impact prospective returns. At bottom, price matters.

Semper hatched late in a secular bull market. At the outset, the S&P 500 was extremely expensive and got even more so until March 2000. Having pivoted with client capital from expensive blue chips into very undervalued smaller and mid-size companies, ultimately picking up Berkshire in early 2000, at the market peak we had a relatively and extremely undervalued portfolio. We earned excellent returns during the first two years of the 2000-2002 bear market—a bear market that sent the S&P down 49% from its peak in price and 37.6% including dividends. Despite falling in line with the index in 2002, our stocks gained more than 25% in total over the stretch.

Our first decade in business concluded at year-end 2008, toward the end of the Financial Crisis. Peak to trough the index fell from 1,548 in 2007 to a demonic 666 in early 2009, a 57% price decline. It was a good decade to be a value investor, but a bad decade to have exactly zero marketing effort. If a tree falls

in the forest and nobody hears it…Our stocks had averaged 10.5% against an annual loss of 1.5% for the index over the period.

Following 2008's pummeling, our stocks rebounded 27.9% in 2009, slightly above the index's 26.5%, which was unexpected since we'd declined by much less. Our stocks then gained 14.4% in 2010 against 15.1% and then 7.1% versus 2.1% in 2011. The reason for introducing this three-year interval where we returned 56.7% versus 48.7% is threefold. First, our 16.1% annual gain over the three years versus 14.1% for the S&P marked the point from which our relative outperformance would shrink, with cumulative 13-year annualized returns of 11.8% versus a mere 1.9% for the index, 9.9% of annual alpha over 13 years. Two, it moved the calendar forward to the outset of the decade just ended, allowing for a subsequent 10-year comparison. Three, 2012 began a run of four consecutive years of widely lagging a ripping bull market. Finally, it moved our 13-year annualized return to 11.8%, ironically almost exactly matching what is now our 11.9% 23-year annualized return.

Year	SAI Equities Only	CAGR from 2011	CAGR from 1999	S&P 500 Composite Total Return	CAGR from 2011	CAGR from 1999
1999	29.1%	11.8%	29.1%	19.9%	1.9%	19.9%
2000	30.7%	10.3%	32.9%	-9.1%	0.6%	4.8%
2001	23.1%	8.6%	29.4%	-11.9%	1.5%	-1.4%
2002	-22.0%	7.3%	13.4%	-22.1%	2.9%	-7.3%
2003	38.2%	11.1%	18.1%	28.7%	6.2%	-0.8%
2004	16.3%	8.2%	17.8%	10.9%	3.6%	1.1%
2005	7.4%	7.0%	16.2%	4.9%	2.6%	1.7%
2006	18.4%	7.0%	16.5%	15.8%	2.3%	3.4%
2007	3.1%	4.8%	14.9%	5.5%	-0.2%	3.6%
2008	-21.6%	5.3%	10.5%	-37.0%	-1.6%	-1.5%
2009	27.9%	16.2%	12.0%	26.5%	14.1%	0.8%
2010	14.4%	10.7%	12.2%	15.1%	8.4%	1.9%
2011	7.1%	7.1%	11.8%	2.1%	2.1%	1.9%

Inception Date 2/28/1999

If at the outset of 2012 an investor was offered 11.8% for the subsequent decade, who wouldn't have leapt at it, particularly given the two prior bear markets contributing to a mere 1.9% annualized gain for the passive index? Hewing to our investment process, we proceeded to "outperform" the prior 13-year result by 0.1% per year, improving our since-inception compound annual return from 11.8% at year-end 2011 all the way up to 11.9% at year-end 2021. At year-end 2021, the index experienced its fourth-best 10-year return over the entire history of the U.S. stock market, returning 16.6% annually. Only the decades ending in 1999, 1998 and 1958 were higher. The trailing 10-year return in 1929 reached 16%. 1958 was an outlier, not being a secular peak but coming off extremely depressed margins and multiples a decade prior.

Year	SAI Equities Only	CAGR from 2021	CAGR from 1999	S&P 500 Composite Total Return	CAGR from 2021	CAGR from 1999
1999	29.1%	11.9%	29.1%	19.9%	8.1%	19.9%
2000	30.7%	11.1%	32.9%	-9.1%	7.5%	4.8%
2001	23.1%	10.2%	29.4%	-11.9%	8.4%	-1.4%
2002	-22.0%	9.6%	13.4%	-22.1%	9.5%	-7.3%
2003	38.2%	11.6%	18.1%	28.7%	11.5%	-0.8%
2004	16.3%	10.2%	17.8%	10.9%	10.6%	1.1%
2005	7.4%	9.9%	16.2%	4.9%	10.6%	1.7%
2006	18.4%	10.1%	16.5%	15.8%	11.0%	3.4%
2007	3.1%	9.5%	14.9%	5.5%	10.7%	3.6%
2008	-21.6%	10.0%	10.5%	-37.0%	11.0%	-1.5%
2009	27.9%	12.9%	12.0%	26.5%	16.0%	0.8%
2010	14.4%	11.7%	12.2%	15.1%	15.2%	1.9%
2011	7.1%	11.5%	11.8%	2.1%	15.2%	1.9%
2012	6.8%	11.9%	11.4%	16.0%	16.6%	2.9%
2013	17.3%	12.5%	11.8%	32.4%	16.6%	4.7%
2014	5.2%	12.0%	11.4%	13.7%	14.8%	5.2%
2015	-10.3%	13.0%	10.0%	1.4%	14.9%	5.0%
2016	27.7%	17.4%	10.9%	12.0%	17.4%	5.4%
2017	18.0%	15.4%	11.3%	21.8%	18.5%	6.2%
2018	-1.4%	14.8%	10.6%	-4.4%	17.7%	5.6%
2019	23.6%	20.7%	11.2%	31.5%	26.1%	6.7%
2020	11.9%	19.3%	11.2%	18.4%	23.4%	7.2%
2021	27.3%	27.3%	11.9%	28.7%	28.7%	8.1%

Inception Date 2/28/1999

Some may conclude that by earning "only" an annualized 11.9% during a decade when the index posted 16.6% that we've lost our touch (if we ever had it). I'd counter, vehemently, that our process doesn't lend itself to earning 16.6% over any ten-year period. The earnings power of our businesses and accretion to fair value drives the economics of returns over time. Our companies retain profit and invest at yields that in combination with the initial yield should get us to perhaps 9% to 12% over time, likely not more, hopefully not less.

More importantly, I'd further argue that an enormous amount of risk develops late in secular bull markets. Subsequent 10-year returns are abysmal, even catastrophic. Following the secular bull during the 1920s, ten-year trailing returns were -0.1% at the end of 1937, -1.8% in 1938 and -0.3% in 1939. The 10-year return at year-end 2008 was -1.5% and at year-end 2009 was -0.9%. 1937, 1938, 1939, 2008 and 2009 marked the *only* 10-year periods in U.S. market history with negative returns.

At year-end 2011 we had sizable outperformance in every yearly backward return series to inception. Our 1-year was ahead by 5% per year, the 2-year was ahead by 2.3% per year…with the 13-year at the previously stated 9.9% annual outperformance. While Semper's returns going forward matched our expectations over time, the index was set to produce one of the best ten-year stretches in its history—a performance no truly prudent investor should expect to match without throwing caution to the wind, something we will never do.

Relative returns during the first four years of this past decade were well behind the index, but then matched it for the next six. For the first three of the four years 2012 to 2015 Semper's stocks returned 9.6% per year while the index averaged more than double ours, at 20.4%. Ours were on par with long-run

expectations, but the bull was doing what bulls do. In 2015, a year where the median stock in the market declined more than 20%, Semper's stocks were down 10.3% while the index gained 1.4%. Few wanted to hear about how the FANGs contributed 4% to the index return. Berkshire's shares were down 12.5% and the heat was on, even though our now 17-year return at 10.0% doubled the index's 5.0% annual return. What have you done for me lately? Over the four years ended 2015, our stocks averaged only 4.3% while the index gained 15.3%.

Thanks to declining share prices of many portfolio holdings during 2015, overall valuation became *very inexpensive*. The 2015 letter attempted to explain this, and with Berkshire as an example delved into how intrinsic value is derived. Many wondered not only if we had lost our touch but whether Berkshire had as well. Fortunately for the handful of clients concerned with short-term ability to pick stocks (we have no short-term ability on that front), the portfolio returned 27.7% in 2016 while the index earned 12.0%. Now at the end of 2021, despite only "beating the market" in two of the past ten individual years, since year-end 2015 we managed to match the bullish index at 17.4% annually for the most recent six of those years. Lagging by earning only 27.3% versus 28.7% in 2021 killed what was five-year outperformance.

One additional consideration. There is no doubt that earning 11.9% in a portfolio of stocks when the index races ahead by 16.6% is a significant difference, regardless of expectations going in. $1 million at an 11.9% CAGR for 10 years grows to "only" $3.1 million, whereas the same $1 million at a 16.6% CAGR grows to $4.6 million, leaving us with only 67% of the resultant wealth. Before we get to the prospective return on our year-end 2021 diminished starting pool of capital (we expect to recapture the difference), don't lose sight of the fact that in the past decade, and certainly the past 13 years since 2008's 37% washout, the S&P has gone straight up (ignoring a very brief pandemic side trip). Yes, we beat the index for the first 3 of the 13-year stretch since 2008 and matched it for the final 6, know that clients had *far more capital* at the outset of the great bull, given our huge outperformance during the two severe bear markets and throughout the first 10 of the past 23 years.

A stock portfolio earning 11.9% versus 8.1% for the index, 3.8% annual outperformance over nearly 23 years, produces way more over the long haul despite lagging by 4.7% annually for the last 10 years of the series. Beginning with the same $1 million, equities compounding by 11.9% over 23 years grows to $13.3 million versus $6 million for the index. Thus, the equity portion of our capital grew more than 13 times and produced more than twice as much dollar wealth. Now take that differential and plug in your return expectations going forward. If we manage to repeat our 11.9% returns over the next 23 years as well, the original $1 million grows to $176 million. The index at 8.1% for the full 46 years? Only $36 million.

Let me be clear here. The Semper return series presented here is before backing out any drag from cash that exists in client accounts and is before our management fees but inclusive of trading costs. The intent is to illustrate returns from investments in stocks. We have clients with little to no cash and some with permanent cash reserves, all of which is included in our composite return series. The drag of these varying cash reserves over 23 years lowers the long-term return by 1.8% and net of fees the return is 9.2%, still 1.1% ahead of the index. The discussion of how much cash to maintain over time, and at what rate new deposits should be put to work is an important one and specific to each investor. A foundation making 5% gifts of assets to charity annually will spend 15% of average capital over a period of two years (presume annual grants occur once yearly). Clients with little to no need for cash can remain fully invested. Every client is different. Institutions often prefer staying fully invested when hiring a manager to invest an equity portfolio or a portion of an equity allocation. This next section may present the most important series of questions faced by index investors over the next decade.

Expected Returns for the S&P 500 – Decades Past, Present and Future – Not Gonna' Do It

"Not gonna' do it." – Various

Armed with a 9.3% earnings yield and a portfolio trading at a wide discount to intrinsic value, we are giddy about not only absolute investment prospects but relative to the market, finding the S&P 500 as secularly stretched as in 1929 and 2000. Each secular peak led to a decade of losses. Surely the next ten years can't produce losses, counters the passive crowd. Interest rates are low so stock prices *must* be high, they insist. The biggest stocks are nowhere near as expensive as in 1999, they doth protest.

Let's examine now the sources of index return, a straightforward exercise involving only a few variables. Once through the sausage grinder, the bull must present an expectation for growth in sales per share, growth in profit margins and growth in the multiple paid for those margins. Sales per share can be further broken down by changes in dollar sales and any dilution or accretion from changes in the share count. The sophisticated owner of the index, or a portfolio resembling the index, if objective in answering these questions, must reconcile them with predispositions about expected returns.

The past decade saw earnings per share for the S&P 500 rise 7.7% annually from $96.44 to an expected $201.86. At the outset, the after-tax profit margin of 9.2% was capitalized at 13 times earnings, resulting in an index price of $1,257.60, 117% of sales. Ten years later, on a profit margin of 13.4% and a 23.6 multiple, the index closed 2021 at $4,766.18, or 316% of sales. Combined with sales per share growing by 3.7% annually, the index compounded by a historically eye-popping 16.6%. Here's a progression of each key component to producing investment return.

The total return from common stocks is most simply broken down by knowing three components – growth in earnings per share, change in the P/E multiple, and earnings from dividends. Total return is easily calculated by multiplying EPS growth by multiple growth and adding the dividend yield:

$$Total\ Return = (EPS\ Growth \times Change\ in\ P/E\ Multiple) + Dividend\ Yield$$

I find further informative utility by breaking down how much of growth in earnings per share comes from margin growth and how much from growth in sales per share:

$$EPS\ Growth = Sales\ Per\ Share\ Growth * Margin\ Growth$$

Of course, it's further imperative to know how much sales growth in dollar terms is diluted from by an increasing share count or increased thanks to a reduction in shares outstanding. Note that one is added to the growth rate for dollar sales and share count, with one then subtracted after the multiplicative function. In the tables below, growth over ten years in not simply a compound figure but measures the rate of dilution or accretion. For those reconciling or following the math, note for "Growth %" when measuring change in the share count, for that one figure you are really measuring annual dilution or ownership increase:

$$Sales\ Per\ Share\ Growth = Dollar\ Sales\ Growth / Share\ Count\ Growth$$

Calculation of total return broken down by the full set of variables is a multiplicative function of each component (lending this letter some academic heft):

$$\big((1+EPS)*(1+PE)\big)-1=PR$$

$$\big((1+SS)*(1+MG)*(1+PE)\big)-1=PR$$

$$\left(\frac{1+DS}{1+SC}*(1+MG)*(1+PE)\right)-1=PR$$

$$\left(\frac{1+DS}{1+SC}*(1+MG)*(1+PE)\right)-1+DY=TR$$

For the above formulas, the variables are:

SS = Sales per Share Growth	PE = PE Multiple Growth	DY = Dividend Yield
DS = Dollar Sales Growth	SC = Share Count Growth	PR = Price Return
MG = Margin Growth	EPS = EPS Growth	TR = Total Return

If anyone suggests submission of this letter to some academic journal, it would be very easy to substitute Greek letters for some real gravitas (leaving delta and omicron out of it, naturally).

Moving on to what's important here, seeing the components of drivers of the decade's 16.6% index return is extraordinary and impossible to repeat during the coming ten years.

10 Years	EPS	DPS	Sales Per Share	Sales in Dollars	Share Count	Margin	P/E Multiple	Yield	Price	Total Return
12/31/11	96.4	29.1	1,052.8	9,531.2	9,052.9	9.2%	13.0	2.3%	1,257.6	
12/31/21	201.9	63.1	1,511.0*	12,794.0	8,467.3	13.4%	23.6	1.3%	4,766.2	
Growth %	109.3%	116.8%	43.5%	34.2%	6.9%	45.8%	81.1%	-42.8%	279.0%	362.6%
Annual Avg	7.7%	8.0%	3.7%	3.0%	0.7%	3.8%	6.1%	2.3%	14.3%	16.6%
Return Attribution				3.1%	0.7%	4.0%	6.4%	2.4%		16.6%

*Estimate

The largest return driver over the decade was an expansion in the P/E multiple from 13.0 to 23.6 times, an 81.1% increase and annual growth of 6.1%. Here it is important to note that it is not correct to infer that 6.1% of the 16.6% return came from multiple expansion. Remember, the derivation of return is multiplicative. Simply adding across can get close but will not be correct. By attributing each of the five components as a percentage of the return can you then get to a contribution from each. Thus, the index earned 6.4% annually just from multiple expansion alone.

The balance of return was closely split between 3.8% annual growth in the profit margin and 3.7% growth in sales per share. The profit margin grew from what was *already* a record 9.2% to a new record 13.4%. To get to one of the best 10-year periods of all time, you'd customarily expect to see some combination of margins and multiples rising from a depressed base. A 4% margin and an 8 multiple to earnings in 1982 would be a perfect example here, as that was the launch point for the great 18-year bull market that ensued, when the multiple grew from 8 to 33 and the margin from 4% to 7.4%.

I ask lots of professional investors how fast sales per share and overall dollar sales grew annually for the past decade and two decades. Most guess wildly high. For the past decade, presumed strong by most observers since stocks retuned 16.6%, sales per share grew 3.7% annually, but sales only by 3.0% in dollar terms. A reduction in the overall share count at an annual rate of 0.7% helped the overall return. If

one considers that companies spent more than all their profits (augmented with an increase in net debt) not paid as dividends repurchasing shares, perhaps that's what's driven the ballooning of the P/E multiple? This will be seen in reverse when examining the decade ending in 1999 when the share count ballooned, repurchases not yet much of a thing. Either way, executives got rich.

Using very rosy assumptions, an investor concluding that the profit margin at 13.4% will be the peak and the 23.6 multiple (an operating earnings yield of 4.2%) will likewise grow no higher will be left with growth in sales per share plus the dividend yield. Adding 3.7% expected growth in per share sales to today's puny and near-record-low 1.3% dividend yield arrives at a 5.0% annual expected return over the next 10 years.

The CIO expecting a 10% return from the index, presuming sales per share growth of 3.7% and our initial dividend yield of 1.3%, requires some combination of 4.8% annual growth in the margin and the multiple (remember from the formulas above, one must multiply rather than add the growth in sales per share, margin, and multiple). Split evenly, at just less than 2.4% annual growth, the profit margin grows to 16.9 and the P/E multiple to 29.8. Holding the margin at today's peak 13.4% requires a 37.7 P/E multiple. These are bets I wouldn't take, and if the job depends on attaining a return expectation, one really needs to think long and hard about these assumptions.

Corroborating the 16.6% decade-long bull market through 2021, how about the degree to which the variables impacted the 10-year bull ended in 1999, which saw the S&P rock along at an even higher 18.2% torrid clip? Although the eventual peak wouldn't come until March 2000, year-end 1999 was close enough for jazz to the secular peak. *Said summit was a great time to have previously owned the S&P. It was a most unfortunate time to own it.*

10 Years	EPS	DPS	Sales Per Share	Sales in Dollars	Share Count	Margin	P/E Multiple	Yield	Price	Total Return
12/31/89	24.3	11.5	452.9*	3,033.4	6,697.8	5.4%	14.5	3.2%	353.4	
12/31/99	51.7	16.2	647.0	5,422.6	8,381.8	8.0%	28.4	1.1%	1,469.3	
Growth %	112.5%	41.5%	42.8%	78.8%	-20.1%	48.8%	95.6%	-66.0%	315.7%	432.9%
Annual Avg	7.8%	3.5%	3.6%	6.0%	-2.2%	4.1%	6.9%	2.9%	15.3%	18.2%
Return Attribution				6.2%	-2.3%	4.2%	7.2%	3.0%		18.2%

*Estimate

Just as from 2011 to 2021, the earlier decade ended 1999 witnessed a likewise mammoth near doubling in the P/E multiple, from 14.5 to a nosebleed 28.4. 'Twas not a multiple capitalized against depressed margins either. The 8% margin at century's end was only historically topped by 1929's then record 8.9%. Inflation was higher prior to 2000 so dollar sales grew by 6.0% annually, twice as fast as during the previous decade. Companies really hadn't picked up on the share repurchase, at least in scale yet, so as the tech world IPO'd every idea with a heartbeat and companies gave mountains of options to insiders and key employees, the share count surged by 25%, 2.2% annually, reducing growth in sales per share to the nearly identical 3.6% as from 2011 to 2021. Ironic. It's hard to tell in which decade-long iteration shareholders were more abused, either from outright dilution or via buybacks at prices north of intrinsic value. Time will tell, I suppose.

Fully 7.2% of the decade's 18.2% gain came from multiple expansion, 4.2% from margin expansion, 6.2% from growth in dollar sales and 3.0% from dividends, which ended 1999 at a record-low 1.1% yield. At the tippy top, the yield would bottom at under 1% thanks to a peak 33 P/E multiple. Dilution cost the investor 2.3% per year of return.

The crowd, increasingly manic as the bull neared the top, expected high-teens returns going forward. Times had been good. They had been great. What did they get? Zip. Zilch. Nada. Losses actually.

To wit, the subsequent decade:

10 Years	EPS	DPS	Sales Per Share	Sales in Dollars	Share Count	Margin	P/E Multiple	Yield	Price	Total Return
12/31/99	51.7	16.2	647.0	5,422.5	8,381.8	8.0%	28.4	1.1%	1,469.3	
12/31/09	56.9	22.6	908.4	8,087.3	8,902.8	6.3%	19.6	2.0%	1,115.1	
Growth %	10.0%	39.8%	40.4%	49.1%	-5.9%	-21.6%	-31.0%	84.1%	-24.1%	-9.1%
Annual Avg	1.0%	3.4%	3.5%	4.1%	-0.6%	-2.4%	-3.6%	1.8%	-2.7%	-0.9%
Return Attribution				4.8%	-0.7%	-2.8%	-4.3%	2.1%		-0.9%

Two gut-punching bear markets ensued over the decade following 1999. Instead of earning expected high-teens returns, the passive crowd lost 0.9% per annum. Whoops. Thankfully, and tongue in cheek, the scant initial 1.1% dividend yield doubled to 2% over the decade. I embellish how vital dividends were here, as dividends per share grew only 3.4% annually. A cumulative 24.1% decline in price, -2.7% per year, combined with some yield for a 9.1% total loss over ten years.

Cherry picking a market low? Nope. The 9-year return through 2008 witnessed a loss of 28.1%, or 3.3% per year. You had multiple compression, margin compression, dilution from net share issuance (banks needed new capital because they were, you know, bankrupt – putting the "rupt," as in "rupture," in banking). Sales in dollars grew, despite two nasty recessions, at 4.1% annually; and dividends added an average 1.8% yield. Oh, and companies don't buy their shares back when they are cheap, because they either need the money to survive, or they become chicken.

I should note here that we were running an alternative earnings estimate in the wake of the Global Financial Crisis. Profits were completely washed out, but in our opinion were rising faster than Wall Street analysts could keep up (analysts are more typically a too-bullish bunch, unless badly wounded). Instead of a depressed $56.86 in EPS as seen in the table above, we were using an $80 EPS instead. The price was still the price, so by using our higher profit figure, the adjusted profit margin was necessarily higher, and conversely the P/E multiple of 19.6 times depressed earnings became 13.9 times. From an attribution, you either had massive multiple contraction offset by some margin growth, or a more evenly divided loss in both the margin and the multiple.

10 Years	EPS	DPS	Sales Per Share	Sales in Dollars	Share Count	Margin	P/E Multiple	Yield	Price	Total Return
12/31/99	51.7	16.2	647.0	5,422.5	8,381.8	8.0%	28.4	1.1%	1,469.3	
12/31/09	80.0*	22.6	908.4	8,087.3	8,902.8	8.8%	13.9	2.0%	1,115.1	
Growth %	54.8%	39.8%	40.4%	49.1%	-5.9%	10.2%	-51.0%	84.1%	-24.1%	-9.1%
Annual Avg	4.5%	3.4%	3.5%	4.1%	-0.6%	1.0%	-6.9%	1.8%	-2.7%	-0.9%
Return Attribution				6.0%	-0.9%	1.4%	-10.0%	2.6%		-0.9%

*Estimate

The news for the bulls doesn't get much better for the 12 years ended 2011. Illustrating this time series allows us to link the bear market beginning 2000 with the most recent decade. Even over 12 years the market still suffered a painful halving in the multiple, slight expansion in the margin from 8% to 9%, yearly dollar sales growth of 4.8%, offset by 0.6% annual dilution (recall the banks) plus some yield. The multiplicative sausage maker churns out a whopping total return of 6.8%, or 0.6% annualized. Call it breakeven but setting up the bull to come.

12 Years	EPS	DPS	Sales Per Share	Sales in Dollars	Share Count	Margin	P/E Multiple	Yield	Price	Total Return
12/31/99	51.7	16.2	647.0	5,422.5	8,381.8	8.0%	28.4	1.1%	1,469.3	
12/31/11	96.4	29.1	1,052.8	9,531.2	9,052.9	9.2%	13.0	2.3%	1,252.6	
Growth %	86.6%	79.8%	62.7%	75.8%	-7.4%	14.7%	-54.3%	110.8%	-14.7%	6.8%
Annual Avg	5.3%	5.0%	4.1%	4.8%	-0.6%	1.1%	-6.3%	1.9%	-1.3%	0.6%
Return Attribution				3.0%	-0.4%	0.7%	-4.0%	1.2%		0.6%

Linking the entire 22 years from year-end 1999 through 2021, the cumulative record would be surprising to those believing over the "long term" an investor will earn 10% annually in stocks. There's an asterisk in compounding series beginning from secular peaks and troughs. Poisonous snakes, lethal to bulls, exist at secular tops. Despite a 16.6% annual surge over the past decade and 16.0% over the full 13 years since year-end 2008, the long-term index return since 1999 rises all the way up to…7.5% per year. Price matters.

22 Years	EPS	DPS	Sales Per Share	Sales in Dollars	Share Count	Margin	P/E Multiple	Yield	Price	Total Return
12/31/99	51.7	16.2	647.0	5,422.6	8,381.8	8.0%	28.4	1.1%	1,469.3	
12/31/21	201.9	63.1	1,511.0*	12,794.0	8,467.3	13.4%	23.6	1.3%	4,766.2	
Growth %	290.6%	289.6%	133.6%	135.9%	-1.0%	67.2%	-16.9%	20.1%	224.4%	394.2%
Annual Avg	6.4%	6.4%	3.9%	4.0%	0.0%	2.4%	-0.8%	2.0%	5.5%	7.5%
Return Attribution				4.0%	0.0%	2.4%	-0.8%	2.0%		7.5%

*Estimate

Those scratching their heads on how to top a record 13.4% margin, 23.6 multiple, 3% annual dollar sales growth (last ten years) and a puny 1.3% dividend yield may find alternatives outside of the passive index or its most overvalued constituents. The next decade will look nothing like the one just closed. As goes the index, holding margins and multiples at present levels, the mid-single digit bet looks unappealing, particularly when it comes with likely nasty splashes of red ink, or blood in the streets (with apologies to Theranos shareholders). Surely there are portfolios built to earn more than mid-single digit returns, incorporating *far* less risk in the process.

Fab 5 Contribution – Gargantuan! How Much Prospectively?

Let's briefly examine how much of the S&P's 16.6% annual return in the past decade came from the Fab 5 giants sitting atop the market. It was like a steel-cage, tag-team match with King Kong and Godzilla against Barbie and Ken, but not scripted in Hollywood. The dolls never had a chance. How much of each company's total return came from margin and multiple expansion, sales growth, change in the share count and dividends? Collectively and individually, what's to expect for the next decade from each variable?

Investors not owning Apple, Microsoft, Google, Amazon, and Facebook in scale for the past decade had a hell of a time keeping up. The quintet comprised 8.5% of the initial market cap of the S&P 500, compounded by 29.8% as a group, and grew to 24.8% of the entire market cap of the index at year-end 2021. It's remarkable that 8.5% of the index earned 29.3% of the total return while 91.5% contributed only 70.7% of the gain. The remaining 495 stocks earned 14.3% per year, not shabby at all, but shrank from 91.5% of the index to 75.2%. Wow. The Fab 5 earned investors 13.6 times their money in a decade where the index made 3.8 times. Both are extraordinary when overall sales in dollars for the index grew 3% annually.

For perspective, $1 million in the Fab 5 grew to $13.6 million. $1 million in the index grew to $3.8 million. Applying the same math but viewing the Fab 5's initial $8.5% index weight as a percentage of a hypothetical starting portfolio of $100 million. If the Fab 5 were allocated $8.5 million of the $100

million at the outset, they had $116 million ten years later. The owner of the Less Fab 495, starting with $91.5 million, grew to $348 million. Lordy.

It's not like the five were undiscovered at the outset of 2012. They comprised 3.0% of index sales and 7.7% of profits. They now combine to produce 11.0% of sales and 17.4% of all profits earned by companies in the index. It is nothing short of extraordinary to see five companies grow from 8.5% of market cap to 24.8% in ten years. Two years ago, I asked how much more share of each could capture. To date they continue conquering.

Suppose the next decade matches the one just ended, with the Fab 5 compounding at 29.8% and the index at 14.3%. In 2032 I'll be writing that the Fabs are now 54% of the S&P 500. OK. That sounds reasonable if they keep growing their businesses faster than everyone else. There's one problem with this little extrapolation, however. At the same rates of growth, the jazz quintet grows to $101 trillion, the 495 laggards to $86 trillion, and on 3.5% growth in sales per share and a 6.5% reduction in shares outstanding, sales grow to $11.8 trillion. Somehow, I don't think the S&P 500 will trade for 16 times sales and 6 times GDP (with GDP growth matching sales growth). But who knows? Hyperinflation?

Fab 5 Cap Weight	EPS	DPS	Sales Per Share	Sales in Dollars	Share Count	Margin	P/E Multiple	Yield	Price	Total Return
12/31/11	0.1	0.0	0.3	289.6	1,000.0	23.1%	14.4			
12/31/21	0.4	0.0	1.8	1,408.6	787.7	21.1%	33.4			
Growth %	464.5%		517.5%	386.4%	-21.2%	-8.6%	131.6%		1206.9%	1256.5%
Annual Avg	18.9%		20.0%	17.1%	2.4%	-0.9%	8.8%	0.5%	29.3%	29.8%
Return Attribution				18.3%	2.6%	-1.0%	9.4%	0.5%		29.8%

S&P 500	EPS	DPS	Sales Per Share	Sales in Dollars	Share Count	Margin	P/E Multiple	Yield	Price	Total Return
12/31/11	96.4	29.1	1,052.8	9,531.2	9,052.9	9.2%	13.0	2.3%	1,257.60	
12/31/21	201.9	63.1	1,511.0*	12,794.0	8,467.3	13.4%	23.6	1.3%	4,766.18	
Growth %	109.3%	116.8%	43.5%	34.2%	6.9%	45.8%	81.1%	-42.8%	279.0%	362.5%
Annual Avg	7.7%	8.0%	3.7%	2.988%	0.671%	3.8%	6.1%	0.0%	14.3%	16.6%
Return Attribution				3.1%	0.7%	4.0%	6.4%	2.4%		16.6%

*Estimate

Remarkably, whether equal weighted or market cap weighted, the five giants produced a 29.8% total return over the decade. Unlike the index where multiple growth contributed the most to return, sales growth drove the bus for the Fab 5, producing two-thirds of the 29.8% return. Margin and multiple expansion combined to produce almost two-thirds of the index return. It wasn't like the 5 didn't enjoy multiple expansion, either. The group traded for an impossible to believe now 14.4 times earnings and saw the multiple explode to 33.4. Few would have believed that in ten years the 5 could grow revenues from $290 billion to more than $1.4 trillion. That's 17% annual growth, with the largest two companies, Apple and Microsoft, already doing $128 billion and $72 billion respectively in revenues. As already large companies, they "only" grew sales by 11.5% and 9.5%; but thanks to the newbies! Google grew sales 21.1% per year, Amazon 25.6%, and Facebook 41.3%. The original two stalwarts did the heavy lifting on the share count. Apple bought back 38% of its shares with Microsoft retiring 11%. The others rewarded insiders with lots of shares, each growing shares outstanding, diluting passive shareholders. In no cases were there complaints by shareholders, and understandably so. Nobody complains when everyone is getting rich. Attribution for the Fab 5 is presented in sequence here for ease of comparison.

AAPL	EPS	DPS	Sales Per Share	Sales in Dollars	Share Count	Margin	P/E Multiple	Yield	Price	Total Return
12/31/11	1.3	0.0	4.9	127.8	26.11	25.8%	11.4	0.0%	14.46	
12/31/21	6.2	0.9	23.2	378.3	16.32	26.5%	28.9	0.5%	177.57	
Growth %	387.1%		373.5%	195.9%	-37.5%	2.9%	152.1%		1124.3%	1165.3%
Annual Avg	17.2%		16.8%	11.5%	4.8%	0.3%	9.7%	0.4%	28.5%	28.9%
Return Attribution				15.2%	4.3%	0.3%	8.7%	0.4%		28.9%

MSFT	EPS	DPS	Sales Per Share	Sales in Dollars	Share Count	Margin	P/E Multiple	Yield	Price	Total Return
12/31/11	2.7	0.7	8.6	72.1	8.39	31.5%	9.6	2.8%	25.96	
12/31/21	8.8	2.4	24.7	184.9	7.50	35.8%	38.1	0.7%	336.32	
Growth %	226.7%	227.8%	187.2%	156.6%	-10.7%	13.7%	296.6%		1192.0%	1250.2%
Annual Avg	12.6%	12.6%	11.1%	9.9%	1.1%	1.3%	14.8%	0.6%	29.2%	29.7%
Return Attribution				10.6%	1.2%	1.4%	15.9%	0.6%		29.7%

GOOGL	EPS	DPS	Sales Per Share	Sales in Dollars	Share Count	Margin	P/E Multiple	Yield	Price	Total Return
12/31/11	15.3	0.0	58.3	37.9	0.65	26.3%	21.1	0.0%	323.27	
12/31/21	102.2	0.9	389.8	257.6	0.66	26.2%	28.3	0.0%	2,897.04	
Growth %	566.4%		568.0%	579.7%	1.7%	-0.2%	34.5%		794.0%	794.0%
Annual Avg	20.9%		20.9%	21.1%	-0.2%	0.0%	3.0%	0.0%	24.5%	24.5%
Return Attribution				21.6%	-0.2%	0.0%	3.1%	0.0%		24.5%

AMZN	EPS	DPS	Sales Per Share	Sales in Dollars	Share Count	Margin	P/E Multiple	Yield	Price	Total Return
12/31/11	1.4	0.0	105.6	48.1	0.46	1.3%	124.6	0.0%	173.10	
12/31/21	47.2	0.9	923.3	469.8	0.51	5.1%	70.7	0.0%	3,334.34	
Growth %	3296.8%		774.0%	877.2%	11.8%	288.7%	-43.3%		1820.0%	1820.0%
Annual Avg	42.3%		24.2%	25.6%	-1.1%	14.5%	-5.5%	0.0%	34.4%	34.4%
Return Attribution				26.3%	-1.1%	14.9%	-5.7%	0.0%		34.4%

FB	EPS	DPS	Sales Per Share	Sales in Dollars	Share Count	Margin	P/E Multiple	Yield	Price	Total Return
12/31/11	0.3	0.0	1.7	3.7	2.14	18.0%	122.8	0.0%	38.23	
12/31/21	14.5	0.0	43.3	117.9	2.72	33.4%	23.3	0.0%	336.35	
Growth %	4545.7%		2401.2%	3077.8%	27.1%	85.7%	-81.1%		862.5%	862.5%
Annual Avg	46.8%		38.0%	41.3%	-2.4%	6.4%	-15.3%	0.0%	25.4%	25.4%
Return Attribution				35.0%	-2.0%	5.4%	-13.0%	0.0%		25.4%

As a group, what can be expected for the next decade? Size dictates that shareholders will not make 29.8%, dollar sales will not grow 17.1% annually and the collective P/E multiple will not again grow 2.3x from 33.4 to 77 times earnings. Something's gotta give.

Except for profit margins at Amazon, we won't likely see much expansion beyond present levels among the other four companies. This is one of the same arguments against the S&P 500. Amazon's multiple at 71 reflects the fact that it's still growing into its profit margin structure. At 5.1%, margins can double from here, depending on the mix of business over time. The primary retail business is a very low margin business, like at Costco. That's not the source of most of the firm's profit, however.

Multiple expansion was another driver of return for the two dominant (by size) members at the outset of the decade. Apple's P/E multiple expanded from 11.4 times to 28.9. Microsoft saw an even greater lift. Some forget that Microsoft traded for less than 10 times earnings at a time when margins were also well below 2000's highs. Over the decade Microsoft's P/E ballooned from 9.6 times to 38.1. A combination of 38 times and a 36% margin does not lend itself to much room for improvement beyond sales growth per

share and a skinny 0.7% dividend yield despite 27% of profit paid as dividends, reflecting the high multiple.

Google's multiple expanded modestly, from 21.1 times to 28.3 times, contributing 3.1% to a 24.5% total return. With a flat share count and no dividend paid, the balance of return derived from 21% annual growth in sales per share. Incremental return on the capital-lite business may see ongoing sizable contribution from margins as well as revenues. Regulatory risk is not insignificant here.

Amazon was the best performing of the five, posting 34.4% annual returns. A high 124.6 multiple to start the decade reflected likely margin expansion, which indeed expanded from 1.3% to 5.1%. Margin contributed 14.9% to return while a 9x increase in sales provided 26.3% of annual return. Shareholders are likely to see perhaps a doubling of margins from here but will also see a compression in the 70.7 multiple. From a base of $470 billion in annual revenues, sales growth will decelerate to high-teens and ultimately lower. Assuming margin growth is negated with multiple compression, a low-to-mid-teens return seems reasonable for the decade to come.

Facebook was the baby of the group at the outset of the decade. In fact, it didn't come public until May 2012. The share count used here is as of the IPO. Sales at the beginning of the decade were as reported for 2011 as a private company. The 25.4% annual return is from the IPO. Incorporation into the Fab 5 group from year-end 2011 is as close to apples to apples as possible, bad pun intended. Spectacular 41.3% annual sales growth contributed more than Facebook's 24.5% annual return. How? The multiple contracted from 122.8 to 23.3, a 13% hit to return attribution. Margin expansion from 18.0% to 33.4% added 5.4% to annual return, with 27% cumulative dilution subtracting 2.0% from return.

It's too soon to say the party is over. Even holding margins and multiples constant at high levels, the Fab 5 should collectively enjoy premium sales growth versus the index and the broad economy for several years. At what some may define as a too-conservative 10% growth in sales, the top line grows from $1.4 trillion to $3.7 trillion. If the index's 3% revenue growth CAGR holds steady, group sales would grow from 11% of the index total to 21.5%. Sounds like a lot. At a like 21.1% margin, $781 billion would double the share of profits from 17.4% to 34.0%. Hmm. A 10% growth in share price versus 5% for the index takes the Fab 5 to 34% of the index market cap from just under 25% now.

I don't know what gets in the way. Regulation? Competition with each other or with others? Slowing sales growth or margin compression? There's little room for error when margins are high and so are multiples, particularly when the businesses are now Goliaths. The law of large numbers is a thing and eventually becomes an anchor. We owned Microsoft for numerous years after the stock dropped 75% from its 2000 high. Regrettably we never got to Google despite understanding the business very well. YouTube is a home run. Regardless, we are thrilled to not own the S&P 500 or the Fab 5 today, outside of a very large indirect position in Apple within Berkshire. High multiples on high margins are a recipe for either disaster or mediocrity. Buck Showalter, former major league skipper, used to say, "I like our guys." Low multiples on healthy profits, room for margin expansion, superb balance sheets and managements with the opportunities and capability to retain earnings and invest at good incremental returns.

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BENIGN NEGLECT

"Benign neglect, bordering on sloth, remains the hallmark of our investment process" – Warren Buffett

"Abnormally good or abnormally bad conditions do not last forever." – Benjamin Graham, Security Analysis

"Stock prices have reached what looks like a permanently high plateau. I do not feel there will be soon if ever a 50- or 60-point break from present levels, such as bears have predicted. I expect to see the stock market a good deal higher within a few months." – Irving Fisher, The Reader's Digest, October 16, 1929

Secular Peaks and Troughs – "Pivot Points"

	9/29 Peak	7/32 Low	3/37 Peak	4/42 Low	2/66 Peak	8/82 Low	3/00 Peak	10/02 Low	10/07 Peak	3/09 Low	12/21 Peak?
S&P 500	34	4	20	7	94	102*	1527	777	1565	666	4766
After-Tax Profit Margin	8.9%	-3.2%	6.4%	6.6%	6.7%	4.0%	7.4%	5.8%	9.4%	-0.1%	13.4%
Price to Op Earnings (TTM)	26	NMF	8	7	18	8	33	19	22	NMF	24
Price to Earnings (CAPE)	30	4	23	9	25	7	44	23	28	15	40
Price to Sales	2.31	0.48	0.51	0.46	1.20	0.32	2.13	1.11	1.57	0.666	3.17
Price to Book Value	3.0	0.3	2.2	0.8	2.4	0.9	5.2	2.3	3.0	1.5	4.9
Dividend Yield	3.0%	17.5%	3.7%	8.7%	2.9%	6.1%	1.0%	2.0%	1.7%	4.0%	1.3%
Market Cap All Stocks	93.3B	15.3B	66.2B	32.4B	624B	1.1T	14.0T	7.0T	15.9T	7.0T	48.9T
GDP	103.7B	58.8B	91.9B	162B	789B	3.3T	9.9T	11.0T	14.6T	14.4T	23.4T
Market Cap to GDP	90%	26%	72%	20%	79%	33%	141%	64%	109%	49%	209%
Total Credit Market Debt	175B	150B	159B	227B	1.12T	5.2T	26.7T	32.2T	51.2T	54.6T	86.9T
Total Credit Mkt Debt / GDP	169%	255%	173%	140%	142%	158%	264%	293%	352%	380%	371%
U.S. Government Bond Yield	3.4%	3.5%	2.6%	1.9%	4.6%	14.6%	5.9%	4.7%	4.9%	3.5%	1.9%
U.S. Discount Rate	6.0%	2.5%	1.5%	1.0%	4.5%	10.75%	5.5%	1.25%	5.0%	0.75%	0.25%
Inflation (CPI)	0.6%	-9.9%	3.6%	10.9%	3.7%	11.0%	3.4%	1.6%	2.9%	-0.4%	7.0%
Unemployment Rate	2.3%	24.9%	11.7%	4.9%	4.2%	10.8%	3.9%	6.0%	5.0%	9.9%	3.9%

*A peak price can approximate the subsequent trough price following 17 years, especially when marked by high inflation.
Source: Semper Augustus, Federal Reserve Bank of St. Louis, Bureau of Economic Analysis, Bureau of Labor Statistics, Standard & Poor's, US Treasury

Ask any seasoned investor to name the father of value investing and you will invariably get Benjamin Graham as the reply. Some, particularly academicians and money-printing economists, may suggest John Maynard Keynes. Blasphemy on the latter. Allow me to propose an alternate patriarch, as well as a narrative stroll across a century of major secular stock market peaks and troughs. They say you can't time the markets. While certainly correct in the short term, an awareness of extremes in valuation and secular excess affords the capable an opportunity to pivot. Doing so can preserve and create fortunes.

Client number one at Semper Augustus came into the world in 1903, schooled at Princeton, where he played football and rowed crew, and by the mid-1920s was firmly established in the family brokerage firm, which in name exists to this day. By early 1928, convinced the stock market was bubbling dangerous, he pulled all family capital out of the market. Clients willing to heed the bearish advice of the young broker followed suit. Many did. Students of financial history will immediately recognize that early 1928, with the Dow Jones Industrial Average at 200 or so, was well before the top, at least by price. Painful for sure, watching the ensuing near double, for the Dow wouldn't reach its eventual 381 summit until October of the following year.

If the volcano was smoking in 1928, it blew on Black Thursday, October 24, 1929, when the Dow declined nearly 13%. The eruption continued into the next week, on Black Tuesday spewing another 12%. The secular bear was now in charge, and by mid-November the Dow had lost nearly half of its value and was now below the level at which the young broker and his clients had stepped aside. Molten lava ran hot for nearly three years, burning investors and speculators alike through July 1932, when the index mercifully bottomed at 41.22. You reintroduce cents when prices cascade from triple to double digits.

What Hell hath the secular bear wrought? Unemployment exploded from 2.3% to 24.9%. A young Federal Reserve lowered its discount rate from 6% to 2.5% (QE not yet a thing). Inflation submarined from a nascent 0.6% to a deflationary -9.9%. That's a negative sign, kids. The after-tax profit margin fell from a record 8.9% to a new record, -3.2%. Yet another negative sign. Total credit market debt grew from 169% of GDP to a misleading 255%. Misleading? As debt was restructured downward from $175 billion to $150 billion, the denominator, GDP, was axed by 43%, from $103.7 billion to $58.8 billion. Oddly, despite the deep depression and negative inflation, investors in bonds still demanded interest. The yield on the long government bond actually rose a hair, from 3.4% to 3.5%. Had the Fed understood the wonders of QE, they could have scarfed up all Treasury debt and driven longer yields lower. Alas, it took Ben Bernanke, student of the Great Depression, to engineer the can-kicking, law-of-unintended-consequences-creating playbook here in the U.S. (although the Japanese had beaten him to it). Then again, perhaps in 1932, hoarders expected Executive Order 6102, the 1933 criminalizing of the trading in and ownership of gold. And you thought mask mandates were rough.

On stocks, they shed 89% of their value, falling from a record 3.0 times book value to a record low 0.3 times and from a like-record 2.3 times sales to another record low 0.5 times. On the bright side, the measly 3% dividend yield ballooned to a rich 17.5%. Lest you think from benevolence, know that the standard dividend payout rate was far higher in 1929 than today, at more than 60%. Also, because corporations maintained strong balance sheets, despite not earning profits during the Depression, they had adequate enough cash reserves to pay dividends. The crazy-high dividend yield was simply a byproduct of crazy-low prices.

It's on these crazy-low prices that the story continues, for here at the market low in 1932 did Semper's anchor client, Robert Brookings Smith, have the presence of mind to determine that the General Electric Company could be had for less than its cash (and net working capital) in the business, and with that price one could purchase everything else (property, plant, equipment, know-how, etc.) for free. Ben Graham would coin bargains such as this as "net nets" in his seminal *Security Analysis*. Mr. Smith was doing this in real time in 1932, while the bible of value investing wouldn't be published until 1934, two years later.

It was the buying of GE, and Merck, and American Telephone & Telegraph, and Dow Chemical starting in 1932 – the list goes on – and the shedding of Treasuries and gilts and railroad bonds, that marked Mr. Smith's second extraordinary pivot. Exiting the market in 1928 required prescience. Waiting to buy, not on an early 50% decline but near the eventual bottom, necessitated patience. Ultimately buying when

blood ran thick in the streets exhibited brilliance. While Graham and Keynes, licking the wounds of their respective losses, wrote, Smith *acted.*

The financial archive is devoid (until 2021) of any legitimate investor suggesting that he or she could spin 40% annually for five years. Who would, and who would believe him or her? They would call you Crazy. But it was from the ashes of the market low in 1932 that the market did indeed rise 40% annually for five years. The Dow recovered from 41.22 to 190.29 on February 11, 1937, and so with dividends had compounded by just more than 40%. Those paying attention will note a few things. First, at 191 in early 1937, the market had precisely merely scaled back half of the plunge from 1929's summit. Next, at 191, the Dow's price remained below the level at which Mr. Smith wished bon voyage to stocks. The moral of this story? When forecasting 40% returns per annum for a half-decade, one should probably first sidestep an 80-or-90% loss and retain the capital and the trust of one's investors with which to claw back from whence one came. Oh yes, it's critical as well to avoid being sued in the meantime for having prognosticated the 40% in the first place, despite the use of such qualifying auxiliaries as "*may*" and "*could*." I may be willing to serve as witness for the class. I could do it.

Let's frame the great 1928 pivot and subsequent 1932 re-pivot in the context of the current active versus passive investing debate. Assume two investors in early 1928, each with $1 million in the mighty Dow. One sells. The other Holds On for Dear Life, to have and to hold from this day forward, for better, for worse, through thick and thin, for richer or for poorer (much poorer it turns out), 'til the money do us part. The active seller collects interest at 3.5% in Treasuries, more in gilts and railroad bonds. To October 1929, the happy holder nearly doubles to $1.9 million, plus dividends, which yielded nearly as much as Treasuries. Then, of course, the determined passive bro "HODLs" while $1.9 million shrivels to $200,000. The seller remains intact with $1 million, plus interest, so now has roughly five times the wealth of Mr. Passive. In the teeth of the Depression, most who owned stocks either sold from panic, or needed what was left to live on. Even fully employed doctors, lawyers, and accountants, while working, were barely paid because patients and clients had no money with which to pay. It's here, amidst misery, that Mr. Active invests, growing the preserved $1 million to $5 million in 1937. Presuming the passive investor has the wherewithal to hold on, they also earn five times their money from 1932, returning to $1 million, but mentally will evermore rue the day they were "worth" $1.9 million.

Moving on with secular history, the great bull born in 1932 was interrupted by a little skirmish we came to call World War II. Had the U.S. investor in 1937 known that a little early saber rattling in Europe (a region famous for such frequent incivilities, and rattling) would ultimately be known as The Big One, said investor might have pivoted to cash again. 1937 can be called a secular peak, because stocks did indeed roll over, the recovery interrupted by another thumping, sending the market down 65% through April 1942 to a point in the war where it looked like the world might, in fact, wind up speaking German and Japanese. [I unsuccessfully attempted learning Japanese during a brief stint at the Air Force Academy in 1987, and for my failure, am eternally grateful the war ended with the good guys victorious.] Things looked grim for the Allied forces, the Dow hitting its WWII low of 92.92 on April 28, 1942. The Battles of Midway and Stalingrad shortly followed, and so marking the turning of the war, stocks began their recovery anew, the Dow finally surpassing its 1929 high in 1954, twenty-five years later and never looking back. Who knew it was a great time to own stocks? Few did. War bonds for Uncle Sam were the dish of the day. As the war closed, the stock market roared, as too did the economy. The war served to utilize an overbuilt capital stock that went begging during the Depression, and quicky healed the unemployment situation (not really the ideal way of doing so).

Incidentally, Mr. Smith didn't spend his war years on the sidelines, cheering the troops and brokering stocks. Instead, missing the fight proved unbearable, and in his late 30s pleaded with his mates at the War Department to allow an old man to join the cause. Put me in, coach! Following a stint commanding a training vessel on the Great Lakes, not the fight he wanted, the lifelong expert pleasure sailor found

himself in the Pacific theatre, ultimately second in command of a light carrier, the USS White Plains (photo heading this section). The Battle of Leyte Gulf, for which he would be decorated for heroism, would frequent his nightmares through the age of nearly 100. Mr. Smith's bride, Nancy, noted later in life that Bob had had it pretty bad in the Pacific. Sustained on but a fraction of their dividends, she explained her situation as considerably better – as she put it, "living at the Hotel del Coronado, spending each day at the beach, watching the ocean, longing for my Bob. And every night at the bar."

From its 1942 low, the market enjoyed a secular bull that lasted the next quarter century. A victorious Robert returned from war, and instead of rejoining the family brokerage first led the liquidation of the Reconstruction Finance Corporation. From there he joined Mercantile Trust, ultimately rising to the Vice-Chairmanship of the second largest bank in St. Louis, for years an epicenter of the banking industry. The family portfolio compounded under the guise of what Mr. Smith described throughout his investing lifetime as benign neglect, but the strategy was far from inactive. Ultimate additions in such uncommon names as Walmart and later, Microsoft and Sun Microsystems bore this out. The only thing benign about the approach was a strict avoidance of sending capital gains taxes to Washington. If one can live on wages, continue to save, and ultimately live on a portion of dividends earned, then throughout a lifetime, fresh cash appears and must be put to work. Mr. Smith was no slouch on this front.

During the four-year period from 1928 while Smith family and client capital idled in cash, waiting for the opportunity to strike, another broker, this one in Omaha, Nebraska, found his clients disinterested in investing in the immediate wake of Black Monday and Tuesday, so found himself at home with *lots* of idle time. Nine months later he and his wife thusly introduced a new baby boy to the world. Born August 30, 1930, the lad grew up reselling Coca-Cola and collecting refunds from recycling the bottles, handicapping horse races, delivering newspapers, and buying a farm (on the cheap) during WWII with his savings at the age of 14. The farm purchase was coincidentally struck at the moment of the Battle of Leyte Gulf during the Battle of the Philippines. All this activity was, perhaps unwittingly, preparation for navigating secular peaks and troughs to come.

Upon graduation from the Columbia Business School, the young entrepreneur would work for a time for his instructor and mentor, Ben Graham at the Graham-Newman Corporation, even offering at first to work for free. He would eventually strike out on his own, operating a series of investment partnerships that eventually would roll into one. The Buffett Partnership ran circles around a raging bull market, posting a cumulative return of 2,611% from 1957 to 1968, a 12-year record of compounding at 31.6%, 25.3% net of fees, versus 9.1% for the Dow. The successful savant, however, sensed things were changing as the go-go 1960s drew to a close.

From the depths of World War II, the quarter-century secular bull market would run smack into a young bear on February 9, 1966. At 995, the Dow would then flirt with the 1,000 level for the next 17 years. The S&P 500 would likewise perform the same mating dance with its 100 ceiling. Had Irving Fisher been around, he could have opined that stocks had indeed reached a permanently high plateau – and been correct! Sigh. Ben Graham's protégé had grown accustomed to finding extremely cheap stocks throughout the entirety of the 1950s through the mid-1960s, but valuations were stretched by 1966, indices trading for 18 times a not-depressed profit margin of 6.7%. Acting on what had become a dearth of value, Warren Buffett closed his partnership to new partners. Though partnership returns continued to excel, earning gross returns of 20.4%, 35.9% and 58.8% in the three years 1966 to 1968 (net returns of 16.8%, 28.4% and 45.6%), by 1969 the partnership was closed entirely, value all but gone from the market. In a May 29, 1969, letter to his limited partners, Mr. Buffett wrote:

> *Quite frankly, in spite of any factors set forth on the earlier pages, I would continue to operate the Partnership in 1970, or even 1971, if I had some really first class ideas. Not because I want to, but simply because I would so much rather end with a good year than a poor one. However, I just*

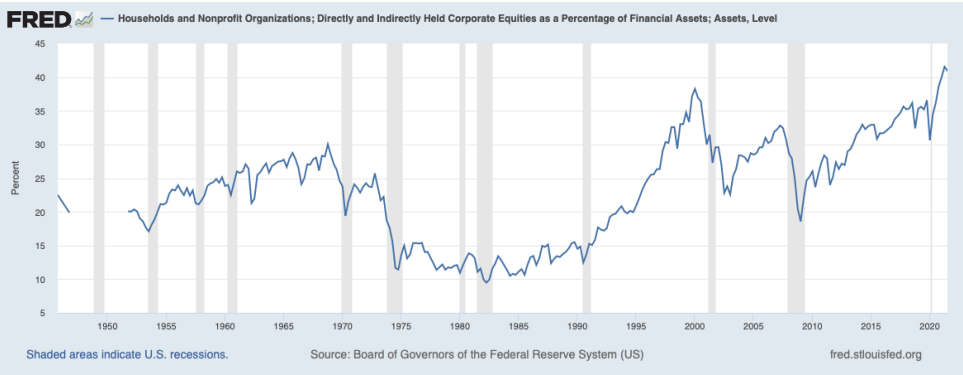
don't see anything available that gives any reasonable hope of delivering such a good year and I have no desire to grope around, hoping to "get lucky" with other people's money. I am not attuned to this market environment and I don't want to spoil a decent record by trying to play a game I don't understand just so I can go out a hero.

From a secular perspective, Mr. Buffett's take on the market was correct, regardless of *his* abilities to find ideas. From its February 1966 high, the market would suffer a series of brutal cyclical declines, each from the 1,000 ceiling on the Dow. The worst of the bear attacks was an early 1973 breaking of the "Nifty-50," a collection of growth stocks that, "could be owned at any price." Turned out, even then, price matters. The Dow would drop 45% through year-end 1974, only to scratch itself back to 1,000 again. However, by the eventual secular low in August 1982, the Dow traded at 777, or 22% below its early 1966 peak and, with dividends, thanks to the high inflation during the 1970s through early 1980s, produced a 75% loss in purchasing power. Over the same stretch the S&P 500 rose from 94 to 102, an 8.5% cumulative price increase over 17 inflationary years – a little less than half of one percent per year, annualized, before accounting for inflation.

During this vicious and drawn-out bear market, Mr. Buffett had, of course, retained a control position in textile manufacturer, Berkshire Hathaway. An acquisition of reinsurance company National Indemnity in 1967 provided ongoing capital with which stock market bargains could be scooped up during cyclical downdrafts, despite the 1969 closure of the partnership. The volatile 1970s most certainly brought buying opportunities, picking up the Washington Post in 1973, GEICO in 1976 and General Foods in 1978. The first two, the Post and GEICO, soared throughout the period while the market traded sideways. The price of Berkshire itself soared more than 40-fold on the back of investment gains, compounding at 24.5% while the market averaged 3.5%. What a bear market.

Having essentially called the top of the market through the 1966 closure of the partnership to new partners and then outright three years later, and through sentiment in his partnership letters, none navigated the 17-year bear market that unfolded any better. By the secular low in 1982, Messrs. Buffett and Smith were spring-loaded for the 17-year bull market to come, the greatest advance ever in U.S. markets.

Only at the depth of the Depression in 1932 could stocks be described as similarly undervalued as they were in August 1982. Few believed it. Investors had been conditioned to expect bear raids of 25% to 45% every few years. Both institutions and households shied from the stock market. "It's a sucker's game, a casino." "Only fools gamble in stocks." I heard these truisms often in my young career in the early 1990s, and only by those scarred by the 1930s and 1970s. Household ownership of stocks as a percentage of household financial assets stood at a historically miniscule 9.5%. When fourth quarter data is updated, reflective of the S&P 500's 11% gain during 2021's final three months, we'll see the ownership percentage at greater than 43%. You've come a long way, baby. Now, "Stocks only go up." #neversell.



Depressed profit margins coupled with depressed multiples create a beautiful combination for those shopping for value. At 8 times a washed out 4% margin, the S&P 500 could be had for 32% of sales in 1982. Today? 317%, a veritable 10-bagger in the multiple paid for a buck of revenue. For perspective, the entire U.S. stock market in 1982 was valued at $1.1 trillion, one-third of U.S. GDP. By March 2000 the market cap had ballooned to $14 trillion, or 141% of GDP. Investors enjoyed margin expansion from 4% to 7.4%, the highest level since 1929, and profit multiple expansion from 8 times to 33 times. Stocks as a percentage of household financial assets swelled from the nascent level of 9.5% to a then record 38.3%.

While Mr. Smith continued fully invested, benign neglect, remember, but still picking up gems with cashflows, Mr. Buffett went into overdrive following the 45% bear market in 1973 to 1974. A 1976 purchase of shares in GEICO took stocks as a percentage of Berkshire firm equity from 63% to 105%. Only following a complete sale of General Foods in 1985 would equities drop for three years below 100% of book value. That is until 1998, which marked a secular peak in the stock portfolio within Berkshire. The stock portfolio was reloaded and supercharged with a purchase of Coca-Cola following a stock market crash in October 1987. Wells Fargo was bought during a savings & loan crisis and 1990 recession. Stocks climbed to 130% of Berkshire's book value in 1992 as the market surged from a recessionary selloff.

The roaring bull that sent the bear into hibernation raged from August 12, 1982, to March 10, 2000. Bottom tick to top tick, the market compounded by 20% per year. By mid-1998, it was obvious to both protagonists in this story that the secular bull had run his course. A secular peak was underway, with blue chips punching highs that year, followed by all things tech, Internet and media two years later. Just as in early 1928 with Mr. Smith and the late 1960s with Mr. Buffett, the time for action was now. Both would undertake yet another prescient pivot, nearly perfectly and tax efficiently, locking in gains and restructuring portfolios in such a beneficial way that few at the time appreciated it. The parallel moves were genius.

In the case of Mr. Buffett, the Berkshire stock portfolio had grown beyond fully valued. Coca-Cola alone, against a cost basis of $1.3 billion in a position built between 1987 and 1989, reached $17.4 billion by July 1998, roughly 40% of the entire equity portfolio and a whopping 46% of firm book value. At that point Coke was up more than 30% for the year and wound up exactly flat by yearend. At the peak it traded for close to 50 times earnings. For those that believe Berkshire's more recent investment in Apple is Mr. Buffett's best, Coca-Cola over a decade grew more than 13-fold, excluding dividends. Apple has now grown more than 5x, albeit over five fewer years. Where Apple is nearly half of the Berkshire stock portfolio, it represents a far smaller portion of total firm assets and book value now than Coca-Cola did in 1998. Apple sits at 17% of Berkshire total firm assets and 32% of book value. There were no utilities. There was no railroad. It was bigtime insurance and a hodgepodge of small wholly owned subsidiaries. Berkshire was an insurance company – an insurance company with a giant and terribly expensive stock portfolio.

What to do with a stock portfolio clearly overvalued, with a top position valued at double or more than any reasonable appraisal of value? Sell and pay a 35% capital gains tax on the proceeds? With a very low-cost basis, the arbiter of opportunity cost would likely just idle and allow time to pass instead of sending a monster check to Uncle Sam. Berkshire is not known for incurring large, realized capital gains unless in some kind of asset swap. Instead, how about one of the greatest pivots in investing history – made via a very big deal. At nearly the exact moment of the twin peaks in both Coca-Cola and in shares of Berkshire itself, Mr. Buffett struck an agreement to acquire another insurance company. The genius move was a pivot *from* insurance – *to yet more* insurance. It wasn't new premium volume Mr. Buffett was after. No, he was on the hunt for bonds. Yes, bonds (and insurance float).

If Berkshire's stock portfolio was extremely expensive in mid-1998, it was matched by the stock market and also by Berkshire's own shares. When you crack open a can of Coca-Cola and the bubbles immediately disappear, you know you are in rarified air. Oxygen arrived with Mr. Buffett paying $22 billion in *Berkshire stock* for General Reinsurance, of which $14.5 billion was goodwill, a heavy premium to the tangible equity of an insurance company. But was it heavy? Berkshire issued General Re shareholders 272,200 shares of equivalent A shares at $80,882 per share, 2.9 times March 31, 1998's book value. The beauty of the deal was that Berkshire's intrinsic worth was only about half that price, meaning that Berkshire had bought General Re for a little more than $11 billion, not the $22 billion apparent price tag.

The use of its overvalued stock as currency was but one important aspect of the deal. Fully 75% of Berkshire's $47.5 billion investment portfolio at this time was invested in very highly appreciated, fundamentally overvalued common stocks. It wasn't just Coke that was expensive. Against a cost basis of $7.2 billion, the entire stock portfolio, priced at $36.2 billion at year-end 1997 (more than $40 billion when the deal was announced) comprised a whopping 115% of Berkshire's entire book value.

Prior to the acquisition, 90% of Gen Re's investment portfolio was invested in fixed-income securities, typical of most insurers' invested assets. When the portfolios were consolidated, stocks combined at only half of the overall investment mix at year-end 1998, down from a three-quarters weighting in Berkshire's portfolio prior to the deal. Mr. Buffett had General Re liquidate its smaller stock portfolio prior to closing. Consolidated equities closed 1998 at $37.3 billion, only $1 billion more than Berkshire alone had owned alone prior to the deal. The fixed-income balance, however, mushroomed to $31.2 billion, up from $10.3 billion the year before.

Buying General Re *tripled* the size of Berkshire's insurance float, General Re's float of $14.9 billion being twice as large as Berkshire's $7.4 billion going into the merger. Combined float totaled $22.7 billion post close, and increased invested assets at Berkshire by more than 50%, bringing fully $25 billion into the portfolio. It was an astounding transaction, paying $22 billion in stock which was worth only about half that and adding $15 billion in float which financed an additional $25 billion in investment assets. Reread this paragraph, then close your eyes and tap your heels together three times, and think to yourself, "There's no place like Berkshire…"

By design, in my opinion, *stocks as a percentage of Berkshire's book value declined from 115% to only 69%*. As a percentage of firmwide assets, the allocation to stocks declined to 30% from 65% without paying a dime in capital gains taxes, then at a rate of 35%.

In the all-stock deal, Berkshire's shares outstanding increased by 23% while total firm assets increased 75%, *excluding* goodwill! General Re brought 43% of the assets to the party yet received only 18% of the consolidated entity. Yes, paying $22 billion for General Re's $8.5 billion in equity meant that Berkshire had paid close to 2.6 times book value in the deal, but remember, adjusting for the valuation premium in Berkshire's stock meant that Berkshire had really paid only 1.3 times book value.

For context, the Berkshire stock portfolio subsequently "only" earned 8.5% per annum for the next 23 years. The anchor of an overvalued stock portfolio tugged on a mere 30% of assets and 65% of book value instead of 65% and 115% respectively. It took two decades to work the multiple to earnings on the portfolio down by half. In the meantime, the 70% of Berkshire's assets not dragged under by multiple compression chugged along, literally in 2009, with an acquisition of the Burlington Northern Santa Fe Railroad. Had Berkshire not "diversified" away from stocks by buying a bond portfolio (effectively at 50 cents on the dollar thanks to the use of its overvalued shares), it would not have had the surplus capital to

dividend out of the insurance operation and immediately into MidAmerican Energy in 1999, the railroad ten years later, etc.

In addition, had Berkshire not done the General Re deal and diversified away from stocks, returns for the next 23 years would have been much more heavily weighed by the stock portfolio. For 23 years Berkshire's stocks compounded at 8.5% while book value advanced by 10.1%. Further, gains in Berkshire's stock portfolio are listed below on a pre-tax basis. Accretion in book value from the portfolio is accounted for after-tax. How important was the flipping of stocks as a percentage of total firm assets from 65% to 30% in one fell swoop, freeing up capital to divert to businesses earning more than 10% on equity? Huge.

These are returns from the end of 1997, the year before Berkshire acquired General Re using Berkshire's shares as currency in the deal.

24 Years at BRK – Returns From 12/31/1997 to 12/31/2021

Gain in Book Value Per Share	11.5%
Gain in Berkshire Hathaway Stock	10.0%
Gain in Berkshire Hathaway Portfolio of Stocks*	8.6%
S&P 500 Total Return	8.9%

* Total return estimated using only disclosed positions in Berkshire's 13F filings
Bloomberg and Semper Augustus Calculations

During 1998, Berkshire issues 272,200 shares trading at 2.9 times book value to acquire General Re. Berkshire's book value per share advances 48.3% during the year. Had the deal not been done, book value per share would have advanced 8.64% during 1998, the share count would have remained at 1.234 million outstanding, and with stocks still at 115% of book value, subsequent returns would have been more dominated by the stock portfolio and not by subsequent acquisitions, which likely could not have taken place.

23 Years at BRK – Returns From 12/31/1998 to 12/31/2021

Gain in Book Value Per Share	10.1%
Gain in Berkshire Hathaway Stock	8.4%
Gain in Berkshire Hathaway Portfolio of Stocks*	8.5%
S&P 500 Total Return	8.1%

* Total return estimated using only disclosed positions in Berkshire's 13F filings
Bloomberg and Semper Augustus Calculations

In my opinion, had Berkshire not purchased General Re and structured the deal as it did, Berkshire's book value per share would have compounded at a rate closer to the 8.5% gain in the stock portfolio over the next 23 years. Further, book value per share gained 48.3% in 1998. Most of that gain was due to the issuance of shares at 2.9 times book value. Had Berkshire not done the deal, I estimate that the stock portfolio earned a price return of 9.9% during 1998 (11.4% with dividends). Operating earnings per share in 1998 were $474.45 per share. Adding pre-tax investment gain of $2,913.23 per share and taxing the total at 35% means book value per share would have grown to $28,016 at the end of 1998 with 1.234 million shares outstanding. By issuing shares at such a premium to book value, 1998 book value per share was $37,801 with 1.519 million shares out.

Presuming that Berkshire's book value would have subsequently compounded from the lower base at the 8.5% rate of gain on the stock portfolio instead of at the actual 11.5% gain in book value per share from

1997, 2021's book value per share would have been $182,932 instead of the expected $345,949. More simply, Berkshire's share price would be worth half as much today had Mr. Buffett not pivoted and bought General Reinsurance in 1998.

In an attempt to clarify here, Berkshire would have annually grown 2% less, not 3% less, because the portion of 1998's gain in book value per share attributed to the General Re acquisition is excluded. Berkshire would likely sport a book value in dollar terms of half of its expected 2021 year-end value of $510 billion. Now that's a pivot.

Meanwhile, another extraordinary pivot was simultaneously taking place 400 miles southeast of Omaha, in St. Louis, Missouri. Having perfectly escaped the entire 1929-to-1932 crash and then perfectly again backing up the proverbial truck at the absolute 1932 bottom, Mr. Smith had two great pivots left in him. By fate, I was lucky to play a fortunate part in these two simultaneous moves, both as valuable as the earlier 1928 sale and 1932 buys. Mr. Smith and I had been introduced by a mutual acquaintance on the premise that we were equally concerned about market valuations and ought to meet ASAP. Meet we did, at the drop of a hat, and very soon joined forces (thanks JG), a union most fortuitous for all involved.

By the fall of 1998, Mr. Smith's portfolio, initially constructed at the Mariana Trench of the Great Depression at arguably the lowest prices any stock market has seen, anywhere, was now very expensive and fraught with risk. The General Electric position acquired in 1932 had grown to represent a Coca-Cola-like proportion of family assets, in 1998-Berkshire terms. Nearing the end of the reign of Jack Welch, fully two-thirds of GE's assets and more of its profitability were derived from highly leveraged finance operations. With a mindset of *always* beating the quarterly number, conservatism within GE's large reinsurance and myriad other operations was, ahem, largely nonexistent.

Mr. Smith's position in GE needed to go, and quick. Via a series of contributions to a family foundation and a number of other charitable vehicles, we were able to sell down not only most of the GE holdings but the preponderance of overvalued positions, many in companies no longer earning their objective cost of capital, and like GE and Coke, trading at nosebleed levels. Not only avoiding capital gains taxes upon disposition of highly appreciated positions but also benefitting from deductibility of gifts to charity, not a dime of taxes was paid. However, unlike the earlier pivot in 1928 which required sitting on a mountain of liquid, risk-free bonds and cash, the climate throughout 1999 and early 2000 provided a different set of splendid opportunities to round out the last great Smith pivot.

As market leadership transitioned from the blue chips in 1998, the investing world grew more and more crazed for everything and anything tech. Where the Standard & Poor's traded for 33 times what were then peak earnings, the NASDAQ more than sextupled in price from 802 to 5,048 over precisely five years to March 10, 2000, trading for no less than 242 times earnings. Despite only producing cashflows 20% as great as the companies listed on the New York Stock Exchange, the market values of the aggregate companies on each exchange nearly equaled each other at the peak.

During the final phase of the bull, the value crowd suffered mightily, lagging the innovative and red-hot tech sector. When a retirement plan saver opened their quarterly statement, it was *obvious* that small and mid-cap value was *not* the place to be. You gotta' go where the action is when the mania rages. Money flowed from the rational to the more immediately successful, driving prices of the haves higher, and during this redemption-of-value phase, sending the already cheap have-nots lower. Who can forget the importance of the SOX, the Philadelphia Semiconductor Index, to investment clubs and finance TV? BUY BUY BUY! Or that well-run and well-capitalized thrifts, street sweeper and particle-board manufacturers, small retailers and generic drug manufacturers went begging, especially as the secular bull peaked, providing opportunity for the prepared and opportunistic. Even mighty Berkshire was cut in half

from the price it paid for General Re, affording us an initial purchase at $43,707 in early 2000, the $7 representing the commission. It was never a broker favorite…

Mr. Smith's pivot in St. Louis is only half captured by the performance record. While the stock portfolio gained considerably in value during 2000 and 2001 while the S&P and NASDAQ bled, lost to history is what was *saved* by parting with the overvalued and particularly with the dangerous. Most of the nearly seven-decade-long GE position was contributed and sold at prices between $50 and $60 per share. Where it took Microsoft shareholders more than 15 years to breakeven from our January 1, 2000 letter, GE owners never did recover, the stock closing 2021 *80% below its 2000 high*. Don't be fooled by the year-end price at $94. The company effected a one-for-eight reverse stock split in July, never something fans of the old stock split trick like to see, generally preferring *more* shares than less. The reverse split is undertaken to mask wealth destruction and obfuscate just how much was indeed lost. To make the math easy, on a pre-split basis the shares are $11.75, a 77% to 80% decline from where we sold them more than two decades ago. The stocks replacing GE and the others sold are up more than ten-fold since then. $1 million becomes $200,000 or $10 million. The portfolio captures the 10x gain but the delta is really 50x.

I owe an extraordinary debt of gratitude to the two gentlemen highlighted here, who combined so adeptly to sidestep nearly all major secular peaks and the carnage that ensued. Getting it right at secular peaks is one thing, but to pick through the wreckage with maximum conviction at secular troughs is another. Lows come at the point of maximum fear, but GOATs know when to pivot. The education received through a connection to both has given me a certain perspective I know I wouldn't have, had I never encountered and developed a bond with both.

I've written at length about what Warren Buffett means to me as a role model and as a mentor, albeit not in the traditional sense. I hope my weaving together the investing histories of two great investors at key inflection points has been at least interesting.

I don't know that my telling this portion of the story of Robert Brookings Smith, "Mr. Smith" to me, can do justice to what a giant of a man he was, a bellwether. Shunning the spotlight in the extreme. A model of living not within, but under one's means. Humble, brilliant, hilarious, and charitable, but kind to a fault and Scotch to his core. Beneficiaries of his generosity and philanthropy only knew their benefactor as, "Anonymous." When the foundation he established became the vehicle for distributing his family's wealth, grants come from a generic name, nothing eponymous about it. If the world knows Benjamin Graham as the father of value investing, I hold Robert Brookings Smith as its godfather. I contend he is the only investor among all to have nailed 1929, 1932 and 2000 so spectacularly well. Semper never would have launched without his support, encouragement, and confidence. What a privilege to work closely with him for the last years of his life. He was in the office daily nearly to the end, at just shy of 100, generous with memories, haunts, and wisdom. He played tennis for most of his century, admitting to only doubles in his latter years. I'd trade nothing for the time spent with him, the education, the laughs and great memories, and the bond to history. Here's to a life lived to its fullest, to a piece of fruit and a glass of milk every day.

At what appears another of the few great secular peaks, I hope we can muster the wisdom and the patience of Warren Buffett and Robert Smith in battle.

BROWN SUGAR

"On my first day as president, I will sign an executive order that puts a total moratorium on all new fossil fuel leases for drilling offshore and on public lands. And I will ban fracking – everywhere." – Elizabeth Warren, to her Twitter followers, September 6, 2019

"There's no debate as to whether we should continue producing fossil fuels. There's no debate. We should not." – Alexandria Ocasio-Cortez

"By the way, we occupy the first place in the world in gas export, accounting for 20 percent of the world market. We are also first in the sphere of liquid hydrocarbons export." – Vladimir Putin

"Without Russia's contribution, prices would rise even more. Some members of the EU meet 90% of their demands for gas with the help of Russian hydrocarbons and have no complaints so far. Everybody is happy. Russia is a reliable partner and has never failed her partners in Europe, even in the hardest times of its economic development." – Putin, again

"China will step up support for other developing countries in developing green and low-carbon energy and will not build new coal-fired power projects abroad." Xi Jinping

"Oil demand probably hit a secular peak last year and, thanks to EVs, now is in secular decline." – Cathie Wood, July 15, 2020

I'd like to begin this section by clearing the air. We own energy. We own cyclical businesses in cyclical industries. We own some businesses investing in green technologies, in wind and solar generation, in the buildout of the electric grid, in carbon capture, in renewable diesel. Kermit the Frog green stuff. We also own companies exploring for and producing oil and natural gas, that send carbon through pipelines and that sell gasoline and diesel fuel to car and truck drivers. We own a manufacturer of diesel engines. We own a commodity chemical company that produces chlorine and caustic soda, used in making bleach, paint and PVC pipe. This company also happens to manufacture bullets. We own an engineering and construction company that manages the subsea infrastructure for offshore oil and gas gathering platforms. We even own companies that, gasp, refine crude oil, to some, the dirtiest of the dirty, turning it into unsavory things like gasoline, diesel fuel, jet fuel, feedstocks for plastics and asphalt. If that's not enough, we own gold miners, who consume massive quantities of energy digging through tons of earth in search of tiny nuggets of gold.

Not only do we own these businesses, but we've owned them intermittently for 23 years. You can imagine that, given the equipment and labor involved in doing what these folks do, enormous quantities of capital are required in their operations. Sometimes these businesses and the industries they compete in are very profitable. Growing demand justifies increasing supply, which requires new capital spending, which is applauded by investors wanting and expecting more profit. Few are the CEOs not wanting to be bigger, as bigger often equates to more pay. Unfortunately, in cyclical industries, it's the apparent and sometimes obvious growing demand that becomes dwarfed by too much supply, crushing prices. When the cycle shifts and the slowdown comes, demand plummets. When profits collapse, so too do capital expenditures. Consolidation ensues, often the product of business failure or simply the need to rationalize too many assets. Slashed investment and diminished supply then open the door for recovery, and the cycle, the capital cycle, begins anew.

Successful investing in cyclical businesses involves two decisions – when to buy and when to sell – for sell you must. Over the years only a portion of our capital was deployed in cyclical, capital intensive companies, and we have had general success at both buying and selling assets.

Come now the era of climate change, an urgent shift from carbon-based energy production to renewables. A push to net zero carbon emissions over 30 years or less is committed to and in high gear. The planet needs it, and elected officials and policymakers require it. Rightly or wrongly, and there is good debate on both sides, this is where we are headed, and headed quickly. The traditional capital cycle, of profit creation and destruction at the hands of overbuilding and then underbuilding is being distorted by policy, towing the law of unintended consequences in its wake. As investors, said law introduces one of the most interesting and perhaps profitable investment opportunities we've seen.

Assets are removed from production not for overbuilding and a lack of profit but because of policy. New assets, built to replace those eliminated, may or may not be as economically efficient or even profitable. To compel this behavior, policymakers introduce tax incentives and regulations compelling the behavior. While the economic cycle will never be repealed, aspects of the capital cycle no longer traditionally function as in the past. We will have overbuilding in places and scarcity in others. A rational understanding of supply and demand, overlaid with an understanding of where policy is headed either too fast or in a misguided direction will hopefully allow for the opportunistic deployment of our investment capital in situations where the action of others (or lack thereof) creates irrational extremes.

"This time is different" are perhaps four of the most dangerous words in the investment lexicon. Well, this time surely does look different.

Framing the Macro

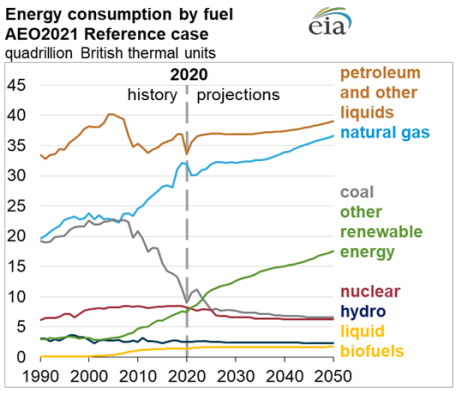
We have spent a lot of time over the years developing a generic understanding of the supply and demand for energy, both domestically and globally. We are not engineers or economists, so the effort here is in trying to apply reason to the current picture and to the long-run expectations of lots of experts. The same can be said of the very skilled who trade energy for a living. Being on the opposite side of a trade with the sharpest of energy traders is generally a bad idea. Fortunately, the traders we know are bullish. Extremely bullish.

Let's begin the bull case for energy with demand, which according to the U.S. Energy Information Administration (EIA), the U.S. consumed about 100 quadrillion British thermal units of energy in 2019, before the pandemic. Consumption in 2020 declined by about 7%, and we expect a full recovery by 2022. Air travel remains depressed, particularly with international routes. U.S. share of global energy consumption was 17% in 2019, so about 604 quadrillion Btu in global demand. The U.S. population at 330 million is about 4% of the globe's 7.9 billion.

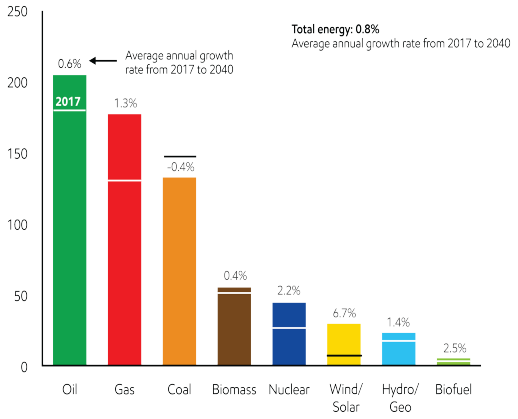
The following chart illustrates consumption by fuel type in the U.S. since 1990 and projections by EIA to 2050. Consumption of petroleum, liquids and natural gas continue to dominate, with growth in renewables not quite replacing net closure of coal capacity. **Under the Paris Climate Accord, China, the largest consumer of energy in the world, is allowed to *increase* its use of coal by the amount consumed by the U.S. in 2015.** As we are seeing with shortages of energy in Europe this winter, when efficient coal is removed from supply too quickly and replaced with inefficient renewables, the result is abrupt shortages of energy and dramatic price spikes. Natural gas consumption is expected to rise nearly as fast as renewables. Renewables are expected to command nearly 60% of the net increase in demand with natural gas accounting for the 40% balance. Gas is used as a feedstock in chemical production and for heat and power in industry. It will not and cannot go away. In addition, we'd expect ongoing increases

in net exports. In all, demand for energy should rise over time, particularly if the population likewise rises.

The following table and several others throughout this section comes from the EIA, who put out a terrific International Energy Outlook early each year. Numerous organizations also publish terrific projections and data sets. The International Energy Agency's *World Energy Outlook*, BP's *Statistical Review of World Energy*, and ExxonMobil's *Outlook for Energy* are also great reads and resources each year. One can presume bias from the for-profit majors, so the work of the agencies is much more independent. In only outlier cases does the demand for oil and gas not grow over time. Renewables will undoubtedly grow very fast, but from a small base, and not with the ability to replace petroleum and natural gas. Coal likely declines. Nuclear is declining, which is certainly a policy mistake.

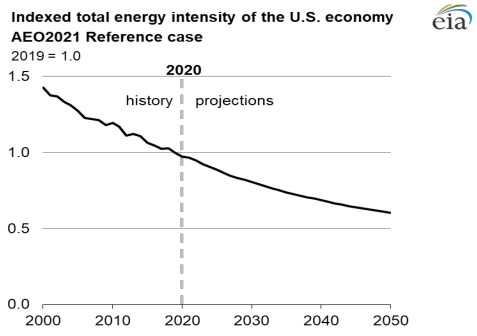


Source: U.S. Energy Information Administration, *Annual Energy Outlook 2021* (AEO2021) Reference case

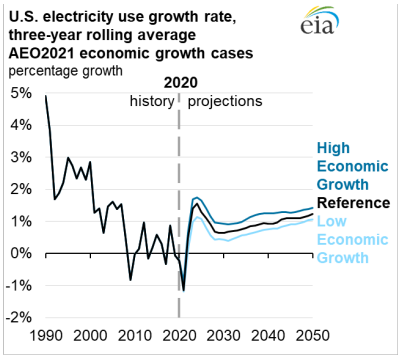


Source: ExxonMobil Outlook for Energy

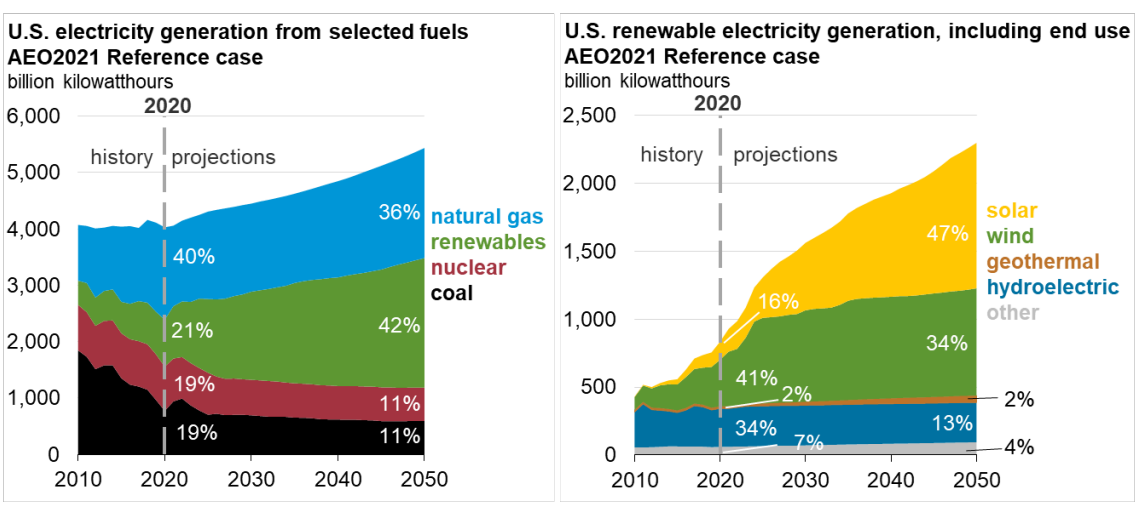
The U.S. leads the globe in energy efficiency and intensity and will continue to consume less energy per dollar output of GDP over time. U.S. electricity use is expected to grow by less than 1% annually for the next three decades. Without a dramatic increase in the technological ability to store power, wind and solar are extremely inefficient sources of energy. They only work due to production and investment tax credits, at least at present. Solar is more efficient than wind. Neither are as efficient as natural gas, which requires no subsidy. It is produced in abundance and burns cleanly. Further, because the electric grid requires a constant supply of power, when the wind is not blowing (or blowing too fast to force the shutdown of the turbine to prevent breakage) or the sun is not shining or behind unexpected cloud cover, either grid-scale battery backup or natural gas-fired capacity must be available. A peaker gas plant can be fired in advance of estimated needs but cannot be fired immediately. Thus, a constant supply of gas must coexist with wind and solar. Wind and solar production will most definitely grow, but so will that of natural gas.



Note: Total energy intensity calculation reflects primary energy, which includes electricity losses.
Source: U.S. Energy Information Administration, *Annual Energy Outlook 2021* (AEO2021) Reference case

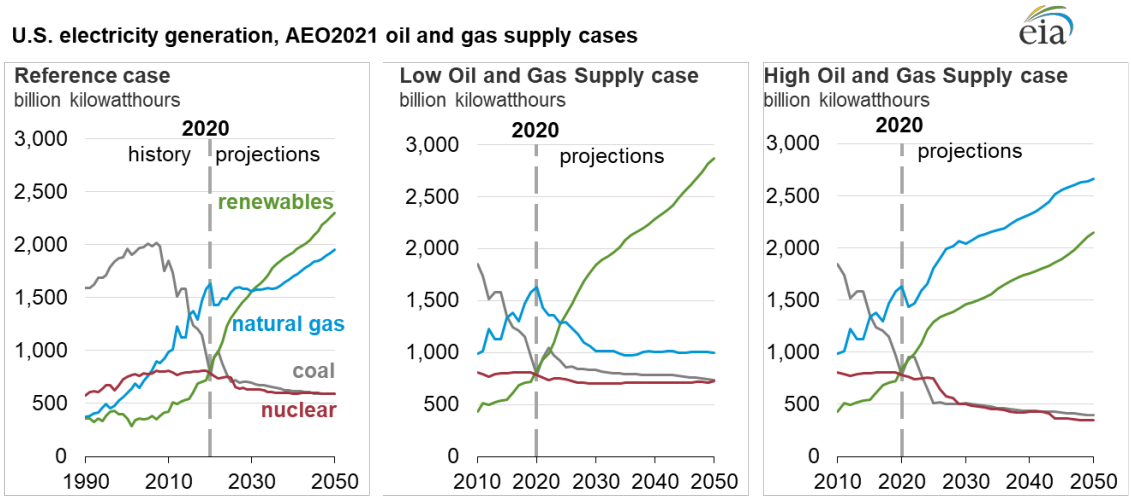


Source: U.S. Energy Information Administration, *Annual Energy Outlook 2021* (AEO2021) Reference, High Economic Growth, and Low Economic Growth cases



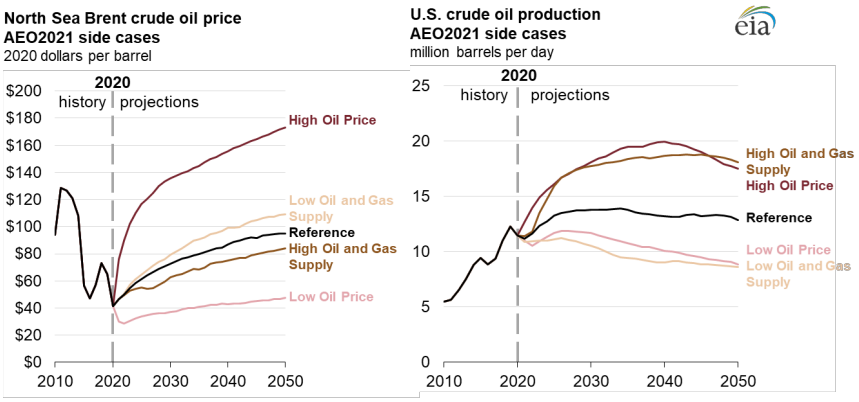
Source: U.S. Energy Information Administration, *Annual Energy Outlook 2021* (AEO2021) Reference case

EIA breaks down expectations into a base case and scenarios for low supply of oil and gas and high supply.



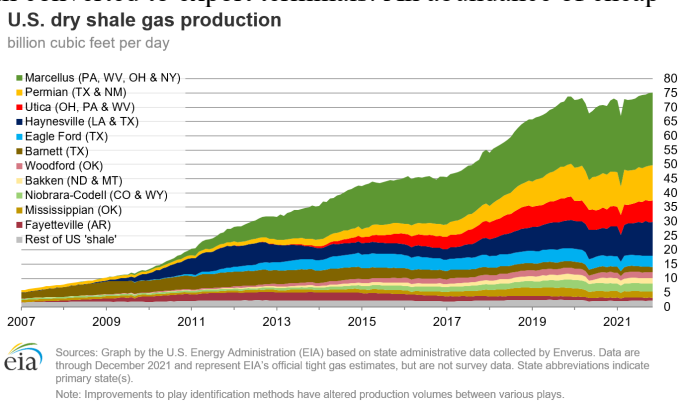
Source: U.S. Energy Information Administration, *Annual Energy Outlook 2021* (AEO2021) Reference, High Oil and Gas Supply, and Low Oil and Gas Supply cases

Thanks to technological breakthrough and innovation, fracking for shale oil and shale gas made the U.S. the largest producer in the world and now a net exporter of both oil and gas. Producing more than 12 million barrels a day of crude oil before the pandemic, up from 5 million a decade ago, in a base case production should continue at the 12-million-barrel pace and in a high supply case would increase to 20 million barrels a day of production by 2035.



Source: U.S. Energy Information Administration, *Annual Energy Outlook 2021* (AEO2021) Reference, High Oil and Gas Supply, Low Oil and Gas Supply, High Oil Price, and Low Oil Price cases

Under nearly all scenarios will U.S. production and consumption of natural gas rise over the next 30 years. As Europe closes conventional supply, reliance on Russia only increases, as does reliance on gas exported in liquified LNG form from the U.S. and elsewhere. It wasn't many years ago that the U.S. was building LNG *import* terminals, only to see them converted to export terminals. An abundance of cheap shale gas and shale oil developed thanks to the combination of fracking and horizontal drilling has made the Marcellus and Utica Shales in the Appalachian Basin in the northeast, the southwestern basins like the Permian in West Texas and Eastern New Mexico, and the Eagle Ford in South Texas, some of the premier plays in global oil and gas production.



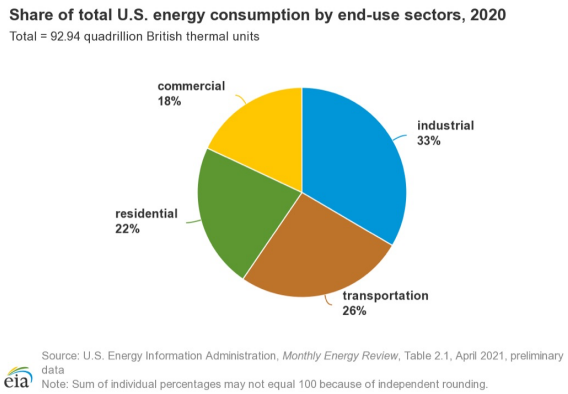
Sources: Graph by the U.S. Energy Administration (EIA) based on state administrative data collected by Enverus. Data are through December 2021 and represent EIA's official tight gas estimates, but are not survey data. State abbreviations indicate primary state(s).
Note: Improvements to play identification methods have altered production volumes between various plays.

On electric vehicles, the announcement of the death of the internal combustion engine is premature. The peak seasonally adjusted annual rate (SAAR) of U.S. auto sales runs to about 17 million vehicles manufactured per year. Gasoline-powered light-duty engines account for 14 million of those at current run rates. The balance is comprised of pure battery, electric hybrid, plug-in electric hybrid, flex and a nominal number of diesel engines. A decade from now most light-duty cars and trucks sold will likely still be gasoline powered. Factoring in a nearly 15-year average life of a new vehicle, if the entire fleet of cars on U.S. roads today total about 240 million vehicles, battery-powered cars make up perhaps 2.5% of that. It will be a long time, if ever, before most vehicles on the roads are battery powered. The same math applies globally. The global auto manufacturing industry produces roughly 100 million light-duty vehicles per year. Roughly 7% of 2021 new vehicle sales, roughly 7 million, were likely EV, including electric battery and plug-in hybrids. There are an estimated 1.4 billion cars and light trucks on the roads.

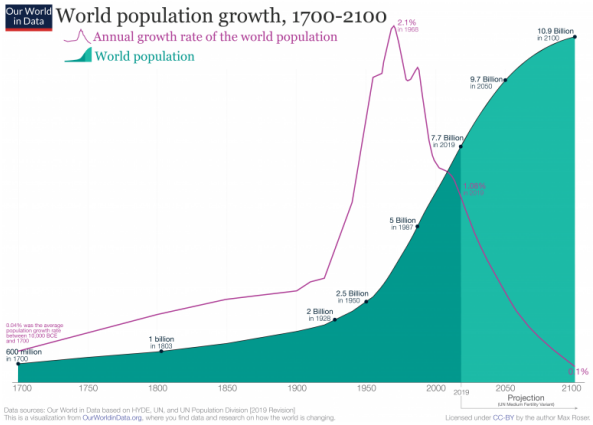
Gas and oil are abundant, cheap and relatively clean resources. The U.S. produces 12 of its 20 million barrels of oil consumed per day. We import heavier crude for production of some refined products. The manufacture of electric batteries requires resources the U.S. owns little of – lithium, cobalt, nickel, various rare earth metals. Supplies of many of these are found in adversarial places like China. Time will tell whether these inputs to growing EV demand are even available, and if so at what cost to the planet for their extraction. There is an abundance of scholarly research suggesting energy storage and the production of battery power is net additive to the carbon footprint of the planet. See work by Eric Hittinger at the Rochester Institute of Technology and Inês Azevedo at Carnegie Mellon. Battery production is associated

with a wide-ranging estimated 56 to 494 kilograms of carbon dioxide per kilowatt-hour of battery capacity (kg CO2/kWh) for electric vehicles.

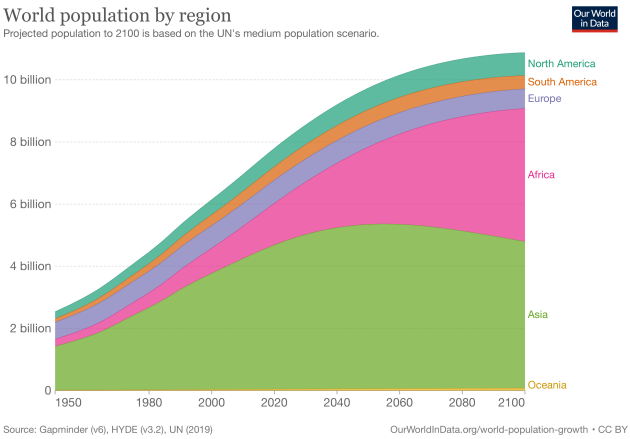
Much of any expected decline in the consumption of gasoline is due to ongoing compliance with fleet fuel efficiency requirements and not as much to displacement from electric vehicles.

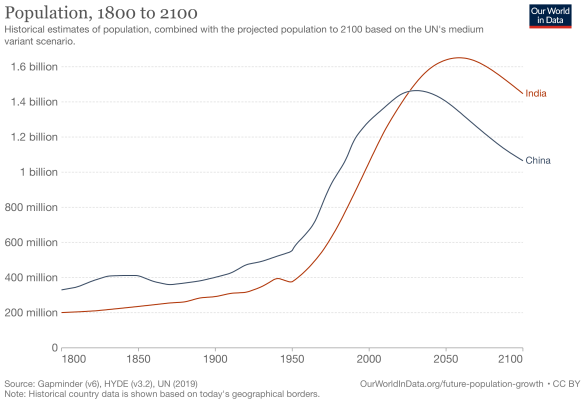


The presumption of ongoing growth in the demand for energy rests on a growing global population. Annual growth in the number of the world's citizens peaked at 2.1% in 1968 and is now in steady decline. The UN Population Division expects a decline from 1% presently to 0.1% by 2100.

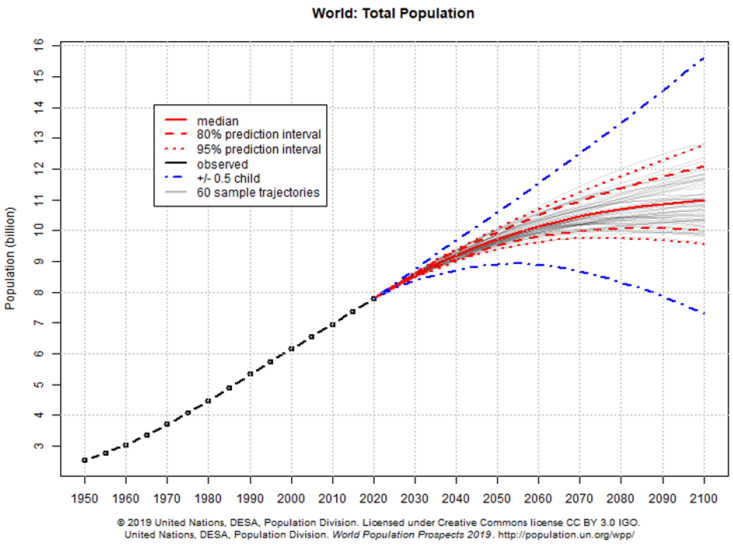


Where growth in the European population peaked and plateaued in the 1960s and is plateauing in North America, it's about to run into a brick wall in Asia, particularly in China thanks to their one-child policy introduced in 1980 and only eliminated in 2015. The Chinese growth miracle, which made the country the largest consumer of the planet's resources for the past four decades, faces stiff headwinds from a population that may shrink by more than the population of the United States over the next 80 years, from 1.4 billion to perhaps 1 billion. Ongoing industrialization and increasing wealth can offset some of the drag, but the loss of the number of pure bodies consuming energy and all resources hurts meaningfully at the margin.





Projecting global population growth declining from 1.0% today to 0.5% in 2050 seems reasonable. The good news is that it's growth, nonetheless. I wouldn't take that to the bank, however, as this range also prepared by the UN is all over the map. Who knows with the unknowns of war, plague and other maladies? We'd also expect continuation in the advancement of healthcare and longer life expectancies.



Population growth in emerging economies can be reliably expected. Africa in particular should supply most of the growth in global population for decades to come. Should the global population decline, demand for energy would be expected to likewise decline. A rapid surge in births and we could see stronger demand than expected. Even with overall population shrinkage, the offset is increased consumption per capita, as middle classes develop among economies like India and parts of Africa.

Refining

The climate change and environmental movements frown upon the refining of crude oil as perhaps the dirtiest corner of the energy world. It happens to be a corner we cannot live without. At prices making no sense, we bought the first two refiners in firm history in October 2020 and have been adding to these positions in HollyFrontier and Valero ever since. HollyFrontier bought a refinery from Royal Dutch Shell recently for not much more than one times cashflow. Breakevens are not very long at such prices. Europe seems destined for an energy crisis that will make the mid-1970s look like a picnic.

European Refining

European major oil companies are shedding high-carbon assets in the race to net carbon neutrality. Europe is likely never to see another refinery built, unless of course policy takes their economy so far off course and this whole experiment of green conversion fails for cost or productive impossibility. Except

for reserves drilled in the North Sea, oil is imported into Europe's refining infrastructure. Lacking a robust pipeline system like the U.S. has, oil must be imported and transported by ship, barge, truck, and train, all at additional cost. Most European refineries were built to process only select grades of crude, such as Middle Eastern, Brent or Urals, lacking the ability to shift among different feedstocks and making them inefficient.

The number of refineries in Europe declined from 137 to 85 today over the last 30 years. The U.S. has likewise seen a ~50% decline in the number of its refineries over four decades. There exists a big difference, however. European total refining capacity has shrunk by probably 15%, while U.S. refining capacity grew, keeping pace with population growth by increasing capacity at existing refineries. Refineries in Europe are thus very high-cost and not very competitive. Cheaper refined product finds its way to Europe from more sophisticated Middle Eastern, Russian, and now U.S. refineries. Complex refineries in the U.S. have access to cheap shale oil feedstocks and are cheaper to transport via a robust pipeline infrastructure. Many European refineries were built to refine very heavy crude and, faced with declining demand for bitumen and fuel oil, are therefore in trouble. On the plus side, European refiners possess the ability to produce naphtha, used as a feedstock in the manufacture of plastics, where demand grows.

Marginally productive on balance to begin with, green pressure forces additional closure of more and more European refining capacity. Hostages to the world, it seems.

U.S. Refining

The U.S. has 129 refineries, down from 250 in 1982. Despite the decline, refining capacity is probably one-third greater, thanks to capacity expansion at remaining sites. However, the number of refineries *and* refining capacity is now falling fast, down close to 10% over the last three years. California, on a quest to out-Kermit the Euro greens, seems intent on producing little of its own power outside renewables and would prefer that its residents not drive, fly, enjoy conditioned air, and be happier for it. Seven refineries have closed since 2020, three in California. The state banned the purchase of gasoline-powered vehicles beginning in 2035 and introduced last year a 2024 ban on the sale of gasoline-powered mowers and leaf blowers. "Blow Me, Governor," is the recently adopted motto of the California Gas-Powered Leaf-Blowers Association, small but hardy.

In addition to outright closure, several conversions of conventional refining to renewable diesel refineries are underway, a product of the tax code. Five plants produce renewable diesel in the U.S. with capacity of 600 million gallons per year. Another six plants are on the way with two billion gallons of additional capacity. Three existing plants are seeing capacity expansions. HollyFrontier converted a small refinery in Cheyenne, Wyoming to renewable diesel to conform to regulatory requirements for total refined mix. It is adding renewable diesel at its New Mexico operations as well. What is renewable diesel? Chemically it's the same as petroleum diesel and operates identically in a diesel engine. It is produced from cellulosic biomass materials such as wood, sawdust, switchgrass, and crop residues. California uses almost all the renewable diesel produced to conform to its "Low Carbon Fuel Standard."

Here's the catch. When a refinery is converted to the production of renewable diesel, the *only* product created is renewable diesel. Traditional refineries produce the entire stack, from gasoline all the way down to asphalt. The impact of less capacity available to refine end products, except for the substitution of renewable for conventional diesel, can be seen at present. Typically, when the price of oil rises quickly, spreads between the input cost of the unrefined crude and the prices of finished goods compress. Oil prices are up dramatically, passing $90 as I write this, yet refinery margins remain healthy. Demand for finished goods is outstripping the ability to deliver supply. We are creating scarcities in the ability to refine adequate product. Opportunity knocks.

Shrinking refining capacity in the U.S. and Europe create scarcity and product shortages. Read: higher prices. Half of the refined product on average created from a barrel of crude oil is gasoline. Diesel is the second largest refined product at less than 30%, kerosene/jet fuel at 6% with descending balances for petroleum coke, still gas, hydrocarbon liquids, asphalt, petrochemical feedstocks, lubricants, and waxes. Think about all of your material possessions, even replacement knees and hips (in my too-near future) and you don't get them without refining crude.

> *Mr. McGuire:* I want to say one word to you. Just one word.
> *Benjamin:* Yes, sir.
> *Mr. McGuire:* Are you listening?
> *Benjamin:* Yes, I am.
> *Mr. McGuire:* Plastics.
> *Benjamin:* Exactly how do you mean?
> *Mr. McGuire:* There's a great future in plastics. Think about it. Will you think about it?

I'd discussed already the unlikelihood that battery-powered electric vehicles would dominate the roadway anytime soon. When it comes to refining, even allowing for a slow decay in the use of gasoline, complicated refineries can shift the mix (to a degree) of the refined product that comes from the stack. The pandemic crushed air travel, so the demand for jet fuel plunged. It was remarkable the degree to which the mix could shift away from refining jet fuel. Should the demand for gasoline trend materially lower, you will see a mix shift and eventual additional capacity closure of higher-cost, less-efficient refineries than those owned by our two companies. Each enjoy a low-cost advantage – HollyFrontier in its inland footprint, proximity to Cushing and other pipeline destinations, and so lower-cost West Texas Intermediate Crude, light and sweet and perfectly suited to the refining process in making gasoline and diesel. Valero, with a sizable footprint in the Gulf Coast, imports various grades which find their way into giant Gulf Coast petrochemical industries. Both are taking advantage of geographical proximity to California, where newly added and converted renewable diesel flows to the Golden State. We like gold, so should lobby for a name change – how about instead of Golden they become the Dystopian State, or the "Hey Brother, Can You Spare Us Some Energy State." Even better.

Should demand for gasoline disappear altogether, we will introduce another unintended consequence. Because refineries are not designed to not produce gasoline, at least some of it, if we want the remainder of what is produced in the stack, guess what? We'll have gasoline, and lots of it, if it's not headed to the car's fuel tank, mowers, and leaf blowers. Gone are the days of sending unwanted surplus fuel into the rivers, at least outside of places like China. You want plastics? You need olefins – propylene, ethylene, butylene. You want olefins, you get gasoline. Oh, Mrs. Robinson! You want asphalt? You get the picture.

Our two refiners are low cost, well managed, geographically benefitted, conservatively capitalized and are in a unique position to take advantage of misguided, albeit well-intentioned energy policies in Europe, California and elsewhere.

Capacity Factors and Limitations in the Production of Electricity

Nuclear energy supplies 20% of America's power and has done so for more than three decades. It is reliable, carbon-free and operates with the highest capacity factor of any type of power, bar none. Capacity factor measures the rate at which maximum power is produced over the course of the year. Refueling of a plant is only required every 1 ½ to 2 years, where coal and natural gas require much more refueling and maintenance downtime. Wind blows infrequently, making nuclear more than three times more reliable. Electricity produced from wind therefore requires way more productive capacity to achieve the same level of output. When the wind blows too hard, a wind turbine must be turned off to avoid

damage from too much stress under too-high speeds. Slight problem. You would need roughly two gas or coal-fired plants to produce the same output as a single nuclear plant. Solar ranks lowest among energy production capacity. You don't get as much sun in the Northern Hemisphere on December 21 as on June 21, of course, and then there are those pesky clouds and solar eclipses. Kidding aside with eclipses, it's only effectively high noon once a day. Efficiency weakens as the sun is closer to the daily horizon. You need four times the productive capacity from solar to replace nuclear. Ranking power sources by capacity factor is seen below. Nuclear is clearly the capacity factor king, so let's not build more. In fact, let's close a bunch of it!

	Capacity Factor	Percent of Production	Efficiency
Nuclear	93%	20.0%	36%
Natural Gas	57%	41.0%	58%
Hydropower	42%	7.3%	94%
Coal	40%	19.0%	48%
Wind	35%	8.4%	36%
Solar	25%	2.3%	16%

Efficiency measures the amount of kinetic energy that is converted to electricity. Very little of sunlight absorbed by a hitting a solar panel is converted to electricity, where virtually all water funneled to the driving of a hydroelectric turbine is used and converted to power. Nuclear power operates at by far the highest capacity, only not producing power 7% of the time when being refueled. Nuclear is less efficient because the steam created to turn a turbine must be cooled, with surplus heat must be discharged into the atmosphere. The same loss of heat takes place in the burning of natural gas and coal – water is heated creating the steam needed to turn a turbine, which then must be cooled.

Charles Frank at the Brookings Institution published a superb paper on the cost and benefit of replacing coal and gas with alternative sources of energy, albeit several years ago. Nuclear, 20% of our electricity supply, which we could have more of if policy allowed it, is included in the analysis. Hydro, which supplies 7% of U.S. power, is included as well. We won't get more hydro power unless we build more dams. While hydro happens to be the most efficient source of power, good luck getting another permit in North America or Europe. [For those wondering, Robert S. Brookings, founder of the eponymous Institution, was Robert Brookings Smith's uncle. The nephew served on the Institution's board for years.]

Net Cost Of Replacing Baseload Coal And Peak Load Gas Simple Cycle					
	Wind	Solar	Hydro	Nuclear	Gas CC
Net Energy Cost per MW	($74,412)	($50,938)	($141,991)	($217,162)	($46,099)
Net Capacity Cost per MW	$200,626	$305,725	$130,493	$298,937	($210,544)
Total Net Cost per MW per Year	$126,214	$254,787	($11,498)	$81,775	($256,643)
MWH per Year	2,236.9	1,359.6	3,496.5	7,852.8	8,059.2
Net Cost per KWH (cents)	5.64	18.74	(0.33)	1.04	(3.18)

Net Benefits Of Replacing Baseload Coal And Peak Load Gas Simple Cycle					
	Wind	Solar	Hydro	Nuclear	Gas CC
Value Avoided Emissions/MW	$106,697	$69,502	$168,394	$405,574	$278,738
MWH per Year	2,236.9	1,359.6	3,496.5	7,852.8	8,059.2
Emission Benefits/KWH (cents)	4.77	5.11	4.83	5.16	3.46
Net Costs per KWH (cents)	5.64	18.74	(.33)	1.04	(3.18)
Net Benefits per KWH (cents)	(0.87)	(13.63)	5.16	4.12	6.64

Source: Brookings Institution; Charles Frank; May 20, 2014

Essentially, the replacement of fossil fuel and nuclear generated power with renewables poses an impossible cost. Replacing high-capacity factor and efficient assets already in service with new low-capacity factor renewables is the path we are headed down. Wind and solar, now 8.4% and 2.3% of energy sources (20% of the total are renewables), must be built to produce anywhere from four to six times the amount of productive capacity at an uneconomic cost per incremental kWh produced. I've seen estimates of between $4 and $8 trillion to build enough solar and wind to replace fossil fuel generated capacity, holding nuclear constant at 20% of the total. This is just in the U.S., the wealthiest nation in the world, consuming 17% of global power. Multiply these dollars by 6 to arrive at the global cost.

Take the analysis one step further. Consider that we are talking about the mere replacement of coal with wind and solar, for example. Think about the conversion from refined oil to the electric grid as the source of power for transportation currently powered by gasoline and diesel. In 2020, the U.S. electric grid had combined 1,120 TW of total capacity and a small 28 GW of solar capacity. If every automobile in the U.S. was electric and charging at 7kW, the grid would require capacity of 2,010 TW, *nearly double*! In other words, not only are we replacing electricity-generating sources like coal with solar, but we are materially adding to the demand for electricity production.

Once we assume full replacement of fossil fuels in energy production, and the addition of the energy required to charge the transportation sector, not previously from the grid, now consider the assets that were decommissioned with remaining useful economic lives. Will regulators and politicians allow utilities to recover these stranded costs? We made societal agreements with regulated utilities to build coal and nuclear generative capacity with very long useful lives for the benefit of the citizenry. Shuttering this capacity early, should we allow continued economic return for an asset taken from service early, but whose cost to place in service was only done so in advance with an implicit guarantee of allowed reasonable and regulated return? I know what the answer should be, but in the world of make believe when everything can be free, punishing the owners of these now "dirty" assets will be on the table when the cost of modern energy policy becomes evident.

Further lost on the net-zero movement is the energy intensity required to develop wind and solar. They are not as clean as many believe.

Solar energy supplied to electric grids only operates at a 25% capacity factor. Wind operates at 35% but both badly trail conventional power sources, with nuclear the highest at 93%. Wind's capacity factor is split between offshore at nearly 40% and onshore, operating at closer to solar's 25%. Both solar and wind require backup and constant power sources, either grid-scale battery or natural gas. At present, battery storage doesn't exist at the scale needed to keep supply to the grid stable. Should battery storage at grid scale develop, that will drive the cost of wind and solar dramatically downward.

Advocates of solar and wind note correctly that in addition to becoming cheaper, renewable power is more efficient in the sense that its own energy feedstocks are carbon-free. Usable electricity in all forms requires more than double the energy input in its creation. Wind and the sun do not release man-made carbon dioxide. However, the manufacturing inputs required in the creation of wind and solar assets do, and in a big way.

Solar panels are essentially huge semiconductors, requiring plastics and the heating of silicon dioxide to such high temperatures that only the burning of coal is sufficient. Lots of coal. The panel further requires a second heating with rare earth metals to allow for high enough conductivity to harness the power of the carbon-free sun. If you are far removed from your last chemistry class, recall that silicon dioxide is quartz, which must be mined. Mining, of course, is hugely energy intensive, requiring massive equipment burning diesel. Further, the amount of coal necessary in the production of solar panels is so large that the Chinese, free to increase coal use under the Paris Climate Accord, and free to burn coal with far more

polluting plants, are the globe's primary manufacturer. Sweet. The frame and plexiglass cover sitting on top of the semiconductor solar panel are plastic. We only get plastics from the refining of hydrocarbons. Grid-scale solar panels are said to have 25–30-year economic lives, but they degrade and lose efficacy over time, and then must be replaced. Recycling requires huge carbon inputs. Finally, while the energy input from the sun is carbon-free, the land required for massive solar fields is not.

To power my home and those of my neighbors in St. Louis County with solar would require just a bit more land than most of my fellow citizens would believe. The county has 1 million people (3 million in the metro area) living in a 523-square-mile geographic footprint. Replacing all of local utility Ameren's coal, gas and nuclear-fired capacity with nothing but solar would require more than 120 square miles of land to match the power supply just to the county, more than 1/5th of all of the land in the area. You could do it with a mere 30 square miles if fully backed up with always-on natural gas supply. In all, Ameren operates 4 coal, 1 nuclear, 3 hydro and 8 natural gas-fired facilities producing 9,800 megawatts (MW) of power. They also operate two large wind and one solar facility which combined produce 701 MW of power, 6% of Ameren's total production, absorbing more than 18 square miles of land, which I would guess is less than the land occupying all the plants producing 94% of the power. If I'm off on the math here it's because solar would be a lousy power source in eastern Missouri, known by some as Misery for its constant cloudy days and miserable summers and winters. Year-round partial cloud cover is bad for solar. Better in the desert where land is *way* cheaper, and the sun beats down constantly. A good rule of thumb is to not build solar where residential land goes for $1 million an acre or on prime farmland costing $16,000 an acre these days. You can certainly pay the farmer royalties to use land for the simultaneous growing of the farmer's corn and the harvesting of your wind. I'm thinking about putting in a wind turbine in my backyard to heat my pool because the cheap solar heater sucks, come September.

We have two companies in the portfolio manufacturing some components for wind turbine blades. Olin makes epoxy using chlorine; Hexcel makes intermodulus carbon fiber using polyacrylonitrile. The processes creating both are extremely energy intensive. Epoxy is stronger and occupies the portion of the turbine nearest the steel tower. The carbon fiber is lighter but weaker so exists at the edges. A single wind turbine made of varying quantities of fiberglass, carbon fiber and epoxy can be almost 200 feet long and the tower more than 400 feet high, not counting the portion buried in the ground. No portion of a wind turbine can be made without the burning of fossil fuels. The torque applied as wind blows the blade is something, requiring a mammoth base of concrete impregnated with rebar in the ground. Ask farmers that lease their land to wind operators how much concrete and steel reside below their land. We have. The John Deere may be green, but the foundation of a wind turbine is not. Cement (the base in concrete) production creates almost 10% of carbon dioxide emissions worldwide. You don't get steel without burning lots of coking coal. Next time you are driving around the country and see the growing army of wind turbines, think about all the coal, gas and oil that goes into the production of green energy.

Decarbonistas

At every turn, even though 1) natural gas demand can only increase over time, 2) the world cannot live without refined petroleum, and 3) nuclear energy is the cleanest, most efficient source of power in the world, the green movement pushes back at every inch of growth and logic. The willpower to kill anything but renewable energy is fierce. ExxonMobil lost three board seats to a tiny activist fund that launched a successful proxy battle suggesting the company is failing to adjust its business strategy quickly enough to match the global push to decarbonize and fight climate change. I wonder if activists realize ExxonMobil is one of the largest global investors in renewables and leads the globe in carbon capture technologies and efforts. Carbon capture? Think capturing carbon dioxide emissions from cement plants, for example, and burying it in geological formations created from former oil deposits. Equinor, partially owned by the government of Norway and in the Semper portfolio, has among the lowest-cost oil and gas reserves

among energy majors. They are also leading on carbon capture, burying captured carbon deep in its North Sea deposits after extracting reserves.

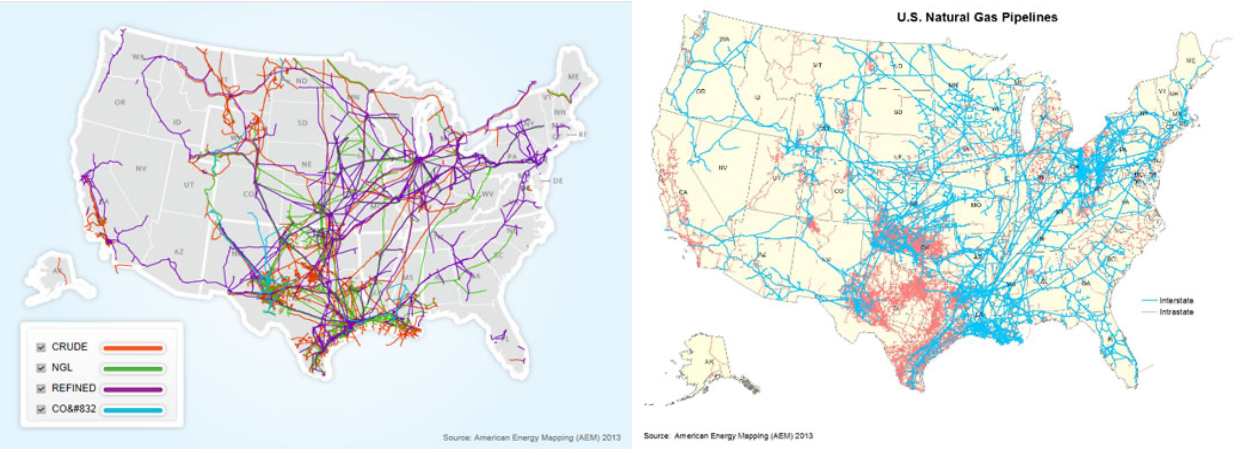
The same activists are sending Europe's integrated energy majors down the path of having no carbon exposure. Norway's sovereign wealth fund, the largest in the world, is divesting all its energy investments. The fund was created with taxes on Norway's oil and gas industry, on Equinor (formerly known as Statoil). Oil and gas make up 25% of Norway's GDP. Some endowments and public funds are likewise compelled to divest of all fossil fuel investments. Forced selling drives prices down, creating opportunity for those not likewise compelled to otherwise motivated behavior.

Berkshire Hathaway was under assault by proxy activists last year, who lobbied that Berkshire failed to adopt a policy requiring each of its subsidiaries to file independent check-box climate change initiative reports. The company deftly rebuked the critics, who included proxy advisory firms Glass, Lewis & Co. and ISS, passive king BlackRock, and CalPERS, the largest public pension fund in the country. Berkshire rightly pointed out that nearly all its carbon footprint comes from two subsidiaries, the BNSF railroad and BH Energy, each of whom file their own set of SEC filings as well as *exhaustive, comprehensive* sustainability reports and initiatives. Berkshire retired 16 coal-fired plants from 2006 to 2020, will shutter another 16 by 2030 and its final 14 between 2031 and 2049. They are committed to net zero greenhouse gas emissions, expecting a 50% reduction in carbon dioxide emissions by 2030 from 2005 levels. Their collection of three electric utilities were the *only* signatories among *all* U.S. utilities to 2015's Paris Climate Accords and likewise adopted subsequent accelerations in the reduction of the carbon footprint. Mr. Buffett noted that not only was it highly unlikely that any of the activists had read Berkshire's annual report and sustainability filings but that they also had no clue about what was being done at the rail and energy subsidiaries, instead pointing out the ridiculous importance of having Berkshire's Dairy Queen, a *franchisor* with scant physical assets, jump through the feel-good hoop, wasting precious corporate resources and time. The power wielded by passive investors who don't care to understand what companies do and even fail to simply read filings is disturbing. Perhaps we should disallow institutional operators of passive public assets from voting proxies? I don't know. Don't slay me, but there was infinite wisdom in the Berkshire response to the assault. For the time being, the shareholder base likewise remains perhaps the most rational of any publicly traded company.

Put This in Your Pipe and Smoke It

Insanity really reigns in the world of pipelines. A multi-year assault against two pipelines in particular, Keystone XL and Dakota Access, proved a willingness to live with the consequences of energy shortages.

The Keystone XL, a partially completed extension to three already operating pipelines from Alberta to terminals and refining and pipeline hubs in Wood River, Illinois, Cushing, Oklahoma and Nederland, Texas was held up for three years and initially cancelled in 2015. It was a 1,719-mile extension. For perspective, the U.S. has more than 190,000 miles of liquid petroleum pipelines and 2.4 million natural gas pipelines crisscrossing the nation. By comparison the U.S. Interstate Highway System runs through all 50 states and encompasses only 47,000 miles. The Keystone expansion would have added supply from the Bakken Basin in North Dakota and Montana and was an increase of less than 1% to the liquids pipeline infrastructure in the country.



Source: American Petroleum Institute; American Energy Mapping

Approval of Keystone XL began with President Obama, who onsite in Cushing declared:

> *A company called TransCanada has applied to build a new pipeline to speed more oil from Cushing to state-of-the-art refineries down on the Gulf Coast. Today, I'm directing my administration to cut through the red tape, break through the bureaucratic hurdles, and make this project a priority, to go ahead and get it done. My administration has approved dozens of new oil and gas pipelines over the last three years.*

The State Department had "studied" the pipeline for seven years, and three years after the President's assurance recommended approval in an 11-volume report. Secretary of State John Kerry overrode the report, not liking the optics of approving another pipeline. The Trump administration overturned the Kerry veto two years later in 2017. Red tape slowed construction until new President Biden revoked the permit on his first day in office. The project was abandoned in June, only 8% already completed. Progress. When a barrel of oil is $150 and a gallon of gasoline runs $8.00, recall the hysteria of adding less than 1% to the nation's liquids pipeline capacity. Pipeline protests are not uncommon.

The Dakota Access Pipeline is a 1,172-mile underground 30-inch pipeline transporting light sweet crude from the Bakken/Three Forks area in North Dakota to a terminal in Illinois. The $3.8 billion pipeline effectively allows for the removal of the equivalent of 3,000 tanker trucks or more than 800 rail cars that would pass neighborhoods and cross waterways every day. It moves 40% of the production from the Bakken. You may recall the highly televised protests with the Standing Rock Sioux tribe and myriad supporters (rumor has it that Warren Buffett, owner of the BNSF and beneficiary of moving oil via rail, was incognito and onsite with the protestors) who fought for ten months to prevent the completion of the *final quarter of one mile* that would be 100 feet below the bed of the Missouri River. The pipeline had been approved following a lengthy review by the U.S. Army Corps of Engineers and been reviewed and approved, following more than 100 revisions by 50 Indian tribes. The Standing Rock Sioux protested in arrears, even though the pipeline did not cross their land and the final leg was on private land. The pipeline was ultimately completed and is operating today, though under constant legal appeal.

If you watch the Patriots play football in December and January (they do that often), you know it gets *cold* in New England. A 2014 winter of "polar vortexes," which is code for *really* cold, caused a surge in demand for heat and shortages of gas across New England. Presuming future vortexes from the north, Kinder Morgan proposed a $3.3 billion, 180-mile pipeline branch from an already existing pipeline in western New York across New Hampshire and Massachusetts to Dracut, Massachusetts. It was bad timing for the cold to hit and to propose any new pipeline because the following year was a presidential election.

Protests from greens and NIMBYs encouraged the entire slate of Democratic candidates to argue in a debate over *who* opposed the short pipeline *more*. Kinder Morgan naturally withdrew their proposal, with CEO Steve Kean suggesting, "There is a regulatory process that has to get sorted out up there." New Englanders would know a civil, puritanical understatement like that to mean, "Pull your heads out of your asses."

For brevity's sake, let's dispense with further pipeline narrative and just enjoy a few media headlines:

> ***Enbridge-backed PennEast becomes the latest to scuttle a natural gas pipeline project***
> *Proposed $8 billion pipeline from (Marcellus Shale) Pennsylvania to New Jersey runs aground due to legal, regulatory challenges – September 27, 2021*
>
> ***How activists successfully shut down key pipeline projects in New York***
> *In the past half-decade, grassroots opposition in New York has led to the cancellation of four major interstate pipelines — a total of 931 miles — that would have cut through communities and ecosystems – Grist; January 4, 2021*
>
> ***Maine referendum deals blow to Hydro-Québec project***
> *Maine residents vote to halt construction of transmission line worth billions in revenue to Quebec utility – CBC News; November 3, 2021*
>
> ***Energy companies abandon long-delayed Atlantic Coast Pipeline***
> *Virginia-based Dominion Energy and North Carolina-based Duke Energy spent $3.4 billion on the project, fighting regulatory battles that went all the way to the Supreme Court, which ruled favorably for the companies last month – Washington Post; July 5, 2020*

Suffice it to say it's not a crisis when your neighbor freezes to death, but it becomes one when *you* freeze to death. Go Pats.

Keeping Up with the Joneses

> *He fought in the rain and he fought in the sun and he fought in the moonlight too*
> *He fought with his knife and he fought with his gun*
> *And he fought till his blood ran through*
> *Well John Paul Jones was a fightin' man a fightin' man was he*
> *He sailed to the east and he sailed to the west and he helped set America free*

John Paul Jones is famous in the U.S as the "Father of the American Navy," for heroism during the American Revolution and as the first well-known naval commander for the Colonies. Outside of the Naval Academy Chapel in Annapolis, where he is buried, his legend was further sealed as the subject of Johnny Horton's, "*John Paul Jones*," a verse from which is italicized above. John Paul Jones was also famously the bassist for Led Zeppelin. Even though millennials know Zeppelin was a band a long, long time ago, they happen to be different Joneses. Oddly both Joneses were Brits, so perhaps they are related, a research project for another time.

Neither JPJ has anything to do with this tangent, however. Sometimes it's good to leave the reader guessing what Chris was thinking, or if he was at all, at 3:30 am. This story does involve a Jones, however, this one a piece of legislation introduced in 1920 by one Senator Wesley Jones, who likely spent a lifetime regretting that his parents didn't name him John Paul. Or teach him to sail. Or play bass guitar.

Many pipeline aversionary problems stem in the Northeast. We are already starting to see the ramifications of removing perfectly good assets, replacing them with less efficient and intermittent sources of power, and refusing at the same time to allow the infrastructure to deliver needed energy in times of both stability and shortages. The Northeast has another little problem. When Europe buries its

head in the sand and natural gas prices surge to ten times the going rate stateside, thanks to the U.S. being now an exporter of gas (in liquified form), when shortages hit the Continent, the U.S. to the rescue (isn't it always like that). A veritable navy of LNG carriers is racing to Europe, delivering gas to a region freezing from self-imposed shortages. While Mr. Putin generally has gas to go around, can he be trusted in a pinch? The delivery of much-needed U.S. gas relieves pressure in Europe and prices began to recover downward at this writing.

New England, meanwhile, benefits not from abundant Gulf Coast gas. If you can't get it there in a pipeline because they don't want those in their backyards, they likewise can't get Gulf Coast LNG; at least they can't get it delivered on a U.S.-flag tanker. Huh? Nor'easters, shivering, are learning about a long-ago written piece of legislation, the Merchant Marine Act of 1920, a section of which is otherwise known as the Jones Act, drafted by the one and only Senator Wesley Jones mentioned above. The legislation was passed to protect American interests by requiring that goods shipped between U.S. ports be transported on vessels built, owned and operated by U.S. citizens. It dramatically makes shipping from mainland U.S. to Hawaii and Alaska very expensive. The unintended consequence for those up north and east results from the little fact that, at present, there are precisely *zero* U.S.-flagged LNG carriers. Only for the bounty created by the success of shale oil and shale gas did the U.S. ever dream in recent years of exporting gas. LNG terminals were initially built and on the drawing boards to *import* liquified gas, not *export* it. That all changed, and now the U.S. goes back and forth with Russia as the world's largest producer of "natty." Too bad for my friends in Boston, who report waving from the coast in frostbitten, mittened hands, at all the foreign-flagged LNG tankers speeding by on their way to Amsterdam.

Coal

Coal production represents 19% of U.S. total grid-scale energy production. We haven't built a coal-fired plant since 2014. 212 gigawatts (GW) of coal-fired capacity are operating in the U.S, down from 340 GW a decade ago. Despite no mandatory retirement age, coal plant operators plan to retire 28%, or 59 gigawatts (GW), of the coal-fired capacity currently operating in the United States by 2035. Coal plants operate about 49% of the time in the U.S. and roughly 53% of the time abroad. Thus, annual generation is just under 100 GW, or 1,000 billion kilowatt hours.

The U.S. shuttered or announced the closure of more than 65% of its coal plants over the past decade. Half of Europe's coal capacity is confirmed for closure. Japan announced two-thirds of its 140 plants will close, which is half of its installed capacity (retiring less efficient plants). Germany is paying more than EUR 4 billion to power companies to encourage and compensate them for closing plants by 2030. Germany is teeing itself up for major problems.

While the West races from coal, global coal use in fact grows over time, mostly in China and India. There are 252 coal-fired plants in the U.S., while China and India have 1,082 and 281, respectively. China has more than half of the global total and both countries are rapidly growing coal production each year. China gets 65% of its power from coal and India a whopping 79%.

Under Paris, China is allowed an increase of the amount of coal produced in the U.S. in 2015. In brief summary on coal, truly the dirtiest of energy sources (despite strides in scrubber technology), most of the Western world is shuttering capacity quickly as the largest polluting countries will pollute more. With coal operating at greater capacity factors and more efficient than wind and solar, more power capacity must be built than the amount retired from coal, a recurring theme by energy source.

Nuclear

The U.S. has 93 operating nuclear reactors at 56 plants in 28 states. The number of reactors peaked in 1990 at 112. California is closing Diablo Canyon, its last remaining nuclear plant. With an aversion to most forms of power generation, there are those in Sacramento driving the state to the use of rubbing sticks together as the preferred source of energy. Oh, we can always rely on our neighbors. Nevada to California, "Pound sand, you have lots of that." Nuclear comprises 20% of power production, expected to fall to 11% by 2050. Makes total sense to kill off your cleanest, most efficient source of energy. At least Nevada, Arizona and Oregon aren't Russia.

The world is following suit. Germany had 17 nuclear plants before Japan's Fukushima earthquake in 2011. Three of the remaining six were closed permanently on January 1 with the remaining three gone by this year-end. Germany is like California. Shut it all, we'll be ok. Good thing to be beholden to Moscow for your energy supply.

Globally there are 441 nuclear reactors in operation, constant since the early 1990s and peaking at 450 in 2018. The U.S. accounts for 21% of the mix. Remember we consume 17% of the world's power. Nuclear provides about 30% of global power. France operates 56, China 51, Russia 38, and Japan, rounding out the top five, with 33. China is adding 14 gigawatts of nuclear capacity.

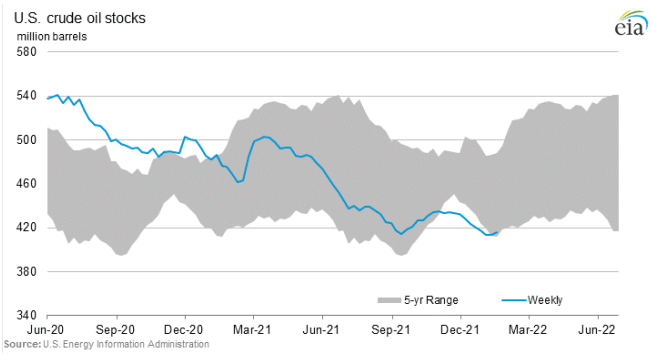
Again and again, why does the West insist on self-immolation? Outside of France, where nuclear giant EDF leans heavily into nuclear and expands, the West is closing our cleanest and most reliable energy source, which outside of a small number of accidents globally has proven extremely safe. Cheap, nuclear is not, but given a willingness to grow wind and solar, the least efficient, lowest capacity sources of power requiring multiples of generative capacity to those power sources being shuttered, cost seems to be of no concern. When governments are already indebted to the point of insanity, what's the difference?

Wind and Solar

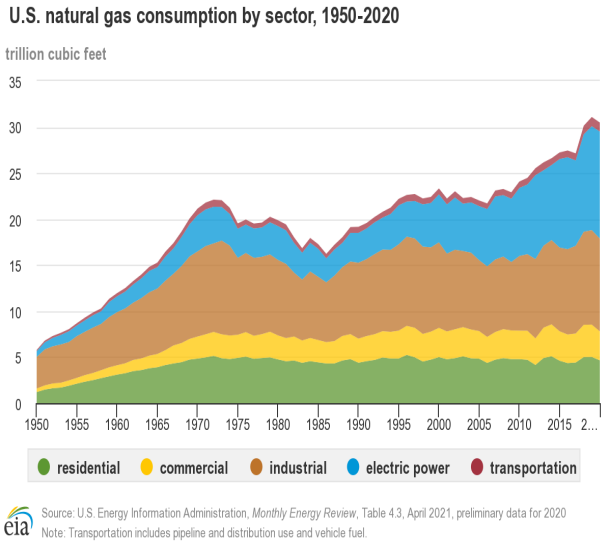
Wind makes up 8.4% of U.S. electricity generation. With total renewables at 20% of generation, wind represents the largest segment at 41%. Growth over the past two decades was remarkable, up from 6 billion kWh produced in 2000 to more than 350 billion today. Most renewables growth has come from wind, aided by a production tax credit that phases out in 2024. Without the tax credit, we aren't likely to see much net addition from wind after that. Solar is also growing very quickly on the back of a 30% investment tax credit which drops to 10% in 2024 but is sustained beyond that. If tax policy remains constant, solar, now only 2.3% of total power production and 16% of renewables, will surge to 20% of total U.S. power by 2050 and 47%, nearly half of renewable generation. Sans tax benefit, nobody would use solar in the grid as it is the least-efficient, lowest-capacity source of power available.

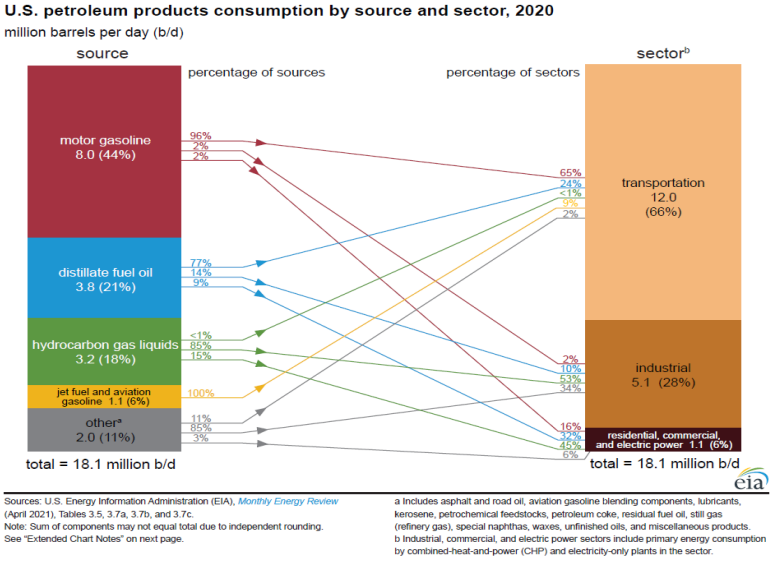
Berkshire Hathaway owns three electric utilities and is the largest generator of wind and solar power in the U.S. At year-end 2020, 48% of Berkshire's generating capacity came from renewables, with 64% of the renewable total from wind, 21% from solar, 10% from hydro and 5% geothermal. Iowa leads the nation with 58% of its power coming from wind. That's Berkshire's MidAmerican Energy, with 7,000 megawatts in operation at year-end 2020. Berkshire's PacifiCorp will have had 2,200 megawatts of wind power by the close of 2021. BHE operates two solar facilities in California, Topaz and Solar Star, with 1,136 megawatts of capacity. In total, on September 30, 2021, BHE owned more than 34,000 MWs of power capacity and invested $35.5 billion in renewables with plans to spend an additional $4.9 billion by 2023. BH Energy operates with a sizably negative tax rate, receiving tax benefits of $1.5 billion in 2020 and $1.3 billion in the nine months ended this past September 30. The energy business at Berkshire will be the second-largest group inside the company within the decade. They are the Jolly Green Giant of U.S. renewables.

Oil and Gas



Scarcity is creating one of the greatest opportunities for investors in oil and gas. The rush to renewables is where we are headed. The parallel decommissioning of otherwise efficient, reliable and cheap sources of power is simultaneously taking place. As the demand for energy grows over time, the intermittent nature of solar and wind power makes the transition underway a tricky one. Because so much more wind and solar is required for each unit of traditional power removed, inevitable scarcities will develop. In the world of oil and gas, we are not spending adequately to replace reserves. In the short term, inventory levels are seasonally at extremely low levels. Given a dearth of spending on exploration, the situation for the investor gets very interesting.



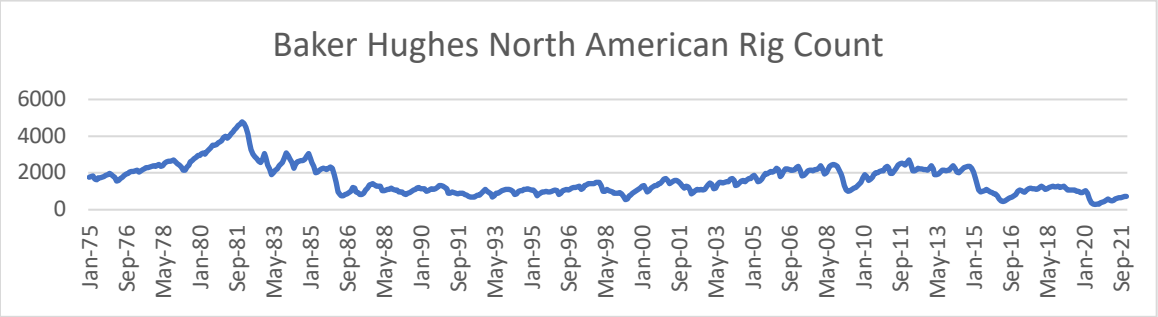


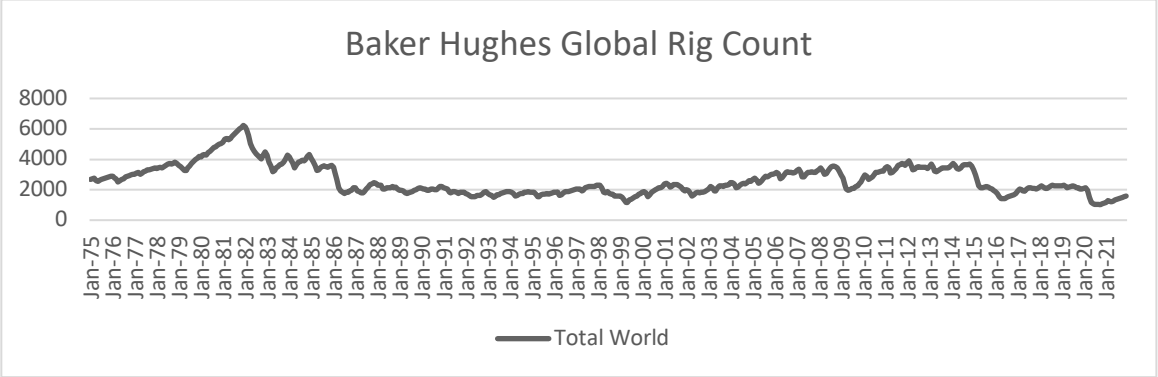
More than two-thirds of petroleum products are used in transportation, while end use of natural gas is largely split between electric power generation, industrial and commercial use, and in residential heating. For power generation, natural gas is used in steam turbines to generate electricity and sources about 40% of U.S. electric needs. A sizable portion of natural gas production comes from oil drilling, which contributes to U.S. natural gas typically being cheap. When gas prices are cheap, surplus gas is burned. These are the flares you see at some oil wells. If you look closely below the x-axis on the chart on the left, you will see the portion used in heating my pool. With gas prices high, hence the coming installation of the wind turbine. The steam rolling off the water is the dollar meter. Not good.

The capital cycle takes companies and investors to the woodshed when overspending and oversupply crater prices. The last boom ran from 2011 to 2015 when prices of a barrel of West Texas Intermediate north of $100 per barrel attracted massive expenditures on exploration and the equipment required to do so. Exxon and Chevron spent more than $40 billion annually for several years, sums well above annual

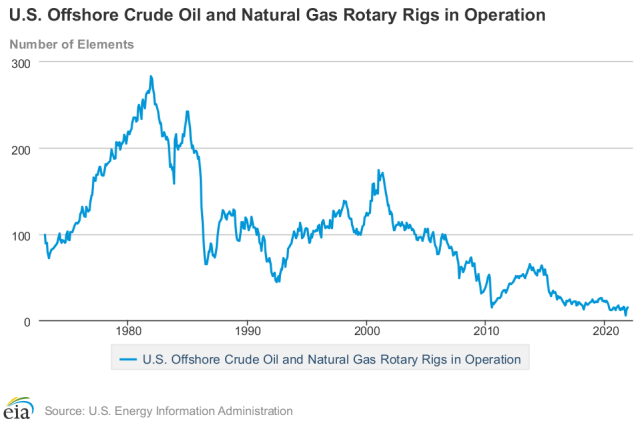
cashflows. Today they are spending half that and not coming close to replacing their reserves. Once bitten twice shy overlaid with politicians who insist their mission is to put these companies out of business puts a damper on the willingness to spend wildly. Further, many smaller E&P companies failed or were so severely harmed as prices for oil and gas plummeted that many reserves in basins like the Permian were rolled up and are now in stronger hands.

We have seen a rise in the number of rigs drilling for oil, but most activity is in extracting already drilled wells known as DUCs, drilled but uncompleted wells. Exploratory rigs drilling for new reserves are scarce. The industry is spending too little to find new deposits and replace reserves. Reserves are not being adequately replaced among the energy majors, with proven reserves in decline. Thus, supply and demand disparities are evolving which will surprise many people. I don't recall a sitting president of the U.S. ever appealing to OPEC and to Russia to increase production and supply.

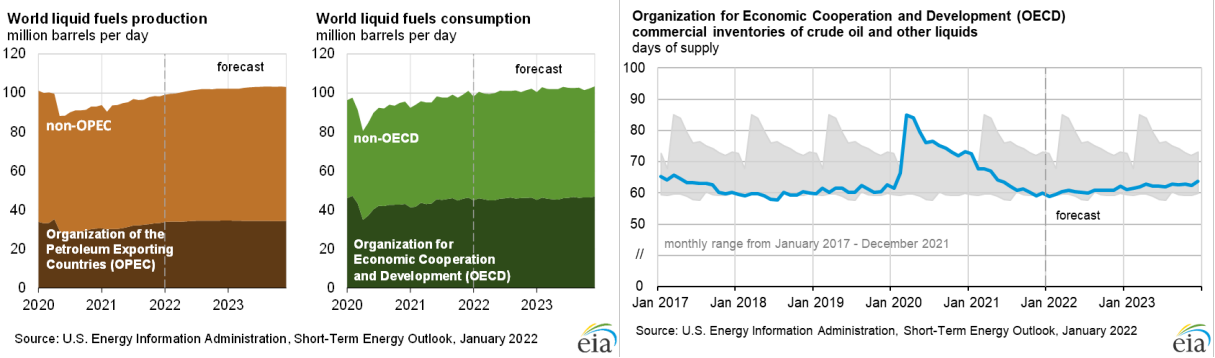




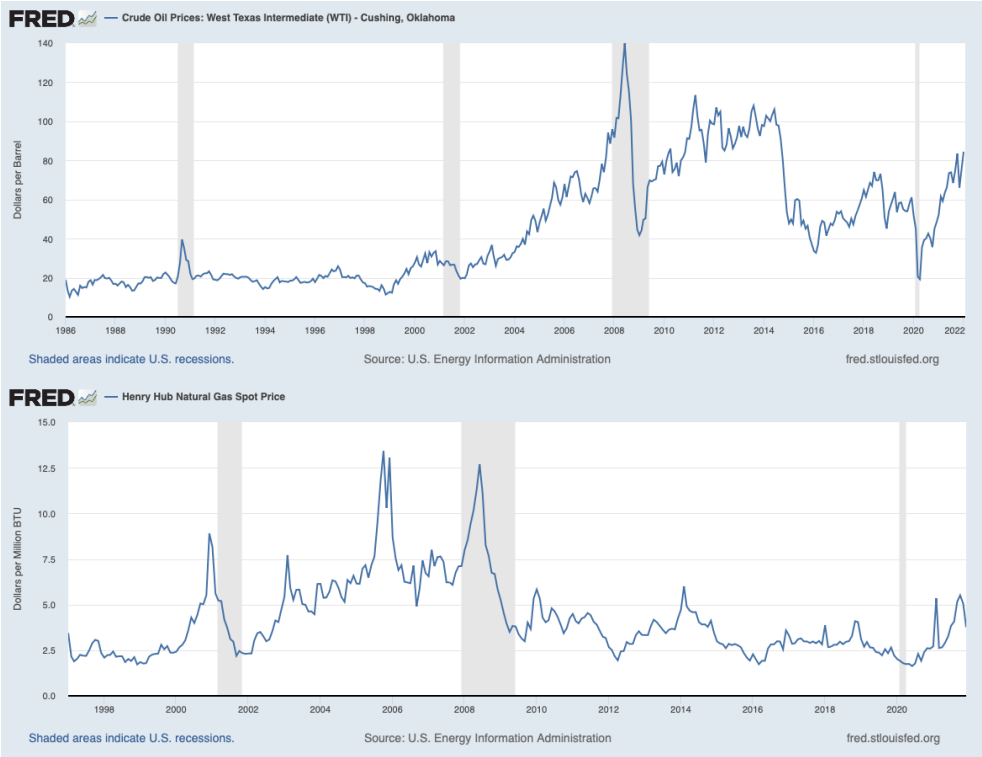
Demand for all energy sources and particularly oil and gas fell off a cliff during the early stages of the pandemic. A miserable five years dealing with oversupply turned horrific as demand cratered. Underutilization of equipment became no utilization for a time, with offshore drilling as a prime example. Offshore drilling is typically more expensive and capital intensive than onshore drilling. Hi-spec deepwater rigs run $600 million. If no contracts are available, rigs sit cold stacked in harbor, and if they sit too long, the cost of bringing them back into production becomes prohibitively expensive. Much of the equipment in operation by 2014, particularly older rigs and equipment, will never be returned to service. Refurbishment is too expensive so equipment that has not reached the end of useful life gets scrapped. The breakeven costs of drilling offshore, in shallow and deepwater alike, have plummeted by more than half, to less than $40 per



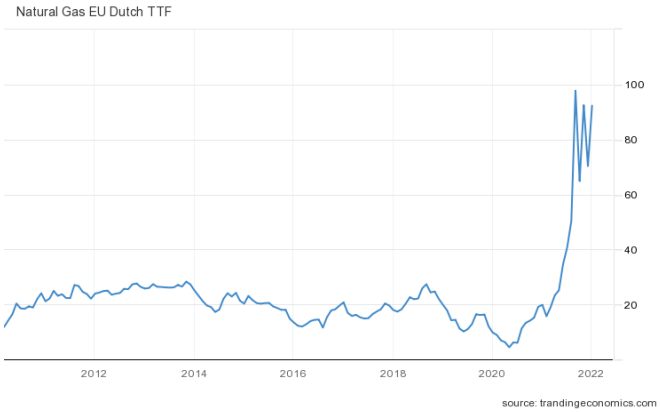
barrel for deepwater, cheaper than breakevens for shale oil. Semper holding Equinor's Johan Sverdup North Sea field is pumping more than 500,000 barrels per day at among the lowest costs in the world. ExxonMobil discovered a huge field in the Guyana-Suriname Basin and likewise controls some of the lowest cost reserves in the world. As demand surges and supply lags, ramping up offshore drilling cannot be done quickly. Once a scarcity of equipment (and labor) develops, as is the case today, prices harden faster than supply can keep up. We continue seeing rationality by operators and restrained spending on exploration.



Demand for all but jet fuel has now fully recovered. Prices for oil and natural gas are surging and barring a deep and immediate recession are likely headed higher. Rising prices do tend to precede recessions, a byproduct of the capital cycle, but this presumes supply rises to the point of overproduction in response to high prices. There is no evidence of this yet.

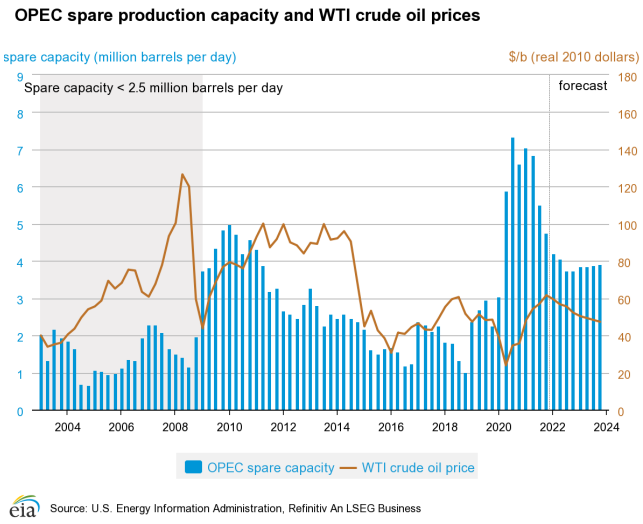


A dearth of natural gas supply in Europe is far more pronounced than in the U.S., with prices rising this winter to records and multiples to the price of U.S. gas. LNG tankers are racing to Europe to capture the spread, waving at New Englanders as they sail by.



OPEC

Prior to OPEC, the oil market was dominated by seven major oil companies often known as the Seven Sisters. They were a tight-knit bunch, mostly colluding and manipulating price and production. Antitrust concerns would come and go, as the U.S. Government benefited as much from oil and gas as they abhorred monopolists. By the mid-1960s a group of sovereign nations collectively formed the Organization of the Petroleum Exporting Countries and rose to set the price of the marginal barrel of oil during the mid-1970's. OPEC countries hold more than 70% of the globe's proven crude oil reserves and produce about 35% of production. Until the U.S. regained energy independence and is again a net exporter of oil and gas, OPEC could hold reserves off the market or increase production. A swing of 1 million barrels against total global consumption of 100 million barrels daily has dramatic impact on the price. During the early stages of the pandemic, when demand for oil cratered, both OPEC and Russia announced a price war and supply *increases*. OPEC production reached a three-decade high. The resultant plunge in oil prices, sending the expiring front-end WTI futures contract to negative for a moment, crippled many U.S. independent oil and gas producers. Many failed and were sold or restructured.



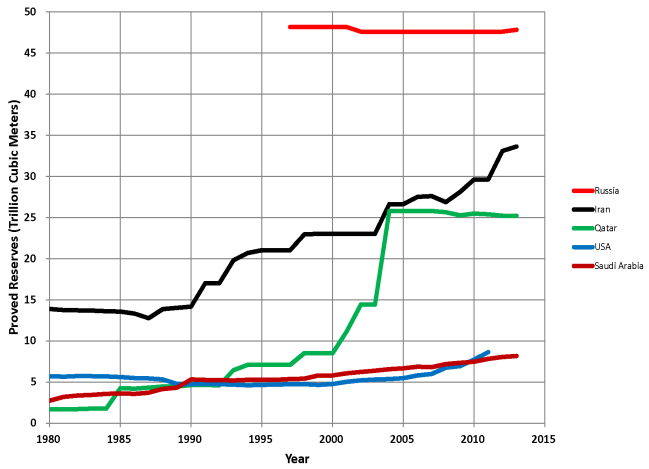
Now, with demand fully recovered, scarcities abound, the theme of this section of the letter. It appears that OPEC has little surplus capacity with which to meet rising demand. To the extent this holds over the intermediate or long term, it is yet another piece of evidence supporting an incredibly tight energy market. OPEC may in fact not want $100 oil due to consumer price elasticity – they thrive on high volumes and prices just high enough.

More Pipeline Fun

Russia is the largest supplier of gas to Europe and to Germany in particular. Tension between Russia and Ukraine centers on pipelines. Russia provides more than a fourth of all gas consumed in the EU, more than 80% of which flows through pipelines running through Ukraine. A brutal winter in 2005 saw Ukraine illegally divert some gas intended for Europe for its own use. Russia retaliated by shutting off all gas supply through Ukraine. In the wake of the dispute, Russian state oil company Gazprom partnered with several European entities and built a pipeline, Nord Stream, running under the Baltic Sea directly from Russia to Germany, increasing Russian influence in Europe and eliminating a portion of gas flowing through and effectively taxed by Ukraine. Gazprom began construction on a second pipeline system in 2016, Nord Stream 2, which will double the capacity of the current system to 110 billion cubic meters of capacity.

For perspective, Russia consumes roughly two-thirds of the gas it produces, thus once Nord Stream 2 is online it will have the capacity to carry half of Russian gas exports and bypass sending gas through Ukraine, which collects more than $3 billion per year in fees from Russia. One of the largest gas companies in Ukraine is Burisma Holdings, which is interesting considering U.S. alliances. Construction of Nord Stream 2 was completed in September, is loaded with gas, and awaits final German approval. The U.S. said the pipeline will not be approved if Russia invades Ukraine. Walk tall and carry a big stick. Some don't like it. In the meantime, it's very cold in Europe and gas prices are off the charts. Scarcity abounds.

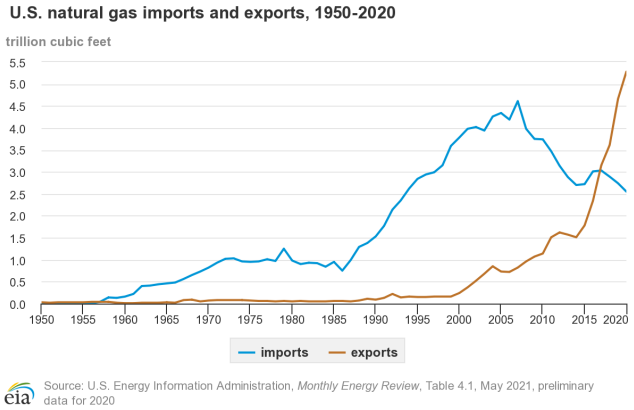
Proved Gas Reserves in the Top Five Countries, 1980-2013 (US EIA)

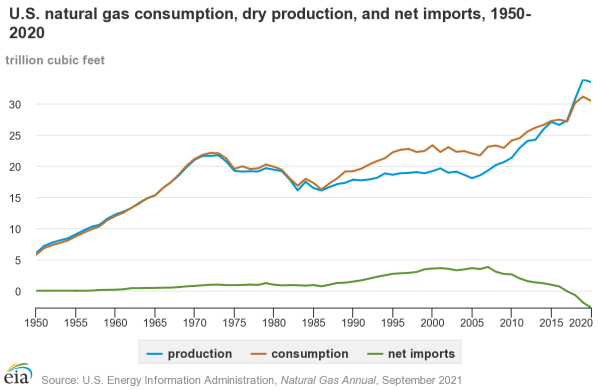


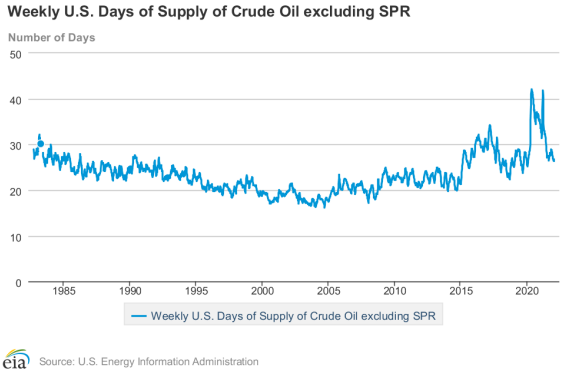
Russia commands the largest proven reserves of natural gas in the world. Different totals are estimated by various sources. I've pulled from EIA, OPEC and BP. Orders of magnitude regarding future demand and supply are all in the same ballpark. With 48 trillion cubic meters, Russia has 77 years of production in reserve. Iran and Qatar have 143 years respectively. The U.S. surged to fourth thanks to shale gas, but by reserves only has 14 years proven to date, twice as much as recently as 2009 and more than triple from 1999. Probable reserves are likely far higher.

By production, the U.S. raced to the top of the heap, producing 915 billion cubic meters in 2020 followed by Russia with 639 billion cubic meters. Total global production is roughly at a 4,000 billion cubic meters per year, or 4 trillion cubic meters.

Recent large increases in production and reserves of natural gas have put pressure on Russia, as the Russian economy is far more dependent on energy exports than is the U.S. A staggering 60% of Russian exports are oil and gas, providing over 30% of its GDP. By contrast, oil and gas comprise only 8% of U.S. GDP. The U.S. became a net oil exporter in 2020 and a net natural gas exporter in 2016. European gas production is also in decline, and with closures of nuclear and coal capacity, Europe is increasingly more dependent on Russia and imported natural gas. Greens correctly believing natural gas is a fossil fuel, which it is, will never see gas consumption decline, regardless of how much solar and wind power is installed.



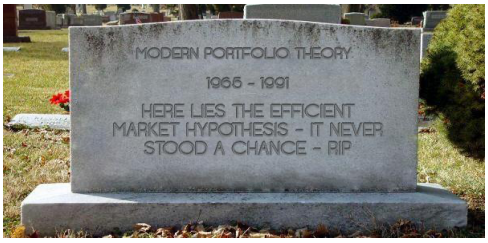




Investing in the classic capital cycle involves decisions to buy and when to sell. Who knows at what point the classic capital cycle will play out in the world of energy? For the moment, there exists a scarcity and rationality by operators we've never seen. Reductions in efficient and not surplus capacity, replacing those assets with less efficient renewables, surging demand post pandemic and a seeming prudence regarding capital spending when prices are rising combine to make the moment an extraordinary one. Our investment in energy is sizable. We've made a lot of money and expect to make a lot more. We win with renewables inside Berkshire. We win with our diversified portfolio of low-cost operators of scarce assets and low-cost reserves.

It helps our cause that fewer investors can or will invest in some of these essential and profitable assets. Low-cost producers of oil and natural gas, low-cost refiners and scarce distribution assets have been recently given away from a return and risk-reward standpoint. A resurgence of deepwater exploration is underway with too few assets to do it quickly. Our engineering and construction business here maintains a fortress balance sheet. They blocked and tackled extraordinarily well during the oil bust beginning in 2015. Political will to kill carbon has created perhaps the greatest asynchronous investment opportunity we've seen. "This time is different" are four dangerous words in investment lexicon. This time is different.

STUDENT-RUN ENDOWMENT FUNDS



"I'm convinced that there is much inefficiency in the market. These Graham-and-Doddsville investors have successfully exploited gaps between price and value. When the price of a stock can be influenced by a "herd" on Wall Street with prices set at the margin by the most emotional person, or the greediest person, or the most depressed person, it is hard to argue that the market always prices rationally. In fact, market prices are frequently nonsensical." – Warren Buffett

"I'd be a bum on the street with a tin cup if the markets were always efficient." - Warren Buffett

"Ben's Mr. Market allegory may seem out-of-date in today's investment world, in which most professionals and academicians talk of efficient markets, dynamic hedging and betas. Their interest in such matters is understandable, since techniques shrouded in mystery clearly have value to the purveyor of investment advice. After all, what witch doctor has ever achieved fame and fortune by simply advising 'Take two aspirins?"- Warren Buffett – 1987 Chairman's Letter to Shareholders

"Modern portfolio theory, it involves a type of dementia I just can't even classify." Charlie Munger

"You can occasionally find markets that are ridiculously inefficient – or at least you can find them anywhere except at the finance departments of some leading business schools." – Warren Buffett

Revolution begins on campus, and a wholesale takeover is underway at colleges worldwide. The uprising ignited with a radical student takeover of Columbia University. Ivory tower doctrine is under attack, students and faculty are fighting dogma – and winning. "Canon of diversity no more," is the mantra of the rebels. The bedrock doctrine of finance is crumbling.

Wait, what? Diversity? Finance? If you know where this is headed, and you should from the quotes and the tombstone above, you know Fama, Samuelson, French, Malkiel, Merton, Miller, the lot of them are turning in their graves, even the ones not fully dead.

It wasn't the 1968 student protest and takeover of Columbia's student union that laid the groundwork for the current revolution. At the very same Columbia University, but three decades earlier, Benjamin Graham taught value investing to such investing greats as Walter Schloss, Bill Ruane, Irving Kahn, Charles Brandes, and, of course, Warren Buffett. It was in the mid 1960s, however, that a pair of academicians introduced the concept of The Efficient Market Hypothesis, Paul Samuelson coining the term and Eugene Fama defining it: "A market in which prices always 'fully reflect' available information is called 'efficient.'"

This section is not to debate the merits, or the demerits, of a belief that the market is efficient and that a skilled investor cannot outperform the market over time. The dictum is wrong and has been largely discredited. This section is rather here to highlight the uprising of so many student-managed funds on college campuses. Outside of enclaves like Columbia's MBA program and early pioneers like the University of Wisconsin's Applied Security Analysis Program, Notre Dame's College of Business Advisory Council Fund, Northwestern's Asset Management Practicum, and the College of Wooster's Hans H. Jenny Student Investment Club, as EMH and Modern Portfolio Theory grew to pervade financial academia in the 1970s and 80s, rare was the program teaching how to invest, let alone creating funds of real capital for students to learn investing through the allocation of real money.

The stock market gained in popularity in the early 1990s (bull markets will do that) and a handful of now established student funds popped up at schools like Ohio State in 1990, Dayton, Texas and Virginia in

1994, with hundreds to follow in the coming years. To my knowledge no student funds were launched in the 1980s. Thank God we had football then, pretty good football at that. Ultimately, I blitzed, bull rushed really, the business school from engineering, eager to learn investing. Instead, I was taught, again and again, that security analysis was futile. The folks in Boulder do have a fund, but only occasionally taught in the classroom. We'll work on fostering support for a more comprehensive approach.

The rise of the student fund is a wonderful thing. Opportunities to learn and practice analysis and portfolio management grow every day. Last year's letter touched on some of the good going on at terrific student funds and highlighted the University of Dayton's Davis Center for Portfolio Management. I'm quite certain the letter had nothing to do with it, but by midyear the student-run portfolio had surged to be the largest fund in the country, with more than $60 million under management, nearly 10% of Dayton's entire endowment.

I'm privileged to speak at lots of schools and interacting with engaged students, excited about learning everything they can about investing, is the highlight of every year. Observing how each student fund is managed led to the conclusion that the universe of funds, both already in operation and those to come, could benefit from learning from and about each other. The letter hypothesized about several "best practices," and endeavored to learn more. We created a survey on the website and asked fund representatives, either the faculty or outside professional responsible for oversight or the student leaders themselves to populate the survey.

The response to the survey was absolutely terrific, and here I'll try to condense some of the great stuff that came in with the hope that the funds can learn from and network with each other. Importantly, I've seen well-run funds fall by the wayside with the loss of key leadership, lack of recruitment and lack of alumni interaction. If this little project leads to a few funds building a more sustainable structure and persist where they might otherwise have failed for lack of support, or simply for inertia, then it's been well worth the time. Huge, huge thanks to everyone that took the time to help with this project. I hope the data and the token effort on our end grow to a useful resource.

Our survey asked a series of 48 questions, some checkbox or multiple choice with a number requiring elaboration. As results came in over the course of the year, it seemed there are four key areas to running a successful student-managed fund – Structure, Oversight, Process and Sustainability.

Structure

Funds are structurally varied. More than half of respondents report they are run as part of a class with another quarter both in class as well as through an extracurricular club. Just under 20% are purely extracurricular. There are some outstanding full-time and adjunct professors accomplishing a ton over a short semester or year. I come down on the side of seeing a multi-year opportunity for interested students. A class structure is conducive to deep dives on companies and can cover several over a finite period. I wonder how well portfolio management can be done when the reins of a portfolio are only in hand for a few months?

Fully 62% are run in perpetuity, with the balance managed as part of a class. The number managed over a single semester outnumber the full-year class funds by two to one. I've seen this class structure executed extremely well when the class also meshes with an extracurricular club. Here, the classroom setting provides a platform for company or industry research, with portfolio management taking place at the club level, where students are engaged for a longer duration.

75% of funds responding are managed exclusively by underclassmen. Most have between 20 and 40 student participants, with about a quarter of funds split evenly with fewer than 10 or more than 40. The

number is probably irrelevant, though greater participation likely goes with continuity. A structure where upperclassmen are charged with recruitment of new members, ideally from underclass ranks, works well. Experience goes with more responsibility. How many high schoolers matriculating to an undergraduate program have any idea what they want to study let alone do in life? However, the ability to be involved at a younger age offers more time to learn and have fun with what may become a passion. I'd also observe here that with a club format, students from diverse areas of study can have an opportunity to participate if interested. Restriction to entirely an upperclass business school student certainly allows for adherence to curriculum or course design, and as such the ability to dig deeper with research. It works well both ways, but I'd encourage those schools where the portfolio is managed solely in the classroom to explore an auxiliary club format which may allow for a more real-world and durable portfolio management experience for students from a diverse background of academic majors.

Almost two-thirds of student funds surveyed manage a portion of the school endowment or foundation. About 15% are managing funds from a private donor. A weakness of a simple check-box survey may confuse this yardstick. Often an endowment is given specific bequests, so a donor directed gift may have a separate pool of endowment funds named and specifically managed by the fund. Some funds are managing capital for specific outside clients. Dave Sather oversees a super program at Texas Lutheran University. With a limited endowment, the students manage a $1.5 million portfolio established by a private donor.

Assets under management range from $100,000 to $60 million, with an average fund size of $5.7 million and a median at $1.9 million. With commissions now negligible, trading costs, particularly for a low-turnover fund become immaterial. This allows for the successful management of a small fund. Size doesn't matter but try telling that to our Big Ten Conference respondents. They are among the largest funds in the country and no doubt are every bit rivals in the investment arena as they are on the field, court, course, ice, diamond, etc. Several Big Ten student funds were generally established earlier than many and have had more years of compounding. Their prominence is certainly a mark of distinction and competitive advantage among each school. One oddity about athletic conferences – when completing investment fund surveys, it's possible to have more respondents than schools in the conference name. Sometimes ten is not ten, and twelve is not twelve. Kidding aside, it is likely the case that as student funds have become larger fixtures, there is prestige to successful and larger funds. This is all about learning, and about helping students secure employment. Wall Street and money management firms hiring have an increasing awareness of where outstanding investment education is taking place, and a well-structured, well-run fund is a beacon.

Oversight

While there are lots of ways to structure student-run funds that work well, a strong framework for oversight and then delegating as much of the day-to-day process to students as possible is integral to a strong and durable fund. Having strong leadership is key. More than 80% of funds surveyed are directly overseen by faculty, with the balance leaning on professional volunteers (typically alumni), advisory boards, and some by the endowment/foundation CIO or investment office.

A reporting function to whomever is the client creates a sense of purpose and responsibility. Where a faculty advisor oversees the fund either in the classroom setting or a club, periodic reviews with the endowment/foundation CIO, board of directors, investment committee of the board, private donor or advisory committee is practiced at the majority of funds. Boone Bradley oversees the Applied Portfolio Management program at the University of Kansas program, founded in 1994. The KU program is managed in a classroom setting, does rigorous dives on several companies per semester, and has one of the strongest alumni bases among student funds. Guest speakers are invited to campus weekly. Boone notes a goal of the program is to incorporate presentations to a governing body. Programs doing this

report the students recognize the importance of responsibility to the "owner" of capital managed. Frequency of reporting and reviews range from monthly to yearly and are done with an even mix of written reports and presentations, both real world practices.

I'll mention benchmarking and performance in this oversight section, though it applies to all. All funds report investments in domestic equity. Roughly 40% also invest in global equity. A surprising 25% of respondents also report investing in credit, including domestic corporate, government, a few in global credit, a smaller handful in commodity and real estate ETFs, and one in options. Leveraged Robinhood day traders the funds are not.

Market cap constraints and benchmarks are varied. More than half of respondents invest in or allow investments in all capitalizations. Roughly 25% utilize a minimum capitalization, a few at $100 million but more at $5 billion and above. Benchmarks, in order of frequency cited, include the S&P 500, Russell 1000, Russell 3000 and 2000, S&P 600, MSCI ACWI, S&P 400 and Russell 2500 Growth. A small number report no capitalization constraint and an unconstrained or no benchmark. Fixed-income benchmarks include Barclays Aggregate, and Bloomberg Intermediate Government/Credit. Performance measurement breaks down 80/20 relative to absolute return.

Continuing with benchmarking and universe, half of funds have ten to thirty holdings, nearly 40% hold 31 to 50 positions and just over 10% hold more than 51. Turnover is reported as 10% to 30% for 63% of funds, more than 50% turnover at 21% and the smaller balance at less than 10%. Considering the nature of student funds, student turnover itself is going to necessarily be high. Parents lament their progeny as "career students," but those don't tend to exist at business schools. Further, these funds are actively managed with the purpose of teaching and learning. Managing a student fund is and should be different than managing client capital at Semper. There is little "excitement" in adding two new positions in a year. If students are doing a bunch of work on a company they like, when the valuation makes sense part of the process and fun is in *acting* on the work. Students can't be afraid to make mistakes – this is part of the learning process.

From oversight and educational standpoints, you want to ensure as much work is done on maintenance of current holdings and when selling a position, a thorough analysis is undertaken. It is very easy to apply rigor to a new company being researched and written up and then give scant thought to the portfolio name chosen for elimination. It's in this realm I offer some considerations. First, choice of a benchmark should be undertaken in concert with the universe of companies eligible for investment, and in all cases designed as a risk-management tool. Fund mission is to provide a hands-on learning experience. You will find a larger advocate of concentrated investing than yours truly, but in the proper setting. We typically have roughly 75% of our investments concentrated in our top ten holdings. Many of these we intend to own for a *long* time, however. A student fund is geared for higher turnover, and as such should have *more* holdings and not fewer. More names do require more maintenance research, but that is an integral part of any proper portfolio management program. As the number of holdings increase and are kept within the universe of a well-selected benchmark, returns will correlate more with the index, which lends itself to a nice "bumper-guard" approach to risk management.

The primary mission is not alpha generation but to learn first and not to blow up second. Warren Buffett's famous two-rule approach comes to mind here – rule one being to not lose money, and rule two, of course, to never forget rule number one. I can't tell you how many university board members and business school deans I've talked to who are terrified of the riskiness of students managing endowment capital. I counter that with proper benchmark selection tying to eligible universe and adequate diversification, it's more likely that the students will not only keep up with the endowment's active managers but stand a good chance of outperforming over time. It should be imminently obvious that students work for free. There is zero management fee. With no fee and say a portfolio of 100 investments

in a 500-stock index, the students will likely do very well. The idea that the typical active manager has specific skill in navigating the inevitable drawdowns is not well founded. Risk management takes place far earlier, with business quality and price paid serving a strong dual purpose here. I like what Southern Illinois University Carbondale's reports as use of the S&P 400 as its benchmark and exclusive universe for security selection and ownership. Here you have a closely defined smaller universe of mid-cap companies meeting S&P's criteria for index inclusion (though the wizards did admit Tesla at nearly 30 times sales into the large-cap index – but that's not for this study). Selection of a mid-cap universe necessarily means less sell-side coverage, forcing more work and learning done by the students. It's also not the S&P 500, where so many endowments are so broadly diversified that returns over time won't deviate much from the index. Why not allow the students to provide some no-fee diversification from the large cap index. I know the Saluki Student Investment Fund has produced index-beating returns over long cycles, again not the mission but the prospect for alpha is on the table and within strong risk-management oriented parameters. Closely defining universe and benchmark allows the students independent latitude then for process.

Process

A well thought out investment process is equally as important as properly defined and designed oversight. Lots of latitude exists here. Done right, students have a framework to not need as much explicit day-to-day oversight, particularly at the club level as opposed to a classroom setting.

Investment style skews toward bottom-up, fundamental value, with 44% of respondents in this category. The remainder are split between top-down fundamental value, top-down fundamental growth, macro-economic quantitative and fundamental quantitative. Frankly, I don't recognize much difference in these distinctions. Growth is but a component of the value equation, and with most incorporating discounted cash flow analysis as well as both a relative and absolute multiples approach, I presume all are on the right track. None reported being technicians. I have a bunch of technician friends, so sorry gents. In fairness these are some of the smartest investors I know, and each, privately over libation, will admit to at least an awareness of valuation. This is where the wink emoji goes.

A template for well-written research reports and presentation materials is a must. I'm yet to meet the young investor that instinctively knows what to look for and what to include in reports and presentation materials. I've had the privilege of judging the CFA Institute Research Challenge Americas or Global finals for seven years running. As the contest evolves, winning reports and presentations tend to be mimicked in subsequent years. When something works, it's not bad to imitate it. It gets funny when an element is included that has no relevance to good investing (my opinion), but because a winning team included it, you start seeing it broadly in subsequent years. I understand Monaco is nice this time of year.

Process involves how responsibilities are delegated. Teams responsible for research are broken down as generalists but far more commonly as sector or industry analysts. Barry University's Andreas School of Business reports senior analysts supervising research teams. This obviously works when fund structure has members involved for a duration longer than a class. Space permitting, I would love to include all of the commentary from each school regarding process. Included here is Wisconsin-Madison's Applied Security Analysis Program's superb commentary about process. Great stuff:

> *Across the entire $10 million AUM, there are three teams – two equity and one fixed income. On the equity side, the group of typically 4 students are able to develop their own process to implement over their 1 year of managing the portfolio (with approval needed from an oversight committee consisting of investment industry faculty/alums). Our process includes screening for new ideas using a forward-looking consensus EPS inflection as a proxy for expectations improving. The analyst will then determine whether or not a) this revision is justified, and b) our*

forecast is markedly different than what we believe the market is pricing in. The covering analyst will then build a 3-statement model, revenue model, and/or anything that helps quantify their analysis. Accompanying this is a report which helps detail their investment thesis, valuation, risks, recommended position weighting, etc. The team will then debate with the analyst on the merits of the investment and then vote whether to add the name to the fund. Broadly, our research process has three steps: 1) Identifying market expectations, 2) Building a model and developing an investment thesis, 3) Determine proper valuation, identify risks. We are required to build a financial model for every company we add to the portfolio. We do have access to numerous data resources such as Bloomberg, FactSet, sell side research, and more. These resources are often used for understanding business models and identifying consensus views. Regulatory filings (Ks, Qs) are the predominant sources of data for model inputs, however.

There is no silver bullet, only that the process is thoroughly defined in advance. Older funds refined processes over the years. More can certainly be done with more and longer participation. The University of Minnesota's David S. Kidwell Funds Enterprise notes a, "focus on companies that are free cash flow positive to avoid the riskiest names, manage all industry exposures relative to benchmark; for credit, we are looking for stable to improving credit stories. We do not focus on relative value."

Position sizing is another aspect where a strong pre-defined process limits risk and introduces clarity of mission. Millikin University's Tabor Investment Portfolio targets sector weighting within 3% plus or minus of their index. Again, risk limitation in a student-run portfolio is paramount. I like the idea of forced rebalancing when position sizes grow too large. That's not what is done here, with more than 20% of our capital invested in a single company, albeit a special one, and until we created a fact sheet, I was unaware we had three sectors completely void in the portfolio relative to our "benchmark." That knowledge elicited an "Oh," and we moved on, giving that zero additional thought. But then, in March of 2020 we didn't have a university board of directors concluding it's too unsafe to have students managing real money. Most respondents mentioned firm position limits and sizing requirements. There are many ways to skin this cat. I'd contend student funds should size positions and concentrate to maximize the educational experience and to minimize risk.

Process incorporates several aspects already addressed under structure and oversight, such as frequency of reporting, nature of reporting and to whom. The more clearly these are spelled out the easier to go about the students immersing themselves *independently* in the learning process.

Wisconsin's highlighted comments mentioned resources. By this point most business schools utilize and are aware of numerous service providers' offerings at greatly reduced, or even better, free pricing. Access to not only to databases like Bloomberg and FactSet but myriad on-line and print resources are available. I have a bias toward introducing the use of the Value Line Investment Survey as a great starting point for company research. Each single page is full of years of relevant data which once accustomed to the format makes it an invaluable resource for keeping up with lots of companies and industries with regularity. Having the students maintain a set of Value Lines or other like format for each portfolio holding would allow the entire class or club simple quarterly updates on portfolio holdings. Frequent updating of the research universe becomes a great lifelong habit.

A final thought on process. I was surprised to see 43% of student funds contacting and interacting with company managements or their investor relations teams. My initial reaction to this was, "Whoa, we can't be having students waste the time of IR and certainly not managements." Upon further review, my initial reaction was 100% incorrect, on several fronts, particularly in the case of companies with IR teams and budgets. First, that's what IR people do. They interact with investors, and student-run funds are no less investors than professionals. In fact, it should be in the best interest of public companies to want to see robust, hands-on education taking place, making each successive crop of graduates that much more prepared as knowledgeable analysts and investors. Second, as investment professionals, whether on my

side of the table or on the management side, we are all extremely blessed to do what we do for a living. To not want to expend time and resources in helping our youth is shortsighted. Now, with open access should come responsibility and reason. If you are going to pick up the phone or click return when sending a message or query, make darn sure you have done your homework and have legitimate questions that cannot be readily answered with a Google search. In other words, don't abuse the privilege of access. Before visiting with management teams in my 20s and into early 30s, I would spend at least a week in advance prior to a meeting researching the company. As the years wore on, you naturally become more efficient and require less prep. Still, when I'm reaching out, it is always having prepared and thought out in advance what I wanted to glean. Conversations with management should always be broadly about the business and not about whether a company is going to beat earnings by a penny. How does the business work? How do you view the changing competitive landscape?

Sustainability

Sustainability of the student-run fund was saved for last because in many ways it is the most important. Too often a thriving fund falls off the map for the loss of a dynamic and engaged sponsor. Not every finance professor is interested in rolling up the sleeves and getting into the pit with the students. There is a time burden and likely little to no monetary compensation. Too often the student-fund operates too-far below the radar of constituents who matter but should be involved and supportive. Engaging alumni investment professionals to be involved or help run a fund is great, particularly when challenged with faculty support. It should come as no shocker that bureaucracy exists at universities. It is not a good thing when the dean of the business school at a large university has no idea whether a student fund exists on campus. A program has no continuity when a fund is managed for a semester, and if not offered the following semester, or even over summer or winter break, management of the fund reverts to the outsourced CIO of the foundation. For schools with endowments managed internally, having the support of and involvement with the CIO and investment office makes perfect sense. CIOs and investment office staff often also teach on campus. At Notre Dame, not only are classes taught but *every* professional on the staff of the investment office are alumni. The investment office at Claremont McKenna executes trades for the student fund, and along with an advisory board are responsible for lending oversight. Day-to-day heavy lifting is done by the faculty advisor, but the importance of having a well-run fund requires the involvement of myriad constituents. Students recognize when what they are doing is seen and treated with importance.

Larger, older student funds understand the necessity of durability which must be worked on. Graduates should not only be welcome back on campus but encouraged to be involved. Whether formally speaking or sitting in on a class and taking ten minutes to share how an alum's first five years as an investment banker have gone is a huge asset. Alums become donors. A student fund relying on a strong leader but lacking a succession plan may not make it. The use of student-fund advisory boards as mentioned by several schools is a great idea. The survey asked how the fund keeps track of alumni and where they work after graduation. Only half maintain an internal database and mailing list. Many report the use of LinkedIn and other social media. It's the student funds with robust and active alumni bases and networks where students are getting great jobs upon graduation, and internships beforehand.

Stock pitches and research contests are great forums for presenting company research and ideas. I had no idea so many existed. 60% of student funds report participating in at least one, which means 40% do not. These are great forums, requiring preparation and organization, but also awareness! Contests mentioned include:

Cornell SC Johnson MBA Stock Pitch Challenge and Undergraduate Stock Pitch Challenge
Emory University RISE Stock Pitch Competition
Federal Reserve College Fed Challenge
Harvard Financial Analyst's Club Intercollegiate Stock Pitch Competition

JDC West
Jefferies Stock Pitch Competition
Linde Davies Investment Challenge
National Investment Banking Competition
NYU Stern MBA Credit Pitch Competition
Quinnipiac Game Forum
Raymond James Student Managed Investment Fund Challenge
Smart Woman Securities National Stock Pitch Competition
Southeastern Hedge Fund Challenge
Student Managed Investment Fund Consortium
T. Rowe Case Competition
Texas Investment Portfolio Symposium
Texas Stock Pitch, University of Southern California VIG Stock Pitch Conference
UCLA Fink MBA Credit Pitch
University of Georgia Terry Stock Pitch Competition
University of Michigan Ross Undergraduate Investment Conference and Stock Pitch Competition
University of North Carolina Kenan-Flagler Alpha Challenge
University of South Florida Applied Securities Analysis Stock Pitch
University of Waterloo Finance Association Stock Pitch Competition (Canadian universities)
Wharton University Finance Club Stock Pitch Competition
William & Mary Women's Stock Pitch & Leadership Summit
Yale Global Network Investment Competition

I love seeing that 95% of schools reporting participate in the CFA Institute's Research Challenge. Many are also CFA affiliate universities. The Challenge was recently expanded to accommodate two teams per school. Participation requires a faculty representative to coordinate but most of the heavy lifting is done by the student teams and a buyside or sell-side CFA mentor who is assigned to work individually with a team, preparing a thorough graded research report and presentation materials. All participating teams get to spend time with the management of their subject company at the outset and finally present their recommendation and presentation to a panel of CFA judges. Winning schools at the local contest level move on to a series of regional contests and finally four winning teams compete in a global final. Next to the candidate program itself, I think this is the best thing the Institute does. The education and exposure are fantastic.

Summarizing a handful of best practices with some bullet points pulled from last year's letter:

- The mission of the fund must be to facilitate learning and hands-on application of investment management. Investment performance is a goal but not the mission.
- Students take leadership roles.
- The endowment or foundation should be supportive but must act as a client and hold the fund accountable for keeping process and philosophy consistent.
- If management of the endowment/foundation is completely outsourced, the outside advisors should be encouraged to be involved with the faculty advisor and student leadership.
- Duration of involvement ideally is over longer periods – a semester only scratches the surface. Structuring funds as an extra-curricular group allows for longer duration of involvement, lower turnover, and better incentives.
- A formal, "for credit" class can be built into the fund structure for the more senior "managers" of the fund. Often this is the portfolio management group.
- Students should be encouraged to join from any major in any year of their education.
- More senior experienced students are responsible for the teaching and training of newer members. Recruitment of new members from earlier grades is essential to continuity.

- Involvement requires commitment, not a checkbox for a resume. A repeatable application process in place keeps turnover low.
- Faculty or outside advisor involvement is critical. Experience in investing and analysis a plus. A network with the alumni base important.
- Broad support by school leadership and those overseeing the main endowment/foundation.
- Custody and trading systems are well thought out, often integrated with the investment office or outsourced manager.
- Proper benchmarking, diversification and a limited defined universe create necessary safeguards and risk management – investing in boiler room promotions would not be looked on with favor by the Board or folks running the endowment!
- Adequate diversification but not so much as to not be manageable is important. Position sizing is part of the process. The mission is learning and experience.
- Focus on company valuation, business quality and price. Research on potential portfolio holdings should be rigorous and face open floor debate among other members of the fund before a decision is made. Incorporate opportunity cost into the research process.
- Investment horizon should be extremely long to match the horizon of the client and incentivize a long-term investment mindset.
- Stress proper portfolio maintenance and research. Emphasis on portfolio maintenance should be just as strong as emphasis on buys and sells. A position should not be held complacently because, "I wasn't on the team that bought it."
- Rigorous fundamental analysis, valuation methods, financial statement analysis and accounting.
- Outside speakers and networking are a must. Involve the alumni and keep in touch with them.
- Facilitate networking and employment opportunities. Participate in other stock pitches or research competitions. Get involved with the CFA Institute and the local Society.

I think what we'll do is keep the Student Fund tab on the Semper website as a resource for fund leaders and students. We'll update it with relevant resources, including a list of and links to stock pitch contests. Let us know which ones are missing. We'll also include some of the commentary that came in on the surveys about process, structure and oversight. We'll categorize answers to the survey with proportionate responses. I'd love it if you have suggestions or thoughts, please pass them along. We have a list of contacts for student fund leaders at lots of schools. If you didn't get an email from me asking for help by populating the survey on the website and would like to be added to the list, please pass along your contact information. I'm happy to share the list but only with student fund leaders at colleges and universities.

Finally, if you are a working investment professional with an interest in how your alma mater's student-run fund operates, reach out to the school, particularly if you are inclined to get involved. If you like the idea of seeing students manage a portion of endowment or foundation capital, at the point you are making charitable contributions, direct some money to your alma mater's student fund. If your school does not have a student fund, push on the school to do so. If you work in the investment office of an endowment or foundation and a student fund does not exist at the school, push to make it happen. These funds should be high-profile and visible throughout the college and alumni base. There absolutely are high schoolers interested in investing and a strong student fund and club is a recruiting selling point. Students become alumni and alumni give, of time and money.

I hope this effort to raise awareness of student-run funds was worthwhile. Seeing the revolution succeed where the teaching of and learning about investing in the college setting is marvelous. There are so many more opportunities for young investors than existed years ago. It will be fun seeing ongoing process as time goes by.

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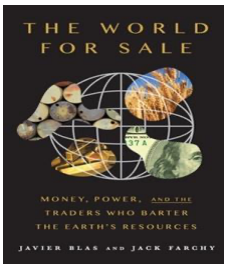
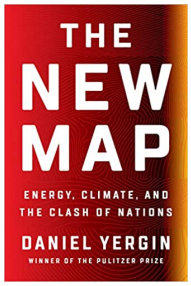
BOOKS AND STUFF

Much of the world presumed the death of oil by the autumn of 2020. The price of a barrel of oil traded for less than zero, albeit on an expiring future contract. Energy comprised less than 2% of the S&P 500, having been 12% as recently as 2012. The interest in reading about a soon obsolete industry likely marked a low at that point as well.

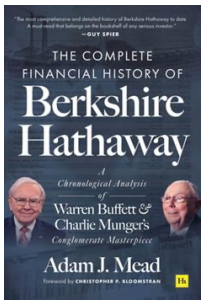
Between here and there, the globe is waking up to the complexity of transitioning to a green, net zero carbon world. There are a few terrific books on energy and peripheral activities. Several good books are out in recent years on the subject.



My favorite read of the year was a gift, *The World for Sale – Money, Power and the Traders Who Barter the Earth's Resources* by Javier Blas and Jack Farchy. The title gives it away but it's a terrific read about the traders and then-secretive trading houses that emerged following World War II and their evolution to modern-day powers.

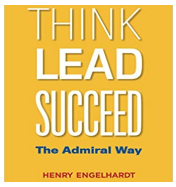


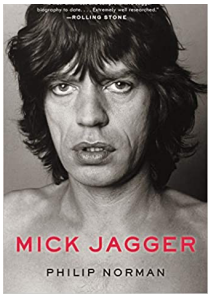
A second great read and extremely timely is Daniel Yergin's *The New Map – Energy, Climate and the Clash of Nations.* Yergin begins with a great overview of the impact of shale gas and shale oil on the U.S.' position in the world of oil. The book covers the energy map, literally, with history and modern-day energy policies among Russia, China and the Middle East. Yergin is an excellent writer and has several other books on energy that I intend to tackle this year.



Adam Mead spent several years pouring through old Berkshire Hathaway annual reports and Chairman's Letters and produced an outstanding chronological history of the company. *The Complete Financial History of Berkshire Hathaway* is a great read for the uninitiated to Berkshire's past and a must have as a reference book for diehards. I found myself pulling it out several times while writing the letter this year, easy to search for shares outstanding in a certain year with the book at hand, for example. Adam included a comprehensive index making the search for items painless. It was great seeing an early draft of the book and offering token suggestions. I was privileged to write the foreword.

I received a nice surprise in the mail late last year from Mark Hammonds in the U.K. *Think, Lead, Succeed* written by The Admiral Group's founder and former CEO, Henry Englehardt, combines a bit of Admiral's founding and evolution from auto insurance to other services with a heavier dose of management and leadership strategies. It's an informative read for anybody in a position of leadership.





The passing of Charlie Watts in August compelled me to reread Philip Norman's biography, *Mick Jagger.* The book covers the Rolling Stones waterfront with lots of great stories about the band's elder statesman and drummer. In a past letter, I'd recommended Keith Richards' autobiography, *Life,* "assisted" by James Fox. Tons of likewise fantastic stories and written as though being told directly by Keith. If you know the band, you will understand the book is no easy read. It occupied my nightstand for longer than any book I've read, but I slogged through. It won't be a reread, but if you are a fan of the Stones or interested in the background of the best band of all time, both books are worth a read.

I spend every night for roughly the first six or seven weeks each year with the annual letter, writing most nights into the wee hours and always with music. Last year I mentioned *Rising Sand*, with Alison Krauss and Robert Plant. The bluegrass and Zeppelin duet joined forces one more time, releasing *Raise the Roof* fourteen years after their original collaboration. Not only is the album fantastic but several great tracks are on YouTube.

I have several numbered playlists saved on Spotify, graduating good songs upward to a playlist for great songs. The impetus for this odd practice was to download old albums of artists to listen to music that never made the "Top" lists on release. So much great music, so little time. It's been fun for several years "discovering" new music released decades ago. Eric Clapton has a bunch of excellent old stuff. *Backless* from 1978 played several times in the past weeks. One track was particularly great, but I'll leave it to the listener to guess which one. J.J. Cale was an epic songwriter, writing several Clapton classics, among music for other artists. He also released several studio albums, which I recommend highly. The archive of Van Morrison's music is brilliant.

George Harrison of Beatles' fame recorded lots of great music post the Fab Four. In addition to several eponymous releases, a two-album collaboration with Bob Dylan, Roy Orbison, Tom Petty and Jeff Lynne as *The Traveling Wilburys* is classic. Fittingly, the group named their *two* releases *Traveling Wilburys Volume 1* and *Traveling Wilburys Volume 3.*

If you haven't found Nathaniel Rateliff & The Night Sweats, they are hard not to like, recommendation courtesy of my music-loving college junior. She thought I'd like listening to Lord Huron, Cage the Elephant, Vampire Weekend – all excellent. She interned and worked at St. Louis' National Blues Museum last year, so had Muddy Waters, Howlin' Wolf and Albert King playing quite a bit. *Cadillac Records* is a superb documentary from 2008 about the 1940s to 1960s blues industry, chronicling Chess Records and numerous musicians from the era.

One final suggestion – Cesária Évora was a Cape Verdean singer and songwriter. Her West African coladeira and morna Cape Verdean creole music is awesome. A 20th anniversary compilation of her music, *Miss Perfumado,* is great dinner music.

Any suggestions on the reading or music front, please send them my way!

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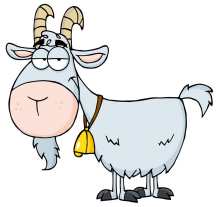
BERKSHIRE HATHAWAY: STILL ON TOP



Berkshire stands to be back in the good graces of its critics on the heels of last year's 29.6% rise in the stock price, besting the S&P 500 and well ahead of the benchmark here in early 2022. Of course, measuring investor performance, or more importantly business performance, through the lens of short-term swings in market prices, which are beyond the control of management, is ridiculous. Believing Berkshire's 2021 outsized market gain reflects management ability, where suggesting failure over the prior three years, which saw the stock up 2.8% in 2018, 11.0% in 2019 and 2.4% in 2020, lacks understanding of what really matters. It's growth in business intrinsic value that an investor should assess *over time*, and on that front Berkshire delivers at least as much as a rational investor should expect.

To wit, Berkshire gained 17.5% in intrinsic value per share during 2021 and 13.0% annually since my estimate of intrinsic value first appeared in the 2015 letter. Over the same six-year interval book value per share compounded by 14.5% and the stock price by 14.7%. I'll spend a portion of this year's Berkshire section discussing aspects of the appraisal which may be conservative and where it may be challenged, leaving the reader to judge and assign their own assumptions.

Operating profits are fully recovered from pandemic lows across most Berkshire's subsidiaries. Key drivers of value – BNSF, the energy business and property casualty insurance and reinsurance – are as healthy as ever. Berkshire's myriad operating companies within its Manufacturing, Service, Retail and Finance businesses profits saw record profits and greatly improved returns on equity. I've been doing cartwheels here, finally reconstructing the group's financials in a meaningfully accurate fashion. The effort has been a multi-year jigsaw puzzle which I finally mercifully reconciled.

Expect Berkshire to announce a record single year profit of $89.4 billion, $9 billion more than it reported in 2019. Of U.S. companies, only Apple's recently announced $95 billion fiscal profit was higher. Globally, Saudi Aramco reported more than Berkshire will on two occasions. Those who follow Berkshire and insurers will know to back out short-term swings in stock market gains and losses (and replace them with the retained earnings of publicly traded holdings). Regardless, the press is likely to have a field day with the headline number.

More important than the headline profit figure, you will see later that the accounting hoops jumped through here show Berkshire's normalized earnings at $47.8 billion at yearend. Last year's $41.1 billion in normalized operating profits were depressed by the pandemic. Making that adjustment we estimated a cyclically recovered $44.5 billion at the close of 2020 and expect more than $50 billion next year. Sharp-eyed readers will see only a 5% improvement in the profit estimate. To the extent Berkshire repurchases large quantities of its shares, fewer dollars are retained and invested internally. As discussed last year, it's the gain in per-share value that counts.

Berkshire's stock portfolio likely earned 29.3% in 2021 following total returns of 20.7% and 39.8% in 2020 and 2019, respectively, outpacing the S&P 500 in all three years. Apple gained 34.7% and at $161.1 billion represents fully 46% of Berkshire's enormous $349 billion stock portfolio and 16.7% of $969 billion in total firm assets. Excluding a gain on shares sold in 2020 and dividends earned throughout, some say the $130 billion gain in Apple is Berkshire's best investment. Hard to argue with more than a five-fold gain in roughly five years. A gain of more than 13 times over a decade with Coca-Cola from 1988 to 1998 took the position to 35% of firm assets, a time when the stock portfolio comprised 115% of firm book value versus 68% at yearend. But who's to nitpick either way. Comprising a list of Berkshire's best investments since 1965 would be a fun exercise. Maybe a drinking game?

Capital allocation at Berkshire continues strong. Last year's letter dug deeply into the economics of share repurchases done well. With private equity and even SPACs driving control prices to value-destroying levels, repurchases become a terrific use of capital if made at intelligent prices. On that front, Berkshire's book value likely grew by $67 billion during 2021, a gain of 15.2%. Thanks to an expected 4.4% reduction in the share count, book value per share grew 20.5%. I've penciled in an additional $8 billion in fourth quarter repurchases on top of the $20.2 billion bought back through September. Since share repurchases began in earnest in late 2019, Berkshire will have spent $59.1 billion buying back 165,475 A share equivalents, shrinking outstanding shares by 10%. At the present pace of repurchases, we'd look for the share count to shrink from today's 1,475,452 outstanding to roughly 1 million over the next decade, presuming purchases between 120% and 150% of book value. None of Berkshire's share repurchases are made to offset dilution from share grants given to executives. Grants don't exist; hence all repurchases drive the share count down and shareholder ownership up. The importance of this nuance versus what "everybody else does" can't be overstated.

More than $6 billion of Berkshire's $15 billion capital budget in 2021 was new investment. The utility and energy operations retain all group profit. Investing enormous sums and augmented with appropriate leverage, the company is building out enormous wind, solar and grid capacity. Growth capital spending has run at twice the rate of depreciation since Berkshire acquired MidAmerican Energy in 1999 for $2.15 billion cash and the assumption of $7 billion in debt. BH Energy worth perhaps $90 billion and a $140 billion enterprise value. Within the decade, BHE will become Berkshire's most valuable operation next to its insurance group. The group likely spent more than $6.8 billion on capital expenditures in 2021, with over $4 billion on investments earning more than 10% on average.

The railroad likewise continues to modernize its system and drives profitability higher. However, the rate by which capex exceeds depreciation is shrinking, and some portion of depreciation is likely understated. Still, the rail likely spent $3 billion in capex last year and is home to several hundred million dollars annually of growth initiatives. BNSF is only modestly growing by carloads and as such, its ability to absorb growth capital is limited far more than at the utility and regulated energy businesses. Since Berkshire acquired the railroad in 2010, all profits have been directed upstream to Berkshire. BNSF invested heavily expanding and improving infrastructure at attractive returns in the years following the merger. From 2011 through the first half of 2016, capital expenditures exceeded depreciation charges by more than two to one. In the subsequent 5 ½ years the pace of capex slowed to roughly 50% above depreciation and at a rate more closely approximating maintenance expense. For 2021, capex only will have exceeded depreciation expense by 26%.

The balance sheet remains a fortress, with $152 billion in expected year-end cash exceeding total firm debt by $37 billion. Berkshire borrows for long durations at remarkably low interest rates. The rail and energy businesses combined debt obligations total $75 billion at an average interest rate of 4.2%, none of which is guaranteed by Berkshire. $40 billion in holding company and finance debt bears an interest rate of 2.5%. A $1.1 billion tranche in Euros was borrowed at an interest rate of zero. That's 0.0%, free money, save for currency risk, through 2025. Of Berkshire's $440 billion in total liabilities, their $115 billion in debt is the only component of the right side of the balance sheet bearing interest. The remainder come at zero cost, or even at a negative cost, as is the case if the insurance operation underwrites profitably over time. It has.

Berkshire's ongoing share repurchases signal a durable and opportunistic shrinking of the left side of the balance sheet. Coupled with capital spending on growth, lengthening debt at record-low interest rates, opportunistic one-off and bolt-on acquisitions, and picking up shares of publicly traded companies when cheap and presenting earning power, the Berkshire capital allocation machine drives forward.

Berkshire Hathaway: Ten-Year Expected Return

Capital allocation at Berkshire is the epitome of assessing opportunity cost and acting on it or doing nothing. While only the seventh largest in the world by market capitalization, it is top five in revenues and profit, and is the largest in the world by fixed assets. For 57 years with present management in charge, corporate behavior and devotion to the shareholder are unparalleled. With myriad subsidiaries and layers of operational complexity, the uninitiated struggle to understand the company. Those committing time to understanding business drivers and sources of durable profitability can derive a concrete expectation of returns over a decade. Scroll a list of the 100 largest companies in the world and I don't think an investor can come anywhere close to an equally reliable forecast. Barring a deep depression or a hyperinflation, I'd be surprised if Berkshire compounds over the next ten years at less than 10% per annum.

The company faces an opportunity set far less fertile than enjoyed for nearly six decades. Deals on reasonable terms are scarce if impossible to find at the scale on which Berkshire operates. Credit offers no outsized opportunity given skinny yields and narrow credit spreads. Stock prices among the mega cap universe in which Berkshire must troll are far from cheap. Idle cash earns nothing (for the moment), becoming expensive powder over a too-long horizon. The good news is where Berkshire's contemporaries among the largest publicly traded companies in the world have been rewarded with high valuations thanks to growth and operational success, Berkshire is not rewarded for meeting or exceeding expected returns and business performance. At the outset of the past decade, no rational analyst or investor would have expected the S&P 500 to compound at 16.6%. When lagging the headline number, most believe the company to have underperformed and shun the shares. Ergo, the shares remain fundamentally attractive relative to a conservative and informed expectation of the *next* decade. At this time ten years on shareholders will celebrate having outperformed today's expensive indices.

Given the dearth of opportunities on the acquisition front, consider the following:

Berkshire pays no dividend.
Berkshire issues no shares to executives.
Berkshire writes down or off very few assets, 2020's write-down of Precision Castparts being an outlier.
Berkshire infrequently uses its shares as currency in deals unless they are dear, and they are getting at least as much as they are giving in value.
Berkshire occasionally repurchases its shares when they are cheap, represent the best immediate use of capital and do not imperil the financial strength of the firm.

Combining the above, Berkshire's return on equity capital approximates growth in book value per share over time. The stock price likewise tracks the same return on equity and change in book value per share.

Berkshire's Use of the Common Stock

The use of company stock at Berkshire is a story of capital allocation. Six decades ago, it was the selling of unprofitable textile mills and the repurchasing of shares at less than book value that attracted a young Warren Buffett to Berkshire Hathaway in 1962. The then 32-year-old value investor had amassed a position in what was then a manufacturer of textiles in New England at below $11 per share, with some purchased as low as $7.50, not only below book value but far below net working capital. For perspective, with no share splits over the years, the stock closed 2021 at $450,622 per share. Today the company earns $11 in profit per share every three hours, 365/7.

Berkshire's share count ended fiscal 1964 at 1,137,778, down 29% from 1,607,380 in 1963. During the first half of fiscal 1965, prior to Mr. Buffett taking control of the company two-thirds of the way through the fiscal year, the company had closed two mills and was tendering for another substantial number of its

outstanding shares. Berkshire's CEO, Seabury Stanton, offered to buy Buffett's shares at $11.50, but in a subsequent letter changed his offer to $11.375 (stocks traded in 1/8^{ths} until 2001). Famously, Mr. Buffett balked at the insult and wound up buying a control position, canning Stanton, and thus becoming the proverbial dog who caught the truck.

Throughout early fiscal 1965 (ended September 30 until 1967) under Stanton, Berkshire bought back 120,231 shares, ending the year with 1,017,547 shares out. Mr. Buffett won control of the company in May. Repurchasing more then 10% of the company's shares substantially below book value, coupled with modest net income, pushed per-share book value up 23.8% from $19.46 to $24.10 at the close of fiscal 1965.

With Mr. Buffett in charge, Berkshire went on to repurchase shares during twelve years and issue shares fifteen times – once in 1996 to offer the B shares, once in 1992 as convertible debentures, and to finance all or portions of 13 acquisitions.

Repurchases commenced again in 1967, 1969 and 1973, 1966 and 1967 at discounts to book value would bring the share count below 1 million, to 970,678 in 1977. Berkshire's acquisition of Diversified Retailing used shares as currency, a large and expensive suboptimal use of capital, particularly in retrospect. The 1977 share count following the deal would mark the low over the 57-year history. The stock rose in value to rich levels during the 1990s, so shares were frequently used as currency in acquisitions. The share count would peak at 1,650,806 following acquisition of BNSF which closed in 2010 and a retirement of Wesco shares using Berkshire shares in 2011.

Ongoing use of shares has largely been extraordinary, effectively buying low and selling high. Modest repurchases in 2012 and 2013, followed by the repurchase program now underway since 2019 suggest the share count may return to the 1977 level a decade hence, perhaps even sooner. Assuming the scale of the current program continues on present course, with half of our estimate of normalized profit and the majority of operating earnings used buying shares between 120% and 150% of book value, then the share count will fall below 1 million outstanding and shareholders will earn total returns north of 10% annually, even with no assumed multiple expansion.

Under said program, the company will not grow at a rapid pace in dollar terms. Growth in assets, equity, revenues, and profits will clip ahead at a mid-single digit pace. It's the annual retirement of more than 4% of outstanding shares at reasonable prices that will drive *per share* earnings and intrinsic value. The underlying assumption here is Berkshire's return on equity persists at 10% per annum, likely higher.

Under a healthy repurchase program, gone are the days of Berkshire growing market cap and profit at double digits in dollar terms. It beats the alternative of pushing investment to deals at high prices. If anyone understands the relevance of per share results, it's the gentleman who gained control of Berkshire in 1965. Still, even at mid-single digit growth, profits compound to large numbers. From a base of $47.8 billion here at year-end 2021, profits are fully recovered from 2020's pandemic-plagued depressed levels. The orange column below shows a $1 billion decline in normalized, but not cyclically adjusted, earnings from 2019 to 2020. Leaping over 2020, 13.5% growth from 2019 to 2021 was at a 6.6% annual pace in dollars. On a per-share basis, thanks to a 5.7% decline in shares outstanding in 2020 and an estimated 4.4% last year, earnings per share grew from $25,908 per A share to $32,397, a 25% cumulative two-year advance, 11.8% per year.

Annual Progression of Berkshire's Market Cap, Profit, Multiple and Stock Price Change

	2014	2015	2016	2017	2017 @new tax	2018	2019	2020	2021	2022 (e) At Int Val
Market Cap	$371 B	$325 B	$401 B	$489 B	$489 B	$502 B	$552 B	$537 B	$665 B	$904 B
Net Income	$23 B	$25 B	$27.5 B	$29.1 B	$31.8B (H)	$36.4 B	$42.1B	$41.1 B* add $2.9 B	$47.8 B	$50.2 B
P/E	16.1x	13.0x	14.6x	16.8x	15.4x	13.8x	13.1x	13.1x	13.9x	18x
Earnings Yield	6.2%	7.7%	6.9%	6.2%	6.5%	7.3%	7.6%	7.7%	5.6%	5.6%
Gain in Stock Price		-12.5%	23.4%	21.9%	21.9%	2.8%	11.0%	2.4%	29.6%	36.0%

Source: Berkshire Hathaway; Semper Augustus

Last year's letter included the following table, updated again this year. Two sets of projected 10-year returns illustrate Berkshire earning either 8% on equity per year or 10%. In both cases, half of profit is assumed spent repurchasing shares at five multiples to book value ranging from half of book to twice book. The most likely range where Berkshire would repurchase shares and levels at which the shares will trade fall between 120% of book value and 150%. Finally, presumed profits under the 8% and 10% return on equity scenarios are capitalized at 13-, 15-, 18- and 20-times earnings. The base expectation is shaded in green, with profit at a 10% return on equity, capitalized at 18 times earnings. Under the base, if shares are bought back at 120% of book value, $79.1 billion in net income capitalized at 18 times yields a market capitalization of $1.424 trillion. On what would be a share count of 964 million, a 4.2% decline per year, the shareholder earns 328% over the next decade, an annual return of 15.6%. On little increase in the multiple to earnings, at 15 times the annual return drops to 14.1%. A decline in the multiple from today's 13.9 times to 13 times still has the shareholder earning 12.9% per year.

Presumed repurchases made at 150% of book value take the base case to a 14.9% annual return at 18 times earnings and only 12.2% at 13 times.

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Ten-Year Expected Return at Year-End 2018 With ROE at 8% and 10%
Share Repurchases With 50% of Normalized Annual Profits Illustrated

Repurchase with 50% of profits at 50% of BV

	10-Year: 2031 8% ROE and growth ($47.8B 2020 base)			
	13x	15x	18x	20x
Market Cap	755	871	1,045	1,161
Net Income	58.1	58.1	58.1	58.1
Share count	641	641	641	641
P/E	13	15	18	20
Earnings Yield	7.7%	6.7%	5.6%	5.0%
Stock Price Change	261%	302%	362%	402%
Annual Gain Per Year	13.7%	14.9%	16.5%	17.5%
Share Count Reduction	57%	57%	57%	57%
Annual Share Reduction	8.0%	8.0%	8.0%	8.0%

Repurchase with 50% of profits at 50% of BV

	10-Year: 2031 10% ROE and growth ($47.8B base)			
	13x	15x	18x	20x
Market Cap	1,029	1,187	1,424	1,582
Net Income	79.1	79.1	79.1	79.1
Share count	514	514	514	514
P/E	13	15	18	20
Earnings Yield	7.7%	6.7%	5.6%	5.0%
Stock Price Change	444%	512%	614%	683%
Annual Gain Per Year	18.4%	19.9%	21.7%	22.8%
Share Count Reduction	65%	65%	65%	65%
Annual Share Reduction	10.0%	10.0%	10.0%	10.0%

Repurchase with 50% of profits at 100% of BV

	10-Year: 2031 8% ROE and growth ($47.8B 2020 base)			
	13x	15x	18x	20x
Market Cap	755	871	1,045	1,161
Net Income	58.1	58.1	58.1	58.1
Share count	981	981	981	981
P/E	13	15	18	20
Earnings Yield	7.7%	6.7%	5.6%	5.0%
Stock Price Change	171%	197%	236%	263%
Annual Gain Per Year	10.5%	11.5%	12.9%	13.8%
Share Count Reduction	34%	34%	34%	34%
Annual Share Reduction	4.0%	4.0%	4.0%	4.0%

Repurchase with 50% of profits at 100% of BV

	10-Year: 2031 10% ROE and growth ($47.8B base)			
	13x	15x	18x	20x
Market Cap	1,029	1,187	1,424	1,582
Net Income	79.1	79.1	79.1	79.1
Share count	883	883	883	883
P/E	13	15	18	20
Earnings Yield	7.7%	6.7%	5.6%	5.0%
Stock Price Change	258%	298%	358%	397%
Annual Gain Per Year	13.6%	14.8%	16.4%	17.4%
Share Count Reduction	40%	40%	40%	40%
Annual Share Reduction	5.0%	5.0%	5.0%	5.0%

Repurchase with 50% of profits at 120% of BV

	10-Year: 2031 8% ROE and growth ($47.8B 2020 base)			
	13x	15x	18x	20x
Market Cap	755	871	1,045	1,161
Net Income	58.1	58.1	58.1	58.1
Share count	1,051	1,051	1,051	1,051
P/E	13	15	18	20
Earnings Yield	7.7%	6.7%	5.6%	5.0%
Stock Price Change	159%	184%	221%	245%
Annual Gain Per Year	10.0%	11.0%	12.4%	13.2%
Share Count Reduction	29%	29%	29%	29%
Annual Share Reduction	3.3%	3.3%	3.3%	3.3%

Repurchase with 50% of profits at 120% of BV

	10-Year: 2031 10% ROE and growth ($47.8B base)			
	13x	15x	18x	20x
Market Cap	1,029	1,187	1,424	1,582
Net Income	79.1	79.1	79.1	79.1
Share count	964	964	964	964
P/E	13	15	18	20
Earnings Yield	7.7%	6.7%	5.6%	5.0%
Stock Price Change	237%	273%	328%	364%
Annual Gain Per Year	12.9%	14.1%	15.6%	16.6%
Share Count Reduction	35%	35%	35%	35%
Annual Share Reduction	4.2%	4.2%	4.2%	4.2%

Repurchase with 50% of profits at 150% of BV

	10-Year: 2031 8% ROE and growth ($47.8B 2020 base)			
	13x	15x	18x	20x
Market Cap (billions)	755	871	1,045	1,161
Net Income	58.1	58.1	58.1	58.1
Share count	1,126	1,126	1,126	1,126
P/E	13	15	18	20
Earnings Yield	7.7%	6.7%	5.6%	5.0%
Stock Price Change	149%	172%	206%	229%
Annual Gain Per Year	9.5%	10.5%	11.8%	12.6%
Share Count Reduction	24%	24%	24%	24%
Annual Share Reduction	2.7%	2.7%	2.7%	2.7%

Repurchase with 50% of profits at 150% of BV

	10-Year: 2031 10% ROE and growth ($47.8B base)			
	13x	15x	18x	20x
Market Cap	1,029	1,187	1,424	1,582
Net Income	79.1	79.1	79.1	79.1
Share count	1,051	1,051	1051	1,051
P/E	13	15	18	20
Earnings Yield	7.7%	6.7%	5.6%	5.0%
Stock Price Change	217%	251%	301%	334%
Annual Gain Per Year	12.2%	13.4%	14.9%	15.8%
Share Count Reduction	29%	29%	29%	29%
Annual Share Reduction	3.3%	3.3%	3.3%	3.3%

Repurchase with 50% of profits at 200% of BV

	10-Year: 2031 8% ROE and growth ($47.8B 2020 base)			
	13x	15x	18x	20x
Market Cap	755	871	1,045	1,161
Net Income	58.1	58.1	58.1	58.1
Share count	1,206	1,206	1,206	1,206
P/E	13	15	18	20
Earnings Yield	7.7%	6.7%	5.6%	5.0%
Stock Price Change	139%	160%	192%	214%
Annual Gain Per Year	9.1%	10.0%	11.3%	12.1%
Share Count Reduction	18%	18%	18%	18%
Annual Share Reduction	2.0%	2.0%	2.0%	2.0%

Repurchase with 50% of profits at 200% of BV

	10-Year: 2031 10% ROE and growth ($47.8B base)			
	13x	15x	18x	20x
Market Cap	1,029	1,187	1,424	1,582
Net Income	79.1	79.1	79.1	79.1
Share count	1,145	1,145	1,145	1,145
P/E	13	15	18	20
Earnings Yield	7.7%	6.7%	5.6%	5.0%
Stock Price Change	199%	230%	276%	307%
Annual Gain Per Year	11.6%	12.7%	14.2%	15.1%
Share Count Reduction	22%	22%	22%	22%
Annual Share Reduction	2.5%	2.5%	2.5%	2.5%

Let's analyze the 8% return on equity case for a moment. Think about the illogic about profits only growing to $58.1 billion from $47.8 billion on a trailing basis at yearend and an expected $50.2 billion for 2022. In dollar terms that's only a 2% rate of growth. How can profit be expected to grow so slowly? The presumed 8% return on equity means profits are *immediately* cut from a 10% return to an 8% return, an abrupt decline of 20% from current levels and then held at that level. I could dedicate an entire essay as to why this outcome is quite unlikely, but for illustration's sake, even in the near-impossible outcome it doesn't become lethal to the Berkshire owner. In a worst case, management suspends price discipline and spends half of profit repurchasing shares at 200% of book value each year. The share count is only nominally reduced by 18% cumulatively, or 2.0% per year. Under this scenario, presuming a decline to 13 times earnings from 13.9, the shareholder earns 9.1% per year. Back to the earlier discussion about the S&P 500 and attribution from margins, multiples, sales growth, dilution and dividend yield, I'll be surprised if Berkshire, even under misguided management suspending discipline and culture, fails to beat the index over the next ten years. As George H.W. Bush, or at least Dana Carvey was wont to say, "Wouldn't be prudent."

If elephants remain in hiding, and the opportunity to add materially to the stock portfolio fails to present itself, finding a home for capital becomes imperative. Fortunately, at least for the intermediate horizon, large sums can be invested in the utility and energy business. Should opportunity diminish there, and I will discuss this shortly, share repurchases become more and more important. Should Berkshire's shares rise to a level where repurchase becomes unattractive, then and only then would a shareholder look for the likelihood of dividends, and preferably special dividends. Markets being markets, more likely than not we'll again suffer a deep recession, perhaps soon, and opportunities to purchase common stocks and even full ownership of businesses will appear. In the meantime, we don't at all mind Berkshire's shares being cheap. We can buy them with portfolio cash from dividends, sales, and deposits, and more importantly Berkshire can buy them back in scale.

Should Berkshire not grow much by revenue and profit over the next decade, but instead meaningfully shrink the share count by buying the stock at attractive prices, then a smaller Berkshire is a better Berkshire, opportunity cost and all things considered.

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Estimating Fourth Quarter and Full-Year GAAP Net Income and Change in Book Value

Expected 2021 Fourth Quarter and Full Year Results

(In billions of USD)	First 9 months	SAI Q4 Est.	SAI 2021 Est.
Change in Investment Portfolio (Ex KHC) *	$37.2	$38.3	$75.5
Derivative Contract gains (losses)	0.8	0.2	1.0
Operating Earnings	24.7	10.2	34.9
Earnings Before Tax	62.7	48.7	111.4
GAAP Income Tax	11.8	9.2	21.0
Effective Tax Rate	18.9	18.9	18.9
Net Income	50.9	39.5	90.4
Earnings Attributable to Noncontrolling Interests	0.8	0.2	1.0
Net Income Attributable to BRK Shareholders #	50.1	39.3	89.4

*Includes gain/loss on fixed income
May not sum due to rounding

An outsized return on Berkshire's investments in common stocks will cause an overstatement in reported profit relative to economic profit for the third year in a row and the highest reported profit in company history. The headline $89.4 billion figure will be one of the highest ever annual profits recorded by any company. Relative to our GAAP adjusted normalized measure of Berkshire's profit, we record dividends plus retained earnings of the companies in Berkshire's stock portfolio as annual gain from common stocks. Compare a combined $16.7 billion in normalized Semper assumed gains from investments to the $75.5 billion change in the portfolio during 2021. I'll discuss why my normalized figure is likely conservative, but stocks don't return 29.3% every year.

Revenues and profits from most Berkshire operating subsidiaries are fully recovered from 2020's pandemic induced decline. Pre-tax 4th quarter operating earnings of an expected $10.2 billion will be a Berkshire record, as will $34.9 billion for the full year. Normalized profits (the Semper estimate) at Berkshire's Manufacturing, Service, Retail and Finance group and the BNSF were depressed by a combined $2.9 billion during 2020.

Underwriting profit from Berkshire's combined insurance group will be below our long run assumed 5% pre-tax combined margin. The Semper estimate excludes what are typically GAAP reported losses from development in retroactive and periodic payment annuity lines. Over time we expect the use of premiums for many years to produce profits in in these lines, but they will not show yearly profit. If losses develop sooner than expected the business will not be as good as anticipated when the policies were written. Lifetime losses are capped.

All in all, 2021 was a banner year for Berkshire. Unless insurance reserves develop badly in the 4th quarter it stands to be the most profitable year for all Berkshire subsidiaries. Just remind your favorite headline writer to ignore huge swings in stocks from annual returns. It's not the $89.4 billion to be reported that should get the ink but rather Berkshire's record nearly $35 billion in pre-tax operating earnings. Durable profit growth coupled with superb capital allocation drive intrinsic value.

The Stock Portfolio

Berkshire's "underperforming" stock portfolio likely returned approximately 29.3% during 2021, beating the highflying S&P 500's 28.7%. The portfolio earned 20.7% in 2020, beating the index by 2.3%. Berkshire's stocks likewise beat the index in 2019, 39.8% to 31.5%. For the three years Berkshire's stocks compounded by 29.7%, no doubt growing faster than the underlying businesses.

I've written at length in past letters, and touched on in the *Benign Neglect* section earlier, about Berkshire's pivot in 1998, diversifying an expensive stock portfolio that had compounded at nearly 30% for nearly three decades by buying General Reinsurance, absorbing a large bond portfolio, and shrinking Berkshire's allocation to stocks without paying a dime in taxes. Evaluating the stock portfolio alone from that point, time was required to work off excessive overvaluation. Still, from the end of 1998, Berkshire's stocks compounded at 8.5%, beating the S&P's 8.1%, also expensive in the late 1990s as discussed earlier in the letter.

Despite a total return of 2.0% in 1999 versus 21.1% for the index, Berkshire would outperform the index for the next two decades.

Berkshire Hathaway Stock Portfolio

Year	Berkshire Portfolio Total Return	Reverse CAGR from 12/31/2021	CAGR from 12/31/1998	S&P 500 Total Return	Reverse CAGR from 12/31/2021	CAGR from 12/31/1998
1999*	2.0%	8.5%	2.0%	21.1%	8.1%	21.1%
2000	8.6%	8.8%	5.2%	-9.1%	7.5%	4.9%
2001	-17.4%	8.8%	-2.9%	-11.9%	8.4%	-1.0%
2002	0.2%	10.3%	-2.1%	-22.1%	9.5%	-6.8%
2003	27.5%	10.9%	3.2%	28.7%	11.5%	-0.6%
2004	5.6%	10.0%	3.6%	10.9%	10.6%	1.3%
2005	6.0%	10.3%	3.9%	4.9%	10.6%	1.8%
2006	18.5%	10.5%	5.6%	15.8%	11.0%	3.4%
2007	1.3%	10.0%	5.1%	5.5%	10.7%	3.7%
2008	-24.4%	10.7%	1.7%	-37.0%	11.0%	-1.4%
2009	19.6%	14.0%	3.2%	26.5%	16.0%	0.9%
2010	15.0%	13.5%	4.2%	15.1%	15.2%	2.0%
2011	6.5%	13.4%	4.3%	2.1%	15.2%	2.0%
2012	14.7%	14.1%	5.1%	16.0%	16.6%	2.9%
2013	28.8%	14.0%	6.5%	32.4%	16.6%	4.7%
2014	7.7%	12.3%	6.6%	13.7%	14.8%	5.2%
2015	-4.5%	13.0%	5.9%	1.4%	14.9%	5.0%
2016	13.1%	16.2%	6.3%	12.0%	17.4%	5.4%
2017	15.3%	16.8%	6.7%	21.8%	18.5%	6.2%
2018	-13.6%	17.2%	5.6%	-4.4%	17.6%	5.6%
2019	39.8%	29.7%	7.0%	31.5%	26.1%	6.7%
2020	20.7%	24.9%	7.6%	18.4%	23.4%	7.2%
2021**	29.3%	29.3%	8.5%	28.7%	28.7%	8.1%

*Internally estimated BRK portfolio return

**Holdings as 9/30/21; return to yearend

Source: Berkshire Hathaway; Semper Augustus Calculations; Bloomberg Data

Beyond the past three years, the S&P 500 produced very difficult to beat and not likely repeatable returns. For the ten years through year-end 2021 the index averaged 16.6%, beating Berkshire's 14.1% on the stock portfolio. The prospective question is how will the Berkshire portfolio compound for the next ten years?

I suggested earlier that unless index profit margins move higher from today's record 13.4% and/or the multiple to earnings expands beyond the mid-20s, index investors won't get more than growth in sales per share and dividends. Where sales growth per share averaged 3.5% for the last ten and 20 years, given high corporate and government debt, growth going forward isn't likely to be any higher. Coupled with today's 1.3% dividend yield and average returns of no more than 5% seems likely.

Is Berkshire's portfolio as expensive as the index, as it certainly was in 1998? Apple is now 48% of the portfolio. Adding the next three largest holdings – Bank of America, American Express and Coca-Cola – and the big four comprise 76% of the total. Tell me whether these are individually and collectively expensive and you have more than three-quarters of the answer. My expert opinion is I don't know.

On Apple, revenues tripled over the past decade and the business maintained a healthy 26% net margin. Profits funded 6% of revenues spent on research and development and allowed for the repurchase of 37% of shares outstanding, as well as sending a quarter of profits to shareholders as dividends. Midway through the decade the stock traded for 12 times earnings, which is when Berkshire came on board, buying $36 billion between 2016 and 2018 at an average cost of $35 per share. While Apple shareholders saw a total return of more than 12 times their money, Berkshire reaped a five-fold gain excluding dividends in five years (and sold roughly 11% of the position through 2020). During the first five years of the decade sales in dollar terms grew 15% annually and slowed to 10% for the past five. Berkshire enjoyed a lift in the multiple from 12 times to 30 times. It's reasonable that from what's now nearly a $400 billion run rate in annual revenues that the law of large numbers will exact further slowing of the top line. At 30 times earnings, share repurchases shrink outstanding shares at a far lower rate than they do when paying 12 times. Apple's appetite for buying shares seems price insensitive, with repurchases of $85 billion and $72 billion over the last two years consuming well over 80% of operating income and roughly all net profit. The multiple doubled to 30 over the last two years.

Berkshire's Five-Year Ownership of Apple (2016 to 2021)

Date	Shares (millions)	Cost Basis (millions of USD)	Cost Basis per Share	Market Value (millions of USD)	Market Value per Share
Q1 2016*	39.2	$1,000	$25.48	$1,069	27.25
Q4 2016	245.0	6,747	27.54	7,093	28.95
Q4 2017	666.9	20,961	31.43	28,213	42.31
Q4 2018	1021.2	36,044	35.30	40,271	39.43
Q4 2019	1003.5	35,287	35.17	73,667	73.41
Q4 2020	907.6	31,089	34.25	120,424	132.68
Q4 2021***	907.6	31,089	34.25	161,163	177.57

*Initial Buy by Todd or Ted

**All shares adjusted for 4-for-1 split in 2020

***Sharecount reflected at 9/30. New basis calculated using average cost method

Spending $100 billion repurchasing shares of a company with a $3 trillion market cap gets you 3.3% of the company. Slowing revenues and margins not likely to expand (or contract), I don't get to 30 times, but I'd also not be thrilled sharing 21% of a $130 billion gain with the government by incurring a realized capital gain. I'd bank on some multiple contraction over time, and if sales can grow by high single-digits at worst it's dead money for a few years. My valuation of Berkshire's entire stock portfolio shaves $50 billion from market value, most of which represents expected multiple contraction at Apple. If one were

to apply the entire $50 billion to the Apple position that takes the $161 billion holding at 30 times to an immediate 21 multiple.

Bank of America is the next largest position at just under 14% of the portfolio. Berkshire paid $14.6 billion for what's now a $46 billion holding, excluding dividends earned during the ten years of ownership. Here's a good rule: Buy banks during deep recessions and financial crises, but only buy those that don't fail. Got it. The best way to ensure you are buying a bank that won't fail is to be the buyer of last resort, or at least the buyer of optical enhancement. Despite Bank of America insisting the capital position was strong (it wasn't), Berkshire bought a 5% coupon, $5 billion preferred, redeemable at 5% over par. But if you are going in, get warrants. In addition to the 5/5/5 preferred, Berkshire got warrants which allowed them to buy 700 million shares of common stock at $7.14 anytime over the next decade. The stock closed 2021 at $44.49 per share. It's also not a bad thing if the majority of upside in your position is in unconverted warrants, ensure the bank is limited on paying dividends. Before the financial crisis the bank paid dividends at a $2.40 annual rate. When in need of capital, which they swore they didn't, but took, regulators limit dividends going out the door when sending bailout capital. The annual dividend rate was thus cut to $0.04, or a penny per quarter, and held there until 2012. In the meantime, total shares outstanding rose by 150%. Repurchases didn't resume until 2017. Thus, profits were retained, strengthening the already "strong" capital position of the bank. Once things were humming along, if a pandemic pops up but the Fed intervenes massively, you can buy additional shares on a dip, which Berkshire did in July 2020. Bank of America shares entered 2020 at $35 and Berkshire bought $2.1 billion at an average $24 per share price. With dividends the additional shares already have nearly doubled in 18 months. Remember, they don't do it well in Omaha anymore.

What is Bank of America worth? When is the next deep recession or crisis? Loss reserves are never at a peak at an economic peak. Quite the opposite. Trading for 145% of book value and about 13 times earnings, all is well. Until it isn't. Included in Berkshire's top ten holdings, on top of Bank of America and American Express (they are a bank), you will find a 2.1% position in U.S. Bancorp and a 1.3% holding in Bank of New York Mellon (not really a bank). Gone are sizable holdings in Goldman Sachs (also a Berkshire bailee in the financial crisis), JPMorgan Chase, longtime holding M&T Bank and the vast majority of a another long held and sizable position in Wells Fargo. Had Berkshire not taken the machete to these holdings, banking would comprise more than 30% of the Berkshire portfolio. Wells was bought in the teeth of the 1989 and 1990 recession and California real estate downturn. To answer the question on Bank of America, presuming no downturn it's fairly valued. One of these days we'll have a crisis, the bank will be cheap, losses will rise, reserves will follow, and Berkshire will do big deals providing capital at Berkshire terms when banks publicly swear they need no such thing.

Third largest holding, American Express, is a great company. They issue credit cards and the credit that gets extended and own their own payment rail, serving both merchants and cardholders. Berkshire owns 19% of the company. Harmed by the pandemic, particularly by a lack of international business travel, the stock dropped by nearly half to March 2020, trading at $67. Despite travel not back globally, most consumer and commercial activity is back. Profits surely are, now 20% higher than in 2019. The stock trades at a new high as I write this but only at a high-teens multiple to earnings power. The capital position was not impaired during the financial crisis, and the company only took a minimum of required capital. The share count rose by less than 3% and there were no preferreds or warrants issued. The stock will be harmed by the next downturn, but the business will be fine. If you can survive the loss of Costco, you can survive anything, for goodness' sake. Berkshire's $1.3 billion investment in Amex was worth $25 billion at yearend, excluding dividends regularly received. The stock would be buyable net of capital gains paid so Berkshire sits with what is a permanent holding not materially overvalued.

Coca-Cola rounds out the Big 4, at $23.7 billion, 7.1% of the stock portfolio. On a $1.3 billion investment made in the aftermath of 1987's stock market crash, Coke was 40% of the portfolio and 46% of Berkshire

equity by 1998, trading for nearly 50 times earnings. If there had ever been a time to sell Coke, that was it. On a thirteen-bagger in a decade, however, sending 35% of any gain realized to Washington was unappealing, so the purchase of General Re was the next best thing, ultimately even better. The Coke holding reached $17.4 billion in 1998 and is now only $23.7 billion. Twenty-three years of working the multiple down by half, from 50 to 25 coupled with little business growth yielded a mediocre result for what was by far Berkshire's largest holding. Viewing it as a bond yielding 4% would be a reasonable way to view the position. The position draws the attention of the supremely health-conscious, questioning the conscience of anyone so contemptible to own such a cancer. I'm sure if those casting aspersions were willing to pay the tax bill, Omaha would consider selling it. Not a likely outcome, it's now 4.6% of book value, down from 46%. Not a share was sold.

Below Coca-Cola, if Kraft Heinz is included in the stock portfolio and not as an equity-method holding, positions six to ten total 12.3% of the portfolio. Excluding Kraft, the next five total an even 10% of the stock portfolio and $33.5 billion in combined value. We're getting into rounding error territory.

The Stock Portfolio and Semper's Valuation

Assessing Berkshire's stock portfolio when appraising firm intrinsic value, I present two observations. Both suggest a conservative valuation.

The overwhelming majority of Berkshire's stock portfolio is owned within insurance operation and largely exists as surplus capital. The insurers will report roughly $325 billion in equities at yearend, presuming no fourth-quarter portfolio activity. BHE owns Berkshire's $6.9 billion position in BYD with a cost basis of $232 million in 2008. BHE also owns another $825 million of equities, largely held by nuclear decommissioning trusts and Rabbi trusts. There are another $6.9 billion of equities not held by the insurers or at BHE. I presume they are held at the holding company level and carry them there in my annual reconciliation.

Berkshire owns several holdings not included in its quarterly SEC 13F filings. Five Japanese trading companies bought for about $6 billion in 2020, trading for $8.6 billion at yearend, financed with what is now $7 billion in 0.6% coupon Japanese yen denominated debt at current exchange rates. The debt is at the holding company and the equity interests in the trading companies are held by the insurers. Small positions in Diageo and IAG, an Australian agribusiness insurer, are also held by the insurance operation. Finally, BYD is not reported on the 13F, and if I'd included it among Berkshire's top ten holdings it would rank 8th or 9th, depending on whether one considers Kraft an equity holding or an equity method holding, as it's treated in the financial statements. I adjust Berkshire's carrying value in Kraft to market value of the shares.

Equities in the insurance operation closed 2021 trading at 19.4 times earnings, so a 5.1% earnings yield. Dividends will total $5.0 billion, making the dividend yield 1.54%. The equity portfolio is included in a sum of the parts analysis with an offsetting adjustment representing any degree to which the portfolio as a whole is under or overvalued. I'm marking down portfolio value by $50 billion, or slightly more than 15% of value. The adjustments were $39 billion and $19 billion for 2020 and 2019 respectively. If you look at the adjustment as a discount to the multiple, 2021's 19.4 times would reduce to 16.4.

In addition to a subsidiary driven sum of the parts analysis, deriving the earning power from the groups and moving parts is also crucial. Berkshire's normalized net earning power is $47.8 billion at yearend. Pre-tax earnings are $53.3 billion. Of the pre-tax normalized earnings, $5 billion comes from dividends earned and $11.7 billion is the portion of Berkshire's share of the stock portfolio companies retained and not distributed as profit. Dividends plus retained earnings total the earnings yield, again 5.1% at yearend. From an earning power standpoint, by assuming Berkshire only earns the earnings yield presumes an

annual expected return equal to the earnings yield. If instead the analyst believes the stock portfolio will earn 10.2% annually, double the earnings yield, then my normalized earnings from the stock portfolio are understated by half, or by $16.7 billion. Presuming retained earnings are invested at adequate returns, then over time it's not unreasonable to expect at least a dollar of retained earnings producing a dollar of market value. Earnings retained at higher and higher returns should translate into more earnings than are recorded as current earning power. This is a conservative aspect of the Semper valuation.

Take note of the way dividends are taxed and retained earnings are presumed taxed. Dividends received by insurance companies from other U.S. companies receive a 70% dividend received deduction on holdings less than 20% owned. Thus, at the 21% Federal tax rate, Berkshire pays 14.7% rate on dividends received. For businesses more than 20% owned, the deduction is 50% making the rate 10.5%. Berkshire's blended rate on dividends received is about 13%. Dividends are already taxed by the distributing company, hence the deduction.

Retained earnings are also already taxed at the company owned, but unless eventually distributed Berkshire will only see appreciation in underlying shares. If held permanently or for many years, any capital gains taxes paid upon actual sale may be years in the future. A 3% hypothetical tax rate is hence applied reflecting long-term deferral and the time value of money.

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57 Years of Change in Book Value Per Share and Market Value Per Share – With Compound Annual Growth Rates Run Forward and Backward

The first page of Berkshire's annual report and Chairman's Letter presents the annual and compound annual history of Berkshire's returns against the S&P 500. The presentation format has evolved over the years. The Semper letter provides an auxiliary and more comprehensive presentation.

Berkshire's preferred measure of corporate performance for most of its history under present management was annual and compound annual change in book value per share. That performance measure made an expected departure from the presentation page two years ago. Over time the measurement of change in book value per share will lose efficacy. Share repurchases above book value reduces book value – the larger the premium paid the more rapid the decline. Also, many of Berkshire's subsidiaries and assets were purchased many years ago. With many assets carried at historic or depreciated cost, carrying value understates replacement or economic value. Yet, book value at Berkshire is still a terribly important measure.

Many of Berkshire's operating subsidiaries are capital intensive. Equity is the measure against which insurance premiums are written, and in many cases, regulated. In railroads, pricing rests on the capital of the business as well as on market forces. Monopolistic electric utilities and regulated energy assets earn allowed returns against rate-based equity. These are Berkshire's core businesses. Investments in common stocks are carried at market value, not cost basis, and are reserved against with a liability for taxes on unrealized gains. The argument that inflation erodes the carrying value of certain assets, understating replacement cost or current value is valid. Pricing in some cases is inelastic, especially in the short term. Further, recognizing that repurchasing shares at premiums to book value, even if made at fair or undervalued prices relative to intrinsic value, will erode book value and book value per share is also valid. Book value is far from a perfect proxy. In Berkshire's case, if it is indeed in share repurchase mode, book value will lose some utility over time. Measurement of durable earning power remains the most important job of the analyst valuing Berkshire. If not measuring profits against equity, then some assessment of replacement cost of assets must be made.

Because we monitor and measure book value, we will annually present both Berkshire's change in book value per share as well as the change in market value of the common stock. You may not get it from Omaha, but you'll get it here. You will also get compound growth series, forward and backward, from 1965 forward and from 2021 backward. The backward series becomes the 1-year, 2-year, 3-year returns and so forth, back to the 57-year return (which matches the foreword CAGR). Keep the table handy when some authority wails about Berkshire underperforming over some certain period, or when a joker "proves" he's the next Buffett with some convoluted, cherry-picked time series of changes in book value per share or stock price change, or both, intermittently. In both cases of analyzing series of returns over any period, whether from a point in time forward or looking at trailing returns over a time series, endpoint sensitivity matters.

The reverse CAGR series backward from 2021 are the one-year return, two-year return, etc.…The average annual change in book value per share essentially approximates the return on equity over time. There exists no time series when Berkshire's annualized change in book value per share is less than 10%. The most recent year and years can have dramatic influence on what shorter-term returns intervals look like. Six years in a row of earning 0% followed by a 100% return in year seven can make the seven-year return look like a smooth 10% per year.

Berkshire's Performance vs. the S&P 500: Annual Returns + Growth Rates Forward and Backward

Year	Book Value per Share Growth	CAGR from 2021	CAGR from 1965	Market Value per Share Growth	CAGR from 2021	CAGR from 1965	S&P 500 Total Return	CAGR from 2021	CAGR from 1965
1965	23.8%	18.7%	23.8%	49.5%	20.2%	49.5%	10.0%	10.5%	10.0%
1966	20.3%	18.6%	22.0%	-3.4%	19.8%	20.2%	-11.7%	10.5%	-1.4%
1967	11.0%	18.6%	18.2%	13.3%	20.2%	17.8%	30.9%	11.0%	8.3%
1968	19.0%	18.7%	18.4%	77.8%	20.4%	30.6%	11.0%	10.6%	9.0%
1969	16.2%	18.7%	18.0%	19.4%	19.5%	28.3%	-8.4%	10.6%	5.3%
1970	12.0%	18.8%	17.0%	-4.6%	19.5%	22.1%	3.9%	11.0%	5.0%
1971	16.4%	18.9%	16.9%	80.5%	20.0%	29.1%	14.6%	11.2%	6.4%
1972	21.7%	19.0%	17.5%	8.1%	19.0%	26.3%	18.9%	11.1%	7.8%
1973	4.7%	18.9%	16.0%	-2.5%	19.3%	22.7%	-14.8%	11.0%	5.1%
1974	5.5%	19.2%	14.9%	-48.7%	19.8%	12.5%	-26.4%	11.6%	1.4%
1975	21.9%	19.5%	15.5%	2.5%	22.0%	11.5%	37.2%	12.6%	4.2%
1976	59.3%	19.5%	18.6%	129.3%	22.4%	18.4%	23.6%	12.1%	5.7%
1977	31.9%	18.7%	19.6%	46.8%	20.7%	20.4%	-7.4%	11.8%	4.6%
1978	24.0%	18.4%	19.9%	14.5%	20.2%	20.0%	6.4%	12.3%	4.8%
1979	35.7%	18.3%	20.9%	102.5%	20.3%	24.2%	18.2%	12.5%	5.6%
1980	19.3%	17.9%	20.8%	32.8%	18.8%	24.7%	32.3%	12.3%	7.1%
1981	31.4%	17.9%	21.4%	31.8%	18.5%	25.1%	-5.0%	11.9%	6.4%
1982	40.0%	17.6%	22.4%	38.4%	18.2%	25.8%	21.4%	12.3%	7.1%
1983	32.3%	17.0%	22.9%	69.0%	17.7%	27.8%	22.4%	12.1%	7.9%
1984	13.6%	16.7%	22.4%	-2.7%	16.6%	26.1%	6.1%	11.8%	7.8%
1985	48.2%	16.7%	23.5%	93.7%	17.2%	28.7%	31.6%	12.0%	8.8%
1986	26.1%	16.0%	23.6%	14.2%	15.6%	28.0%	18.6%	11.5%	9.3%
1987	19.5%	15.7%	23.5%	4.6%	15.6%	26.9%	5.1%	11.3%	9.1%
1988	20.1%	15.6%	23.3%	59.3%	15.9%	28.1%	16.6%	11.5%	9.4%
1989	44.4%	15.5%	24.1%	84.6%	14.8%	30.0%	31.7%	11.3%	10.2%
1990	7.4%	14.7%	23.4%	-23.1%	13.1%	27.4%	-3.1%	10.8%	9.6%
1991	39.6%	14.9%	24.0%	35.6%	14.5%	27.7%	30.5%	11.2%	10.4%
1992	20.3%	14.2%	23.8%	29.8%	13.9%	27.7%	7.6%	10.7%	10.3%
1993	14.3%	13.9%	23.5%	38.9%	13.4%	28.1%	10.1%	10.8%	10.3%
1994	13.9%	13.9%	23.2%	25.0%	12.6%	28.0%	1.3%	10.8%	9.9%
1995	43.1%	13.9%	23.8%	57.4%	12.1%	28.9%	37.6%	11.2%	10.7%
1996	31.8%	12.9%	24.0%	6.2%	10.7%	28.1%	23.0%	10.2%	11.1%
1997	34.1%	12.2%	24.3%	34.9%	10.9%	28.3%	33.4%	9.8%	11.7%
1998	48.3%	11.4%	24.9%	52.2%	10.0%	28.9%	28.6%	8.9%	12.2%
1999	0.5%	10.0%	24.2%	-19.9%	8.4%	27.2%	21.0%	8.1%	12.4%
2000	6.5%	10.5%	23.6%	26.6%	9.9%	27.2%	-9.1%	7.5%	11.8%
2001	-6.2%	10.7%	22.7%	6.5%	9.2%	26.6%	-11.9%	8.4%	11.0%
2002	10.0%	11.6%	22.4%	-3.8%	9.3%	25.7%	-22.1%	9.5%	10.0%
2003	21.0%	11.7%	22.3%	15.8%	10.1%	25.4%	28.7%	11.5%	10.5%
2004	10.5%	11.2%	22.0%	4.3%	9.8%	24.8%	10.9%	10.6%	10.5%
2005	6.4%	11.2%	21.6%	0.8%	10.1%	24.2%	4.9%	10.6%	10.3%
2006	18.4%	11.5%	21.5%	24.1%	10.7%	24.2%	15.8%	11.0%	10.5%
2007	11.0%	11.1%	21.3%	28.7%	9.8%	24.3%	5.5%	10.7%	10.3%
2008	-9.6%	11.1%	20.5%	-31.8%	8.6%	22.6%	-37.0%	11.0%	8.9%
2009	19.8%	12.9%	20.5%	2.7%	12.6%	22.1%	26.5%	16.0%	9.3%
2010	13.0%	12.3%	20.3%	21.4%	13.4%	22.1%	15.1%	15.2%	9.4%
2011	4.6%	12.3%	19.9%	-4.7%	12.7%	21.4%	2.1%	15.2%	9.3%
2012	14.4%	13.1%	19.8%	16.8%	14.7%	21.4%	16.0%	16.6%	9.4%
2013	18.2%	12.9%	19.8%	32.7%	14.4%	21.6%	32.4%	16.6%	9.8%
2014	8.3%	12.3%	19.5%	27.0%	12.3%	21.7%	13.7%	14.8%	9.9%
2015	6.4%	12.9%	19.3%	-12.5%	10.4%	20.9%	1.4%	14.9%	9.7%
2016	10.7%	14.0%	19.1%	23.4%	14.7%	20.9%	12.0%	17.4%	9.8%
2017	23.0%	14.6%	19.2%	21.9%	13.0%	21.0%	21.8%	18.5%	10.0%
2018	0.4%	12.6%	18.8%	2.8%	10.9%	20.6%	-4.4%	17.6%	9.7%
2019	23.0%	17.0%	18.9%	11.0%	13.8%	20.4%	31.5%	26.1%	10.1%
2020	9.8%	14.2%	18.7%	2.4%	15.2%	20.1%	18.4%	23.4%	10.2%
2021*	18.7%	18.7%	18.7%	29.6%	29.6%	20.2%	28.7%	28.7%	10.5%

*Internally estimated BRK BVPS

The Semper expectation presumes Berkshire conservatively earns 10% on equity. Most of the moving parts within the conglomerate earn more. Strong stock market returns since 2008 tilt aggregate returns upward, and if the portfolio is dramatically overvalued, we may see returns move lower as valuations are worked off. In the meantime, Berkshire has considerably and consistently earned more than 10% on equity. A minor caveat: Nominal attribution to the "excess" profitability north of 10% change in book value per share is calculated using yearly profit against trailing book value, where return on equity is more logically viewed as profit against *average* annual equity. Said differently, if the business earns 10% on average annual equity, the annual change in book value per share *should* be greater than 10%.

Spend a minute on the return from Berkshire's share price data in the middle three columns. Compare these to the S&P 500 in columns to the right. Berkshire's stock returned 29.6%, beating the index return of 28.7% by 0.9%. The 1-year return was obviously 29.6%. As many were quick to point out after 2020, Berkshire had lost its touch. The stock was only up 2.4% while the index returned 18.4%. Berkshire's shares likewise "only" advanced 11% in 2019, even though that would pretty much match our expected return from owning Berkshire in any single year.

The S&P 500 averaged a 16.6% annual total return over the past decade and 16% beginning at the end of 2008, near the end of the financial crisis. Berkshire's operations are not structured to earn 16% annual returns over a decade. Those days are long gone. A shareholder disappointed in Berkshire for not keeping pace when the market delivers higher returns for a decade than Berkshire can be reasonably expected to produce should probably not own shares in the conglomerate. That said, revert back to the earlier conversation about the past ten years through the lens of what to expect for the next ten years and over time. The discussion of Berkshire "underperforming" over anywhere from 2 years to 20 years will evolve as Berkshire continues to compound at rates north of 10% and the index does what it does. On the unlikely proposition of Berkshire's shares underperforming the index for the next decade, I offered a bet recently bracketed with a steak dinner and nice Bordeaux on one end and a cash bet with more than one comma, my pony being BRK and the competing nag the S&P. The offer went unanswered.

Look to Berkshire's compounding in book value per share. First, the portion of Berkshire's profit attributed to gains and losses in the stock portfolio are muted by a 21% deferred-tax liability. Only $790,000 of a $1,000,000 unrealized gain is included in the change in book value. Declines are likewise positively muted. At yearend, Berkshire's expected $349 billion stock portfolio sits on top of a $104 billion cost basis. The $245 billion unrealized gain is offset with a $51 billion deferred-tax liability.

That said, by including the financial crisis in assessment of return, while book value per share and change in market value per share toggle back since 2008, from that point backward book value runs ahead of the stock all the way back to 1988. Book value per share compounded over the past decade well ahead of Semper's 10% return on equity assumption. The stock portfolio averaging 14.1% per year for the last decade certainly contributed to that, as does the fact that most of the big operations earn more than 10% returns on equity as ascribed to each group. Semper's bar is to earn 10% with the Berkshire position plus any accretion of the discount that exists to appraised intrinsic value. With a wide discount still there, and with the index trading at a high multiple on record margins, we love the predictability and conservatism that exists in our largest investment. This table will tell a different story against an index just completing one of the best ten-year periods in history.

Seeing the correlation between changes in book value per share and stock price per share is revealing. You can also see how much more consistent changes in book value are relative to changes in market value during some 10-year stretches. Berkshire suffers under the law of large numbers and has since the late 1990s. Then again, so does the S&P 500. I thought it would be interesting to see Berkshire's relative change in book value per share and market value by decade working backward from year-end 2021. Berkshire gained more per decade by book value than would be expected for a 10% return on equity and

no change in the multiple to book. The weak stock price for the 10-years ended 2011 captures the final year of the 2000 to 2002 bear market as well as 2008. Profitability proved more durable than the stock price, some of which was the ongoing working down of Coke's multiple.

10-Years Ended	Avg. Book Value per Share Growth	Avg. Market Value per Share Growth	Avg. S&P 500 Market Value per Share Growth
1972-1981	25.5%	31.7%	8.3%
1982-1991	29.1%	37.4%	18.1%
1992-2001	20.7%	25.8%	14.2%
2002-2011	10.5%	5.8%	5.0%
2012-2021	13.3%	15.5%	17.2%

From 2021	Book Value per Share Growth	Market Value per Share Growth	S&P 500 Market Value per Share Growth
10-year CAGR	13.1%	14.7%	16.6%
20-year CAGR	11.6%	9.3%	9.5%
30-year CAGR	14.2%	13.9%	10.7%
40-year CAGR	17.6%	18.2%	12.3%
50-year CAGR	19.0%	19.0%	11.1%
57-year CAGR	18.7%	20.2%	10.5%

Berkshire closed 2021 trading at 13.9 times normalized earnings and 1.3 times book value. Presuming sustained profitability on assets already owned and a reasonable set of reinvestment opportunities for retained earnings, expecting a repeat of Berkshire's 13.1% decade-long change in book value per share and 14.7% annual gain in the shares is in the cards. This is not a wild expectation of earning 40% per year. Returns will follow business profit and returns on retained capital. Should the best opportunity be in Berkshire's own shares then the scenario bears out. Should the stock rise too much, then expect the market value to outpace the business. Investors liking outsized returns wouldn't be disappointed. We, of course, will be miserable because with cash always on hand for various reasons, said cash needs a home and price matters.

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Berkshire Hathaway Intrinsic Value Update

Berkshire grew intrinsic value by 17.5% in 2021. For the second year in a row nearly all operating earnings were devoted to repurchasing shares at material discounts to intrinsic value. Private equity and to a lesser extent SPACs gone wild inhibit elephant hunting. Retained earnings in Berkshires utility and energy operation are augmented with like amounts of conventional leverage and spent on very attractive, predictable earning power assets. Share repurchases are a wonderful use of capital when shares are cheap. Shareholders' proportional ownership is growing at 4-5% per year at the present clip.

Ongoing analysis of Berkshire involves several methods, tweaked and refined each year. Following the company closely since 1996, the year B shares were offered, and owning the company since February 2000, I'm surprised each year when I take the better part of a week under the hood, updating my thinking on valuation. I'm more excited this year than in most – not because the shares remain cheap and business fundamentals progressing nicely, but because I finally tortured my reconciliation and assignment of myriad data points enough to finally believe my estimates of where equity is assigned among the major groups and which portion of normalized profit is derived from each.

On this aha moment, an apology is in order. I'd been overly critical a few years ago when desegregating Berkshire's hodgepodge in its consolidated financial statements known as, "Insurance and Other." Innocuous sounding enough, but this group includes Berkshire's huge insurance operation, a collection of dozens of wholly-owned operating companies under a "Manufacturing, Service and Retail" umbrella, the roll-in of a smaller but hugely profitable group of leasing and finance companies to the sub-MSR group, and finally a bunch of assets and liabilities held at the holding company level, changing every year.

Having grown accustomed to a thoughtful and extremely useful supplemental presentation of Berkshire's main subsidiaries from 2003 to 2016, seeing the tables and data disappear in 2017's annual report made the task of determining for that year and prospectively which assets and liabilities in the master "Insurance and Other" lump to distribute back to the MSR group quite tedious. Berkshire bought Precision Castparts during 2017, so rolled-up figures would necessarily be included in MSR. The task grew even more complicated in 2018 when the separately reported finance operation was likewise rolled into the MSR group. Several investments in common stocks are not held by the insurers and over time existed at different subsidiaries. Minutia for sure on many fronts but assessing Berkshire's MSR group is an extremely important component to understanding where profits are wholesome and where in places they are lacking.

Returns on equity within the MSR group ground downward from nearly 10% in the mid-2000s to 6.15% in 2016, the final year group financials were presented. Equity of the MSR group totaled $56.8 billion in 2015. Paying $37.2 billion including debt for Precision made the new subsidiary a material piece of MSR. The new equity balance in MSR was presumably north of $90 billion and given immediate weakness in PCC's turbine business, already strained pre-merger, group return on equity no doubt dropped from 8% to 6%. We're not big on six-handles unless depressed. By including the finance group in 2018, particularly Clayton Homes which has been knocking the cover off the ball for years running, profits surely perked up, but to what extent excluding Clayton, et, al.?

I've included an annual summary financial statement for the MSR group each year, despite known data shortcomings. Isolating cash, debt, other intangibles, and deferred-tax liabilities, which are reported unassigned to any group as a standalone item on Berkshire's consolidated balance sheet, made the job of getting the numbers correct impossible, or so I thought. Through a series of prorations and assumptions about reported segment figures I think the presentation now is finally extremely close to what Berkshire would see internally. The very good news is by year-end 2021 the MSR group is earning far healthier returns than it was in 2018 and 2019, even with the finance businesses included. It looks like the MSR

group earned 9.6% on equity and 11.1% on capital in 2021 (return on capital is higher because I have more cash than debt assigned to the group). Regardless, even when adding $10.6 billion written down for PCC in 2021 back to equity, return on equity would adjust to a respectable 8.8%. That's a wholly-unleveraged 8.8%. There are gads of private equity shops that would love to get their paws on an unleveraged 8.8%'er. Imaging what can be done with double or triple leverage? Better yet, what would a company like Transdigm do with some of these assets!

Berkshire's Manufacturing, Service, Retail and Finance Group 2003 - 2021

Assets	2021E	2020	2019	2018	2017	2016	2015	2014	2013	2012	2011	2010	2009	2008	2007	2006	2005	2004	2003
Cash and Equivalents	$26,830	$27,830	$19,547	$18,313	$13,519	$8,073	$6,807	$5,765	$6,625	$5,338	$4,241	$2,673	$3,018	$2,497	$2,080	$1,543	$1,004	$899	$1,250
Accounts and Notes Receivable	$36,631	$32,681	$33,711	$32,332	$28,881	$11,183	$8,886	$8,264	$7,749	$7,382	$6,584	$5,396	$5,066	$5,047	$4,488	$3,793	$3,287	$3,074	$2,796
Inventory	$20,191	$19,208	$19,852	$19,069	$17,366	$15,727	$11,916	$10,236	$9,945	$9,675	$8,975	$7,101	$6,147	$7,500	$5,793	$5,257	$4,143	$3,842	$3,656
Other current assets	?	?	?	?	?	$1,039	$970	$1,117	$716	$734	$631	$550	$625	$752	$470	$363	$342	$254	$262
Total current assets	$83,652	$79,719	$73,110	$69,714	$59,766	$36,022	$28,579	$25,382	$25,035	$23,129	$20,431	$15,720	$14,856	$15,796	$12,831	$10,956	$8,776	$8,069	$7,964
Goodwill and other intangibles	$59,067	$61,358	$72,219	$70,611	$71,503	$71,473	$30,289	$28,107	$25,617	$26,017	$24,755	$16,976	$16,499	$16,515	$14,201	$13,314	$9,260	$8,362	$8,351
Fixed assets	$20,722	$21,200	$21,438	$20,628	$19,868	$18,915	$15,161	$13,806	$19,389	$18,871	$17,866	$15,421	$15,374	$16,338	$9,605	$8,934	$7,148	$6,161	$5,898
Other assets	$11,182	$8,360	$8,215	$9,307	$9,391	$3,183	$4,445	$3,793	$4,274	$3,416	$3,661	$3,029	$2,070	$1,248	$1,685	$1,168	$1,021	$1,044	$1,054
Total assets	$174,623	$170,637	$174,982	$170,260	$160,528	$129,593	$78,474	$71,088	$74,315	$71,433	$66,713	$51,146	$48,799	$49,897	$38,322	$34,372	$26,205	$23,636	$23,267
Liabilities and Equity																			
Notes payable	$297	$1,062	$1,472	$1,857	$1,832	$2,054	$2,135	$965	$1,615	$1,454	$1,611	$1,805	$1,842	$2,212	$1,278	$1,468	$1,469	$1,143	$1,593
Other current liabilities	$31,154	$29,279	$27,611	$31,314	$26,545	$12,464	$10,565	$9,734	$8,965	$8,527	$15,124	$8,169	$7,414	$8,087	$7,652	$6,635	$5,371	$4,685	$4,300
Total current liabilities	$31,451	$30,341	$29,083	$33,171	$28,377	$14,518	$12,700	$10,699	$10,580	$9,981	$16,735	$9,974	$9,256	$10,299	$8,930	$8,103	$6,840	$5,828	$5,893
Deferred taxes (net)	$10,432	$9,900	$12,325	$10,100	$9,550	$12,044	$3,649	$3,801	$5,184	$4,907	$4,661	$3,001	$2,834	$2,786	$828	$540	$338	$248	$105
Term debt and other liabilities	$17,569	$17,795	$16,215	$16,247	$19,810	$10,943	$4,767	$4,269	$4,405	$5,826	$6,214	$6,621	$6,240	$6,033	$3,079	$3,014	$2,188	$1,965	$1,890
Total liabilities	$59,452	$58,036	$57,623	$59,518	$57,737	$37,505	$21,116	$18,769	$20,169	$20,714	$27,610	$19,596	$18,330	$19,118	$12,837	$11,657	$9,366	$8,041	$7,888
Non-controlling interests	$921	$635	$607	$572	$570	$579	$521	$492	$456	$2,062	$2,410	$0	$0	$0	$0	$0	$0	$0	$0
Berkshire equity	$114,250	$111,966	$116,752	$110,170	$102,221	$91,509	$56,837	$51,827	$53,690	$48,657	$36,693	$31,550	$30,469	$30,779	$25,485	$22,715	$16,839	$15,595	$15,379
Income Statement																			
Revenues	$151,629	$134,097	$142,675	$148,809	$126,533	$120,059	$107,825	$97,689	$95,291	$83,255	$72,406	$66,610	$61,665	$66,099	$59,100	$52,660	$46,896	$44,142	$32,106
Operating expenses	$136,380	$122,410	$129,332	$128,501	$117,026	$111,383	$100,607	$90,788	$88,414	$76,978	$67,239	$62,225	$59,509	$61,937	$55,026	$49,002	$44,190	$41,604	$29,885
Net interest expense	$630	$798	$416	$265	$264	$214	$103	$109	$135	$146	$130	$111	$98	$139	$127	$132	$83	$57	$64
Pre-tax income	$14,449	$10,889	$12,365	$12,308	$9,243	$8,462	$7,115	$6,792	$6,742	$6,131	$5,037	$4,274	$2,058	$4,023	$3,947	$3,526	$2,623	$2,481	$2,157
Non-Controlling Interest	$117	$63	$64	$64	$61	$53	$65	$64	$57	$249	$310	$0	$0	$0	$0	$0	$0	$0	$0
Income taxes	$3,323	$2,526	$2,929	$2,880	$2,974	$2,778	$2,367	$2,260	$2,455	$2,183	$1,688	$1,812	$945	$1,740	$1,594	$1,395	$977	$941	$813
Net Income	$11,009	$8,300	$9,372	$9,364	$6,208	$5,631	$4,683	$4,468	$4,230	$3,699	$3,039	$2,462	$1,113	$2,283	$2,353	$2,131	$1,646	$1,540	$1,344
Income Tax Rate	23.0%	23.2%	23.7%	23.4%	32.2%	32.8%	33.3%	33.3%	36.4%	35.6%	33.5%	42.4%	45.9%	43.3%	40.4%	39.6%	37.2%	37.9%	37.7%
Profit Margin	7.26%	6.19%	6.57%	6.29%	4.91%	4.69%	4.34%	4.57%	4.44%	4.44%	4.20%	3.70%	1.80%	3.45%	3.98%	4.05%	3.51%	3.49%	4.19%
Return on Equity	**9.64%**	**7.41%**	**8.03%**	**8.50%**	**6.07%**	**6.15%**	**8.24%**	**8.62%**	**7.88%**	**7.60%**	**8.28%**	**7.80%**	**3.65%**	**7.42%**	**9.23%**	**9.38%**	**9.77%**	**9.87%**	**8.74%**
Return on Equity (w/ $10.6B PCP W/D Added Back)	8.82%	6.77%																	
Return on Tangible Equity	19.95%	16.40%	21.05%	23.67%	20.21%	28.10%	17.64%	18.84%	15.07%	16.34%	25.45%	16.89%	7.97%	16.01%	20.85%	22.67%	21.72%	21.29%	19.12%
Return on Capital	11.09%	8.93%	8.63%	8.91%	5.96%	6.19%	8.73%	9.09%	8.48%	7.82%	8.19%	7.25%	3.59%	7.06%	9.36%	9.36%	9.59%	9.59%	8.79%

"We're gonna need a bigger boat." If this table makes an appearance in next year's letter, with one additional year, I'll turn it sideways on its own page… In any event, I'm embarrassed at my public criticism. Enough data existed to make reasonable assumptions as to assignment of key figures. Earlier attempts weren't far off, but lacking precision I lacked a filter and chose to criticize when none was warranted.

Many Berkshire followers conflate earnings power and balance sheet nuances, often double counting or under counting in places. Our analysis reconciles across methods. Measurement of earning power is preferred, primarily our GAAP adjusted financials and sum of the parts approaches. Both favored methods are joined at the hip, requiring adjustments to the published financial statements. The balance, simple book value per share and the classic two-pronged methods, are reconciling tools, and are also more impacted in the short term by swings in the publicly traded stock portfolio, more than 90% of which is held in Berkshire's overcapitalized insurance group.

Much of this section will be somewhat repetitive from earlier letters. Methodologies are unchanged but continue to be refined and each year. I'll highlight areas where assumptions may either conservative or not and allow the reader to judge or substitute freely. An understanding of the moving parts goes a long way to an understanding of the whole of Berkshire.

Net Income Basis

Net Income Basis – 2021 Year-End Estimated (*dollars in billions)*

	Pre-Tax Income	After-Tax Net Income
Operating Groups		
Berkshire Hathaway Energy	$4.0	$5.4
BNSF	7.9	6.7
Manufacturing, Service, Retail and Finance	14.4	11.0
Operating Group Subtotal	**26.3**	**23.1**
Insurance and Investment Income		
Insurance Underwriting Normalized Gain	3.5	2.7
Insurance Investment Income	21.6	20.2
Holding Company Net Income	2.5	2.2
SAI Pension Expense	-0.6	-0.4
Insurance and Investment Income Subtotal	**27.0**	**24.7**
Totals	**$53.3**	**$47.8**
Cash Tax Rate		**10.7%**

Source: Semper Augustus

Profit figures for Berkshire's primary operating groups are derived in concert with our sum of the parts analysis and the normalization of GAAP earnings approach utilized to remove certain aspects of volatility from reported results. One primary nuance not captured when deriving earning power is the degree to which a subsidiary or group is cyclically over or under earning. The Manufacturing, Service and Retail group, which now includes the former Finance and Financial products (leasing mostly) group, was hammered during much of the pandemic year. Much of retail closed entirely for a time. Supply chains suffered and non-essential manufacturing likewise slowed or stopped. In all, the pandemic took a toll on the group, with pre-tax income declining from $12.3 billion in 2019 to $10.9 billion, with after-tax profit declining 15% to $8.1 billion. Sale and restructuring of some underperforming subsidiaries combined with a robust recovery and operating efficiencies likely drove pre-tax and after-tax profits to record $14.4 and $11.0 billion, both 17% higher than in 2019. The group is fully recovered and operating at its most profitable level in years.

BNSF likewise was hammered in 2020, with volumes substantially lower. With loads of variable costs, profits only declined by 6%. The railroad shipped 9.5 million carloads in 2020, down 7.2% from 2019. Expect roughly 11.1 million for 2021, up 8.6% over the 10.2 million in 2019. The back half of 2021 was no doubt weakened by supply chain issues, particularly at the ports but systemwide. BNSF is likely to report a record GAAP profit of $6 billion for 2021, 16% above 2020 but fully 9.5% higher than in 2019. We adjust net profit higher by $700 million to reflect the degree to which cash profits benefit from the use of accelerated depreciation on capital spending. Much capital improvement took place from 2009, when Berkshire bought the railroad, through 2016. Recently the degree to which capital spending outpaces depreciation charges is slowing, necessitating a reduction in the ongoing benefit. Our figure may be too high by perhaps $200 million at present. Next year's adjustment and forecast is likely to be lower.

Berkshire Hathaway Energy is thriving. Already discussed was the enormous capital opportunity in the utility and energy businesses. Retaining capital instead of paying dividends to Omaha and having a bounty of greenfield and expansionary projects producing attractive, regulated returns is a major source of value creation. Much of BHE's spending on capital projects are tax incentivized, and there is no better group of businesses to seize the opportunity to expand. Tax credits for wind and solar provide so much benefit to have driven the tax rate downward to where it is laughably deeply negative. Throw in the use of accelerated depreciation for tax purposes, rewarding the spending of capital to the benefit of society, that

further drives the cash tax rate well below the GAAP-reported tax rate. The deferred-tax liability balance for PP&E exceeds $13 billion at BHE and $30 billion for all of Berkshire. Both will march higher in the years to come. An updated reconciliation between cash taxes and GAAP taxes is again included in the appendix.

One thing to watch closely at BHE is a coming phase-out of production tax credits for spending on newbuilt wind energy. Presently wind projects started in 2021 qualify for production credits at 60% of the full rate on electrical output for ten years. I don't know if the current credit will be extended, though it has been extended twelve times since 1992. An investment tax credit is set to phase out at the end of 2023. The preponderance of growth capital expenditures at BHE have been on wind at MidAmerican and PacifiCorp, leaders in wind in their respective geographies. We'll see the degree to which BH Energy can add wind capacity. Solar tax credits are set to run longer, so expect to see more spending here over the years. For the time being, the capability of spending enormous sums on renewables and the building of the grid is a huge competitive advantage for the group. BH Energy should be Berkshire's second most valuable group next to insurance within the decade.

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Other Methods for Valuing Berkshire

Below is a summary table for our valuation of Berkshire. Prior year estimates remain as presented with no adjustments for actual year-end profit or balance sheet reconciliation from Semper estimates to actual reported results. More detailed data can be found in the Appendix.

2017 Intrinsic Value by Market Cap and Per Share

	Market Capitalization	Price Per A Share	Price Per B Share
Sum of the Parts Basis	$630 billion	$383,049	$255
GAAP Adjusted Financials	595 billion	361,768	241
Simple Price to GAAP Book Value	609 billion	370,247	247
Two-Pronged Approach (Ours)	610 billion	370,895	247
Simple Average	$611 billion	$371,463	$248

2018 Intrinsic Value by Market Cap and Per Share

	Market Capitalization	Price Per A Share	Price Per B Share
Sum of the Parts Basis	$659 billion	$401,274	$268
GAAP Adjusted Financials	668 billion	406,754	271
Simple Price to GAAP Book Value	611 billion	372,046	248
Two-Pronged Approach (Ours)	672 billion	409,190	273
Simple Average	$653 billion	$397,316	$265

2019 Intrinsic Value by Market Cap and Per Share

	Market Capitalization	Price Per A Share	Price Per B Share
Sum of the Parts Basis	$715 billion	$438,188	$292
GAAP Adjusted Financials	754 billion	462,090	308
Simple Price to GAAP Book Value	764 billion	468,218	312
Two-Pronged Approach (Ours)	807 billion	494751	330
Simple Average	$760 billion	$465,767	$311

2020 Intrinsic Value by Market Cap and Per Share

	Market Capitalization	Price Per A Share	Price Per B Share
Sum of the Parts Basis	$746 billion	$486,871	$325
GAAP Adjusted Financials	801 billion	522,556	348
Simple Price to GAAP Book Value	779 billion	507,925	339
Two-Pronged Approach (Ours)	838 billion	547,179	365
Simple Average	$791 billion	$516,133	$344

2021 Intrinsic Value by Market Cap and Per Share

	Market Capitalization	Price Per A Share	Price Per B Share
Sum of the Parts Basis	$891 billion	$603,882	$403
GAAP Adjusted Financials	860 billion	582,872	389
Simple Price to GAAP Book Value	880 billion	596,253	398
Two-Pronged Approach (Ours)	949 billion	643,192	429
Simple Average	$898 billion	$606,550	$404

Source: Semper Augustus

A simple average of our four valuation methodologies values Berkshire at $898 billion, up $107 billion or 13.5% over the estimate a year ago. In dollar terms the prior year only saw a 4.1% gain. 2020's profits were depressed by $2.9 billion. No such discount exists today, with profit at a record and returns on equity at each subsidiary group as high as in years. Some methods are more conservative at times and less so at others. The Two-Pronged Approach, used intermittently by Berkshire and with changing methods since 2005 makes no judgment about the degree to which the stock portfolio is under or over-valued. It likewise makes no determination if operating earnings are likewise deviant from "normalized" levels. Use of a Simple Price to GAAP Book Value methodology will also lose efficacy over time as share repurchases made above book value will shrink book value per share proportionally more than book value itself. Also, many assets are fully depreciated or carried at values well below a conservative assessment of replacement cost.

Berkshire's A shares are intrinsically valued at $606,550 per share, 17.5% above last year's appraisal. Retiring 4.4% of shares outstanding (assuming an additional $8 billion repurchased in 2021's fourth quarter on top of the $20.2 acquired during the first nine months) drives per-share value growth in excess of dollar-value growth. Sending cash out the door reduces assets and equity by a like amount. Depending on the price paid for shares repurchased, the gain in per share value will grow more or less quickly. The cheaper the shares are acquired, the more intrinsic value per share is added. Overpay relative to intrinsic value and the share count declines but intrinsic value does so as well. Some repurchases made in the wake of the pandemic in 2020 were made below book value, which adds to book value and book value per share. Repurchases below book value are and will be rare for a company earning an unleveraged 10% or more on equity capital. When trading at low prices, whenever you are buying shares its always interesting to think about who is on the other side of the trade. I like to think that Semper purchases are made in competition to Berkshire's buys. Young investors should always consider who is selling what you are buying, and vice-versa, a useful mindset for pretty much every aspect of life.

Semper's methods of valuation are described *briefly* below. Past letters delve into more detail of each. In total, Berkshire trades at a considerable discount to intrinsic value. The A and B shares closed 2021 at $450,622 and $299.00 per share respectively. Using the average of methods, at $606,550 and $404 per share, Berkshire's shares trade at 75% of fair value, giving us 33% upside to fair value. Last year's discount was 67%, with the A shares gaining only 2.4% in 2020 despite intrinsic value growing much quicker. Assuming the shares ever again trade there, we'd expect to earn the annual return on equity, presently 10%, plus the accretion of 33% over some period of time.

Of the four methods for valuing Berkshire, the Sum of the Parts Basis and GAAP Adjusted Financials approach should be more heavily emphasized in today's environment. Some assumptions and adjustments made top-down in the GAAP Adjusted Method are likewise incorporated at the group level. When earnings are neither depressed or above normal profitability, the two approaches should yield similar results. Any valuation figures are not meant to imply precision. The methods are assumption based and modeled to yield a normalized, smoothed result such that when profits or investments bounce around with significant volatility, our figures will move with less deviation. As a simple example, an investment earning 7% made with cash earning nothing will have nearly zero impact on our profitability assessment. More in this below.

Sum of the Parts Basis

Sum of the Parts Valuation *(dollars in billions)*

Operating Groups	December 2018	December 2019	December 2020	December 2021
Berkshire Hathaway Energy	$50 - 57	$50 - 58	$62 - 72	$87 -92
BNSF	95 - 105	100 - 110	100 - 110	115 – 135
Manufacturing, Service and Retail *and now Finance*	140 – 150	170 – 180	170 – 180	200 – 210
Finance and Financial Products	30 - 33	To Black Hole	Now in MSR	Now in MSR
Operating Group Subtotal	**$315 - 345**	**$320 - 348**	**$332 - 352**	**$402 - 437**
Insurance Underwriting Norm Capitalized Value	33	36	39	41
Operating Group Plus Insurance Underwriting	**$348 - 378**	**$356 - 384**	**$371 - 391**	**$443 - 478**
Investments				
Insurance Investments	241	330	372	453
Insurance Investments Valuation Premium/Discount	34	-19	-39	-50
Holding Company Investments (Net of debt)	21	34	32	28
Investments (Insurance and HoldCo) Total *	**$296**	**$345**	**$365**	**$431**
TOTAL VALUATION	**$644 - 674**	**$701 - 729**	**$736 - 756**	**$874 - 909**

*Excludes Investments and Cash in Operating Groups
Source: Semper Augustus

Valuing Berkshire through a sum of the parts assessment is the best approach to understanding the company. Four primary operating groups – Berkshire Hathaway Energy, BNSF, a collection of businesses under a Manufacturing, Service, Retail and Finance umbrella, and the greatest collection of property/casualty insurance and reinsurance companies in the world – are each among the largest businesses in the world on a standalone basis. Berkshire's holding company also owns a collection of investments and liabilities not specifically assigned or owned by the subsidiaries.

Profits at the railroad and most MSR businesses are sent to Omaha for reinvestment elsewhere. Some of these businesses have slight opportunities to reinvest incremental capital. However, if good returns on equity capital can be maintained, even with no or little growth, these businesses serve their purpose of creating free cash above Berkshire's cost of capital. The energy businesses are growing in value, retaining all profits since Berkshire bought MidAmerican Energy in 1999. Retained earnings are matched with traditional gearing, growing Berkshire's far faster than most in the creation and distribution of power.

Berkshire Hathaway Energy

Berkshire Hathaway Energy is a collection of three Western U.S. regulated electric utilities and distribution assets throughout the U.S. as well as Alberta and Great Britain. The regulated utilities, MidAmerican Energy, Nevada Energy and PaciCorp (Pacific Power and Rocky Mountain Power) serve customers in Iowa, Nevada, Oregon, Washington, Northern California, Utah, Wyoming, and Idaho, with growing renewable energy production assets in a growing roster of additional states. The territories served by Berkshire grow faster than the overall U.S. population. The group produces more than 34,000 megawatts of power per year providing energy substantially below the U.S. national average cost and far cheaper in markets with direct competition. Distribution assets include more than 21,000 miles of natural gas pipelines transporting 15% of natural gas consumed in the U.S. An ongoing $18 billion investment is modernizing and building electrical grid capacity in the Western U.S. and Canada.

Half of BHE's owned and contracted generating capacity comes from renewables, a figure that will grow materially higher. Cumulative renewables investments total over $35 billion to date. Wind and solar production assets are built in geographically disparate locations where much of the grid does not exist.

The energy group likely earned $4 billion in pre-tax income (excluding gains in BYD) in 202 and $4.7 billion after taxes and non-controlled interest. The larger net figure is not a typo. BHE's tax rate will run

negative 30% this year, earning sizable production and investment tax credits which help Berkshire in whole. Use of accelerated depreciation also drives the current tax rate downwards. Since the acquisition of MidAmerican in 1999, Berkshire's growing roster of energy businesses have *never* sent a dime of profit to Omaha, instead retaining all profit to grow the asset base. For the last 17 years, BHE spent an estimated $76 billion in capital expenditures against only $33 in depreciation charges. Capex at BHE will total nearly $7 billion and will likely rise to $10 billion annually by 2023. A table breaking down annual and cumulative capex and depreciation for BHE, BNSF and the whole of Berkshire is in the appendix. Where Berkshire's energy operation retains all profit and adds a like amount of debt to finance growth, competitors send 75% of profits, on average, to shareholders as dividends. To the extent competitors want to grow, they must find new capital to replace funds sent out the door. The difference is a huge competitive advantage in Berkshire's favor.

Berkshire Hathaway Energy (91.1% owned)	
Revenues Total	$25.7 B
Energy Operating Revenue	$19.2 B
Real Estate Operating Revenue	$6.5 B
Pre-tax Income (excludes gain/loss BYD and invest.)	$4.0 B
Net Income (GAAP, net of non-controlled interest)	$4.7 B
Net Income (adjusted for cash taxes)	$5.4 B
Reported Tax Rate (derived MD&A-not cash adjusted)	-30.0%
Cash Tax Rate (deferred taxes exceed reported tax)	-47.0%
Goodwill (From BHE 10Q, 10K, AltaLink &NPG Interin	$11.6 B
Deferred Tax Liability (Including $1.7B for investments)	$13.2B
Depreciatioin and Amortization	$3.8B
Capital Expenditures (Mgt. Estimate)	$6.8 B
BYD and Other NDC Trust Stocks; BYD $6.868B)	$7.7 B
Equity (including BYD, NDCs, Rabbi and Non-Control))	$50.6 B
Equity Net of Non-Controlling Interests	$46.1 B
Equity (excluding $6.2 B investments net of DTL)	$44.4 B
Berkshire Equity After NCI and Net of BYD/Investments	$39.5 B
Total Assets (including BYD and Investments)	$132 B
Debt	$52.1 B
Cash	$2.9 B
Interest	$2.1 B
After-Tax Interest	$1.7 B
ROE GAAP w/ % DTL (includes $9.7 billion goodwill)	11.9%
ROE (adjusted for cash taxes)	13.7%
ROC Net of Cash	8.5%
Estimated Value (Net of Non-Controlling Interest)	$81-86 B
Estimated Value With BYD Net of Tax and NCI	**$87-92 B**
Implied P/E	15-16

BHE has $40 billion in equity capital (excluding non-controlling interests and big investment in BYD), which will more than double in size over the next decade. Total assets of more than $132 billion are more than 13% of Berkshire total assets. It should surpass the railroad in value to Berkshire within the next five years, perhaps, and using a conservative valuation may pass the passive investment in Apple in size, even assuming no further sales of Apple shares. Either side of that bet would be a good one.

Coal is materially deemphasized, putting BHE far ahead of the curve in the transition of the grid to renewables. The three regulated utilities closed 16 coal-fired plants from 2006 to 2020, will close another 16 by 2030 and phase out its final 14 by 2050. 22 of the remaining coal units are owned by PacifiCorp. Our infrastructure growth, here and abroad, cannot be fueled exclusively with alternatives, making Berkshire's energy assets in the U.S., Canada and the U.K. increasingly valuable in a world inclined to not make large investments in "dirty" assets. Underinvestment alongside a growing population will make evident the attractiveness of this terrific group. You should expect to see the utility and energy businesses grow and grow in importance to Berkshire's shareholders. While far from "sexy" assets, the collection will generate very good returns in a world of low interest rates for years to come.

An oddity of Berkshire's structure is within which subsidiaries various investments are made. Two such creatures exist within BHE. In addition to the energy operation, MidAmerican energy houses what is now the country's largest residential real estate brokerage firm and equally large brokerage franchisee networks. Home Services of America is rolling up many of the nation's major metro market high-end residential brokerages. Some are formally rebranded as Berkshire Hathaway Home Services while others retain their original branding. Huge by revenues but skinny by margin, the real estate business will do $6.5 billion in revenues (25% of BHE total) on more than $150 billion in sales volume and probably $400 million in net profit, a margin of less than 1% of revenue. It's a capital-lite business with huge volumes and top-line revenues. Rising interest rates during the second half of last year and into the first weeks here in 2022 will slow mortgage refinance activity and volume, and thus profits. Still, the brokerage will have had another record year in 2021.

Those believing technology will disrupt the traditional brokerage business and drive commissions downward like discount brokers have with retail stock trading, I wouldn't hold your breath. I was in that camp, buying and selling a house with no agent years ago. What a fool. I now have a front row seat watching how much work goes into selling a home. The DIY approach leaves money on the table and causes countless headaches. Top agents invest in marketing, do their own staging and coordinate with contractors, inspectors and title companies. They also manage what has become an enormous regulatory burden. Transacting in residential real estate is far from buying or selling a stock on Robinhood. Myriad carving of the overall commission means long, hard hours. Good agents, like good professionals in any field, are worth their weight in gold. People spend more time car shopping than finding a great real estate agent. If you are selling a nice home, I highly recommend not doing it alone. How welcome do you think the appraiser or inspector is having the homeowner in tow? It's what the good agents do.

BHE's other oddball investment is a $232 million investment in the Chinese electric vehicles and battery manufacturer, which soared to $6.9 billion at yearend. Next to BHE's total assets of $132 billion and equity of $50.6 billion. The analyst must set aside the BYD position from the utility and energy operations. Investments in common stocks are certainly not assets included in the utility rate base! The $6.9 billion BYD position ($6 billion as I write this) is carried net of $1.2 billion in deferred taxes at $4.6 billion (now). That's 9% of BHE's total equity.

Mentioning BYD leads to a situation likely resolved within the next few months, or sooner. The Berkshire family sadly lost a giant of a man with the passing of Walter Scott in September. Mr. Scott spent a career at Peter Kiewit Sons, rising to Chairman and CEO upon Peter Kiewit's death in 1979, where he served until 1998. He joined Berkshire's board in 1988 and owned 7.9% of BHE at his death. A philanthropist throughout his life, most of his estate will be left to the Suzanne and Walter Scott Foundation. It is highly likely Berkshire will purchase either the estate or benefitting foundation's share of BHE, which will have a tax-basis step up. It won't be a small check, with BHE valued at perhaps $90 billion, *including* the BYD position. We'll see if Berkshire has an appetite to part with all or part of BYD, with Mr. Munger likely to have recently sold his position at a sizable gain.

A purchase of Mr. Scott's position in BHE will leave 1% in the hands of Greg Abel. With Greg now "kicked upstairs" to Vice Chairman of Berkshire overseeing all non-insurance operations and having handed the CEO torch at BHE to Bill Fehrman (though still Chairman of BHE), it would be great to see Berkshire buy the next Berkshire CEO's 1% piece and own 100% of BHE prospectively. A swap of the position, perhaps in some tax-friendly fashion, would flip most of the Greg's interest from BHE to Berkshire. Leave it to Berkshire to do something intelligent here this year.

Net of the investment in BYD we value BHE between 15- and 16-times earnings. Debt cost of capital is 4.1% pretax. Utilities in recent years are typically valued at higher multiples and lack the opportunity set BHE possesses to reinvest profit. On a GAAP basis the business, ex gains in BYD, earned 11.9% on equity, including goodwill, and 8.5% on capital. Given the predictability of return and for the time being seemingly unlimited ability to absorb growth capital expenditures, the valuation may be quite conservative.

BNSF

Berkshire acquired the 77.5% of BNSF it didn't already own in 2009, having figured out that the economics of railroading had changed for the better following decades of subpar profitability. Cascade had come to the same conclusion, as had the folks at Allegheny, with their long history in the rails. The deal closed and cost Berkshire $34.5 billion, for which it paid $15.9 billion cash, $10.6 billion in Berkshire shares trading for 1.3 times book value and assumed $8 billion debt. The equity piece of the purchase was $34 billion, which was marked up to reflect a $1.1 billion on the original $6.6 billion

investment that was worth $7.7 billion at the valuation of the deal. Berkshire "really" paid $33 billion. The acquisition added $15 billion in goodwill to the BNSF balance sheet. Regardless, since BNSF joined Berkshire in February 2010, *all* profits earned by the railroad were and are sent to Omaha. The rail retained no profit for more than a decade, and our valuation of the business is in a range of $115 to $135 billion. With 32,500 route miles of track in 28 western states, the railroad is closely comparable in size to Union Pacific, which closed 2021 with a $161 billion market cap on nearly matching revenues and profit. It's never a good idea to look to market comps, as often the market is wrong, sometimes wildly so. Many had gotten to thinking 40 times earnings was conservative in the late 1990s, including some insurance analysts. Still, with equity of $44.5 billion, only $9 billion higher than at year-end 2010, the rail earns 13.5% on equity, 15% with our tax adjustment, and 11.4% on capital.

BNSF is likely to report $6 billion in GAAP income on $22.5 billion in revenues for 2021. Like BHE, a portion of capital expenditures at the railroad benefit from use of accelerated depreciation, creating a large deferred-tax liability (guessing $14.9 billion now). On a cash tax basis, BNSF earns closer to $6.7 billion. As stated earlier, the degree to which capex exceeds depreciation is coming down. You can't add track miles to a mature network, and much of the improvements to do things like add additional track in high-traffic corridors and expand tunnels to accommodate intermodal's double stacking of containers has run its course. We'll see where this heads prospectively. From 2010 to mid-2016 capex ran double depreciation. The rate came down to where the rail will spend only $500 million north of $2.4 billion depreciation expense in 2021. Cumulative capex of $43 billion was $20 billion more than depreciation, nearly double.

BNSF	
Revenues	$22.5 B
EBIT	$8.1 B
Pre-tax Income	$7.9 B
Net Income (norm tax rate now 24.0%)	$6.0 B
Net Income (cash tax adjusted)	$6.7 B
Goodwill (BNSF SEC and STB filings)	$14.8 B
Equity (estimated from STB and GAAP filings)	$44.5 B
Total Assets	$90 B
Debt (ex-lease)	$23.3 B
Cash	$2.1 B
Interest	1.03 B
After-Tax Interest	$0.82 B
Deferred Tax Liability	$14.9 B
Equities as an Investment (None now)	n/a
Depreciation and Amortization	$2.4 B
Capital Expenditures	$3.0 B
ROE GAAP Net Income	13.5%
ROE Adjusted for Cash Taxes	15.0%
ROC Net of Cash	11.4%
Estimated Value	**$115-135 B**
Implied P/E (on net adjusted for cash taxes)	17-20

The railroad was back to chugging full speed ahead in 2021, having derailed in 2020 and following a weak 2019. The rail operates with a high degree of variable expenses. Fuel, equipment rentals and materials fluctuate with volume. Labor is more fixed, but during years like 2020 payrolls shrank and some workers took early retirement. Compensation and benefits, still the single largest expense line items in most years, is a lower percentage of revenues in the low 20s now that it was years ago – productivity! Prospectively, any lack of labor availability could be a headwind as supply chain bottlenecks invariably loosen at the ports.

Operating revenues across all mixes of freight shipped were strong not only against 2020's downturn but against 2019 as well. Consumer, industrial and agricultural products all saw strong volumes and price gains. Coal had been in decline for years but boomed in 2021. Operating revenues grew 33% in the third quarter and 19% for the nine months through September. Revenues per car/unit rose, with increased electricity demand, higher natural gas prices and export demand way up. Seems Europe may regret the degree to which it raced to close coal and nuclear-fired capacity. For some, burning coal when wind and solar capacity are insufficient is a superior alternative to freezing to death. I did note for some.

Coal will no doubt phase out in the U.S. and Europe, but perhaps more slowly than those racing to net-zero carbon believe we can get there. It's a product category that will weaken which BNSF will have to replace or lose that portion of volume over time. BNSF further benefits from a lack of new pipeline construction. Shipping oil by rail is far less efficient than by pipeline. Thank goodness the rail network in place is already in place.

Despite perhaps fewer avenues for growth capex at BNSF, modernization in network and assets continues, and like the energy businesses, the rail benefits from its location in the faster growing west. Trade with Asia, depressed for several years, finally picked up. The industry was a *huge* beneficiary of the TCJA tax code change at the end of 2017 on myriad fronts.

BNSF is naturally hostage to economic growth but has also been late to adopt logistical efficiencies that its peers already implemented or are in the process of doing so. Specifically, all the major Class 1 rails except BNSF adopted "Precision Scheduled Railroading" which in a nutshell runs trains on a fixed schedule between points on the network, regardless of number of cars, or units. It essentially replaces a hub and spoke method of delivering freight. Observing operating ratio improvement at the competition will likely compel BNSF to adopt PSR despite the growing pains that would come with any major logistical change. It's likely a more difficult logistical tool to implement in a more geographically distributed footprint, but cost and efficiency benefits are likely to compel adoption.

Manufacturing, Service, Retailing and Finance

2021 was a great year for Berkshire's collection of businesses in its Manufacturing, Service, Retailing and Finance group. I believe great strides were taken over the last several years focused on operating efficiencies among this eclectic assortment of businesses. The group will see revenues 13% above 2020 but also 6.3% higher than reported in 2019. 3% annual growth may not seem like much, but many businesses here are mature and see not much more than modest price and volume increases over time. Some are in decline. That said, a focus on cost and operational execution will see group profits at a record $11 billion versus $9.4 billion in 2019. 2020 finished with only $8.3 billion in net income, which we wrote last year was likely $2 billion depressed. The recovery seen this past year was more than simple mean reversion but execution. Pre-tax profits of $14.4 billion will be 33% higher than 2020 and *17% above 2019*.

MSR Businesses + Finance & Financial Products	
Revenues	$151.6 B
Pre-tax Income	$14.4 B
Net Income at 23.4% assumed tax rate	$11.0 B
Profit margin	7.3%
Goodwill (net of 2020 PCP $10B write-down)	$31.9 B
Other Intangibles (net of 2020 PCP $600m write-down)	$27.2 B
Total Assets (Identifiable + Intangibles)	$196.3 B
Equity (Write-down 10.0 and 0.6 PCC 2020)	$113.6 B
DTL (Unallocated estimate)	$10.4 B
Depreciation of Tangible Assets	$3.5 B
Capital Expenditures	$3.9 B
Total Debt (allocated interest expense Ins & Other & Una	$17.9 B
Cash (Offset to Debt; Balance to HoldCo)	$28.8
Interest	$0.8 B
After-Tax Interest	$0.630 B
ROE (If equity 10.6B higher for PCP writedown: 8.8%)	9.6%
ROTE (excluding goodwill & other intangibles)	20.0%
ROC Net of Cash	11.1%
Estimated Value	**$200-210 B**
Implied P/E	18-19

Given a higher confidence that group equity is now $114 billion, return on equity at 9.6% will be higher than any year since 2005. Before doing cartwheels, know that equity was written down by $10.6 billion in 2020, so adding the charge back to equity reduces the return to a still healthy unleveraged 8.8%, higher than any year since 2007. Hold the cartwheels another moment and recall 2017's tax code change with lowered the corporate federal tax rate from 35% to 21%, an immediate 21.5% boost to the bottom line, presuming an increased level of profitability is durable and not subject to being competed away. Among more industries than I would have imagined the benefit seems to have largely stuck. OK. Fully adjusting backward for the write-down and tax benefit, group return on equity falls to 7.3%. I'll take this in light of balance sheet strength. It appears, presuming I've finally got this financial statement sorted out, the group is operating with net cash of nearly $9 billion, making the group's return on capital 11.1% as stated and roughly 9% even at the punitive higher tax rate. These are the highest returns we've seen in a long time and if margins and returns stick, there genuinely exists no weak links in the Berkshire empire. Sure, there are some individual components needing attention, closure or delivery to private equity, but there appears to be some good blocking and tackling going on. I'm quite certain Greg Abel has a hand in this.

Precision Castparts remains on a ventilator. The existence of vital signs is dependent on a recovery in commercial aircraft manufacturing. The turbine business was already on life support when Berkshire bought precision, but none would have predicted the pandemic and its impact on the airline industry. The present situation was compounded by a too-high price paid in the deal, already acknowledged. The write down is something seldom seen at Berkshire across the entire 57-year history with present management in charge. If Berkshire were the typical U.S. company, it would write down $7 billion per year on average at today's level of profitability, assets, and equity. That's 15% of profit *every* year. I have yet to see the CEO who says our return on equity would be a lot lower if you analysts would add back our cumulative write downs and write-offs over time.

Within the balance of the industrial products group after PCC, Marmon and IMC were on a tear, with revenues and profits up more than 30% and 20% respectively. Lubrizol had some bad breaks, suffering significant losses related to a fire at one of its subsidiaries, Chemtool, located in Rockton, Illinois.

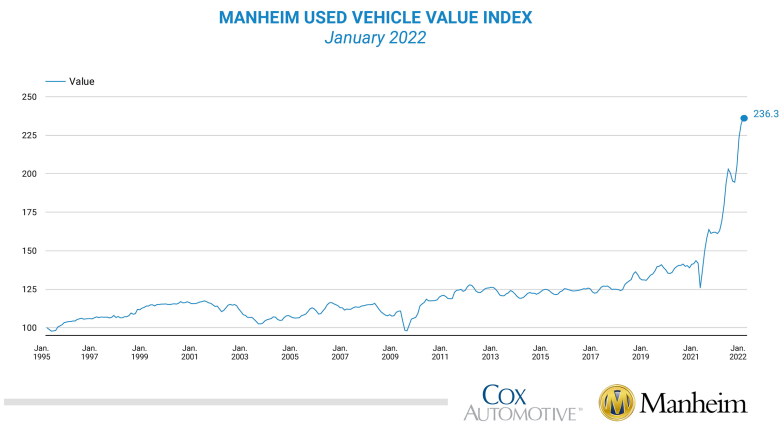
Clayton Homes continues as the star of not only the building products group, not only the MSR group but among all of Berkshire. The builder of manufactured and site-built homes has grown north of 20% for years. Unit sales of site-built homes grew 23% through the third quarter, though factory-built homes only grew 5%. Supply chain issues hobbled all facets of Clayton during the third quarter, so the fourth quarter will likely be ugly as well. Until things slowed in the latter part of the year, Clayton was on track to do more than $10 billion in sales and earn probably $1.5 billion in net profit. Berkshire paid $1.7 billion cash for Clayton in 2003, which had $1.2 billion in revenues at the time. Let's just say Berkshire paid roughly one times current after-tax earnings. Clayton benefits enormously by being part of Berkshire, who provides the financing for much of Clayton's mortgage business. A pivot to building site-built homes in booming markets has so far proven brilliant.

None of the businesses in the building products group were spared by supply chain problems. Delay for materials and inputs such as steel, lumber, energy, petrochemical-based materials, freight, and labor all hampered volumes. The businesses are raising prices accordingly.

Within the smaller and all improved consumer products manufacturing group, Forest River's business just exploded over the past two years, in a good way. Sales of their RVs were up 38% in 2021's first nine months, following a strong 2020. Surely demand will soften once air travel and life return to normal, though normal may be nothing like normal prior to 2020. When you see me motoring down the interstate not in a Jeep or SUV but an RV, you will know that's the top. In the meantime, what a ride.

The service business group was somewhat weak during 2020. Sales fell 4% while profits were flat. Not only were all subsidiaries recovered in 2021 but group revenues will rise by a third with profits likely doubling for the year. These are explosively higher levels of revenue and profit than seen in 2019, led by electronics distributor TTI, benefiting from sales volumes and by enormous operating leverage. Systemic supply chain problems are good for some.

Berkshire Hathaway Automotive is the largest business in the retailing group with over 80 auto dealerships. You may have read about used car prices in places selling for more than original sale price. A shortage of new vehicles due to, again, supply chain problems, obtaining necessary components like semiconductors, created a boom for used cars. A picture tells a thousand words. If there was ever a time to sell your old car and ride a bike for a few months…



New vehicle sales declined substantially in the second half of the year. Total BHA group revenues were up 24% for the first nine months of 2021 but only 8% in the third quarter.

The remainder of retailers were likewise dramatically better off in 2021. Recall, mall-based retailers such as Berkshire's jewelry stores closed for much of the year. Furniture remained strong given strength in housing activity, both new-build and current homes. 2020 was a good year with 2021 being a great year for the furniture group.

Insurance

Fifty-five years of successful underwriting and investing later and there exists no insurance operation on the planet like Berkshire's. There isn't a close second. Berkshire's collection of insurers underwrite property/casualty insurance and reinsurance through three groups, combined the highest rated insurance operation in the world. GEICO underwrites directly marketed private passenger auto insurance is the second largest auto underwriter in the U.S. with 13.6% market share. The Berkshire Hathaway Primary Group includes an assortment of commercial insurers writing medical malpractice, workers' compensation, auto, general liability, and several property and specialty coverages for businesses of all sizes. The Berkshire Hathaway Reinsurance Group writes excess-of-loss and quota-share coverages through National Indemnity since 1967 and General Reinsurance since 1998. The reinsurance group also underwrites life and health reinsurance coverages. The reinsurance group is the fourth largest reinsurance operation in the world by premiums written but by far the largest by surplus, or book value.

GEICO

The private passenger auto insurance industry experienced the most unusual two-year period. The pandemic took cars off the road for a year. Fewer drivers mean fewer accidents, so claims frequencies were far below historical and thus actuarially assumed levels. Offsetting fewer claims was an increase in severities. Fewer cars on the roads, and the perception of fewer ticket-writing police, encouraged speeding and reckless driving, hence more expensive claims paid to fix cars and people. With a welcome surprise of far lower frequencies of claims, GEICO initiated a "giveback" program of crediting policyholders with discounts on renewals. Some insurers simply cut checks as refunds to policyholders. Auto insurance is written on an admitted basis, whereby underwriters file rate applications with each state insurance commission for approval. Regulators were not going to let the industry reap a huge one-time economic benefit at the expense of drivers on the roads for fewer miles than presumed.

Refunds and credits drove reported written and earned premiums downward for the duration they were in place, reducing premiums by $2.9 billion. In GEICO's case the givebacks ran through a portion of the fourth quarter in 2020. Once clear of the givebacks, premiums earned rose 18% over 2020 through 2021. Underwriting results were satisfactory at a 95.8% combined ratio (losses and underwriting expenses combined as a percentage of premiums earned – essentially a profit margin). Not unexpectedly, claims frequencies rose in tandem, but by the third quarter severities rose substantially again. Property damage coverage severities rose 4-5%, collision coverage 13-14% and bodily injury 10-12%. Competitors likewise saw a deterioration in margins due to the same factors. Presuming the fourth quarter follows with high severities, look for rate increases in many markets by early this year. Inflation is a real thing in auto repair and medical expenses. Both are rising very quickly.

GEICO had lost ground in both the rate of market share capture and in profitability for several years against Progressive. Both companies are neck-and-neck at just under 14% market share. Both companies are likely to pass State Farm's 16.2% share in the next few years. GEICO operates largely with no agents or brokers involved in distribution. Paying a gecko is cheaper than paying commissions, thus GEICO's underwriting expenses are at a far lower portion of premiums earned than the competition. For this cost advantage, they tend to incur higher losses. Losses have been too high; thus, Berkshire shook management, placing Todd Combs temporarily in the CEO role, also retaining management responsibilities for the like portion of Berkshire's equity portfolio managed by Ted Weschler. Tony Nicely had run GEICO for 25 years before retiring in 2018.

BH Primary

Berkshire's Primary Group includes its long-held Homestate Companies, MedPro, GUARD, National Indemnity Primary, U.S. Liability, Central States Indemnity and MLMIC. The largest company in the mix is Berkshire Hathaway Specialty which Berkshire seeded on a de novo basis (started from the ground up) in 2013 with a management team hired away from AIG, specifically Lexington Insurance, AIG's excess and surplus division. It quickly became the largest company in the Primary group of commercial insurers. It's always worth keeping an eye on new insurers charging ahead in the capture of market share. Berkshire is famous for a willingness to walk away from underwriting when prices are inadequate. BH Primary saw written premium up 17% through September, with BH Specialty up 42% in professional liability, casualty and property lines. Strong underwriting profitability saw an erosion in the third quarter, the combined ratio moving slightly above 100.

Reinsurance

Berkshire insures and reinsures against a large and diverse number of loss events. Prior pandemics and epidemics, particularly the SARS outbreak in 2003, heightened the insurance industry's awareness of the risk posed by a widespread global outbreak. Business interruption coverage is often sold as part of a business owner's policy and covers damages to property or equipment. It is a *property* cover. SARS is/was a highly contagious and lethal coronavirus, much more so than COVID-19. The SARS outbreak spread to 29 countries and fortunately killed fewer than 1,000 people, none in the U.S. Despite being a property cover, policy language then often didn't specifically exclude pandemics, viruses and communicable diseases. Even if an outbreak does physically cause the closure of a place of business, a restaurant for example, loss claims are limited to loss of income and remediation over the short period of time to clean and disinfect the property. Subsequent to SARS, most of the industry specifically included exclusions with clarifying policy language.

When the degree of activity suspended by the pandemic became apparent, it became clear that insurers would be challenged legally, furthered by some public policy makers suggesting that even though business interruption is a property line that the industry should be responsible for its "fair share" of the

cost of business losses. It became apparent that even though the industry had learned their lesson with SARS and others, (MERS, H1N1/Swine Flu, Ebola, Zika and the bird flu) there were policies in force with loosely written or non-exclusionary policy language. Several European reinsurers writing in the Lloyd's market were at big risk of loss. Berkshire likewise had some exposures that would likely be challenged. In aggregate, given policy limits and Berkshire's extremely diversified book of insurance business, it was going to be in relatively better shape than most from the outset.

Industry losses developed (so far) far better than many expected in the teeth of the pandemic. Swiss Reinsurance, the largest reinsurance company in the world by net reinsurance premiums written suggested industry losses might approach $100 billion. It looks like COVID-19 will be half as expensive, but still the third largest catastrophe behind Hurricane Katrina and the 9/11 terrorist attacks on the U.S.

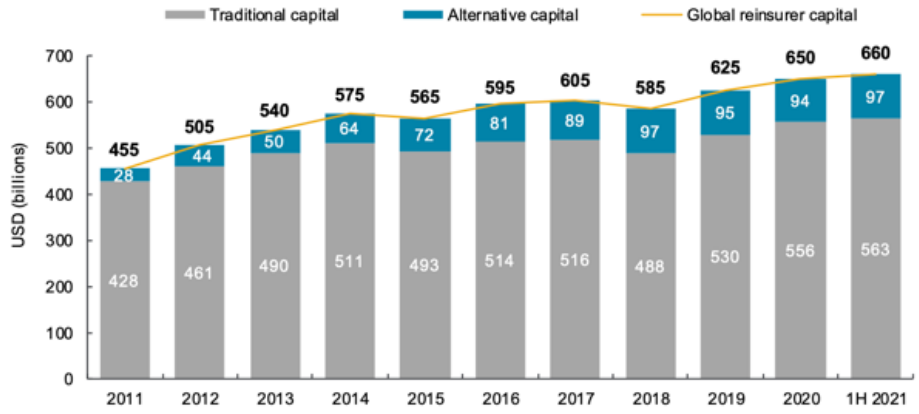
In response, rates materially hardened. Industry rates rose 18.5% through mid-year 2021. Berkshire's property/casualty's premiums earned rose 17.2% through September 30. Here in January global rates are up more than 10%.

Berkshire maintains a stronger capital base than any in the reinsurance industry and is massive in scale. Berkshire's combined statutory surplus (conservatively defined as equity or book value) against which it writes business dwarfs all players. Expect Berkshire's statutory surplus to total $272 billion at year-end 2021, up from $237 billion in 2020 and $219 billion in 2019. GEICO writes more premium volume than any of Berkshire's insurance companies, $40 billion in 2021, but requires by far the least amount of capital, no more than $15 billion. Private passenger auto insurers write on an admitted basis and can write $3 in premiums for every $1 in statutory surplus. GEICO *could* write current volume with only $13.3 billion in capital. They more likely assign $20 billion to GEICO, thus write two-to-one, leaving surplus capital.

BH Primary will earn just over $10 billion in premiums in 2021. This group of insurers requires more capital per dollar of business written than in auto, but with $10 billion in annual premiums requires less than 10% of Berkshire's combined insurance capital. Primary could write current volume with $10 billion in statutory surplus, but for conservatism's sake, assign it $20 billion, thus writing 50 cents of premium per dollar of capital.

The reinsurance operation at Berkshire, National Indemnity (including retroactive reinsurance and periodic payment annuity) and General Reinsurance, holds and requires most of the insurance capital. Berkshire Hathaway Reinsurance Group, as the combined entity is now known, will write close to $20 billion in premium volume in 2021 on surplus of more than $200 billion. By comparison, the entire global reinsurance industry has combined surplus of roughly $600 billion (closer to $700 billion when including alternative capital such as catastrophe bonds and insurance-linked securities). The industry will write roughly $300 billion in premiums. **Berkshire writes less than 7% of combined reinsurance industry premium volume but has more than one-third of industry equity capital.** If anybody wonders how Berkshire can have so much of its insurance companies' investments in common stocks instead of fixed-income securities, look no further.

Exhibit 1: Global Reinsurer Capital



Source: Aon / company reports

Berkshire's insurance operation can be valued differently than any insurer on the planet. By assigning $20 billion in surplus to GEICO and another $20 billion to BH Primary, reinsurance group surplus of $235 billon headed into 2022 is 42% of traditional global reinsurance capital and 36% including alternative capital like insurance linked securities and cat bonds. Against 42% of aggregated global reinsurance capital owned by Berkshire, its writes less than 7% of premiums.

Underwriting requires reserves to cover losses. Equities are a risk asset. North American reinsurers excluding Berkshire allocate more than two-thirds of invested assets to investment grade fixed-income and nearly 10% to cash. Risk assets comprise less than a quarter and in addition to common stocks of public companies include non-investment grade bonds and alternatives such as private equity, real estate, venture capital and hedge funds. Markel, Fairfax, and Alleghany are often compared to Berkshire in structure, but none come close to Berkshire by surplus capital. Of all North American Reinsurers, Fairfax and Markel come closest to Berkshire in asset mix, but with only a third or so of invested assets in risk assets. Fairfax writes more premiums than equity but must lean heavily on the retrocessional market to do so. Earned premiums are $6.5 billion less than written and three-quarters of equity. Stocks are 15% of investment assets. Fixed income and cash roughly match written premium. It's a similar story at Markel, where risk assets comprise roughly a third of invested assets. Markel retains more premium volume and premiums earned match statutory capital. Stocks comprise 30% of investments with bonds and cash totaling about 70%. Several investments in private businesses are made largely with surplus capital but will necessitate having the preponderance of investments in fixed income and cash.

The two largest insurers in the world by premium written are Swiss Re, Munich Re. Where Berkshire's reinsurers write 10 cents per dollar of capital, Swiss Re writes more than a dollar, Munich Re right at a dollar. Equities are 4% of investment assets at each. At neither has equity grown for a decade. These are leveraged bond portfolios requiring new capital at every major catastrophe.

Berkshire will likely end 2021 with $325 billion in equity securities, 72% of its $453 billion investment portfolio. Total insurance group premiums earned are 29% of 2020's year-end statutory capital. Reinsurance premiums earned are less than 10% of reinsurance capital. I mentioned this to recently retired CEO at Alleghany, Weston Hicks, a couple years ago, to which he joked, "Well, the Europeans never met a policy they didn't like." The insurance and investing worlds will miss Weston. What a great run at Alleghany.

Berkshire's insurance group's intrinsic value at year-end 2021 is estimated at $444 billion, half of Berkshire's total intrinsic value per our sum of the parts method. The appraisal of Berkshire's insurance

operation presumes a 5% pre-tax underwriting profit, so $3.5 billion on nearly $70 billion of earned premium for the year. After-tax normalized underwriting profit is capitalized at only 15 times earnings so $40.5 billion of insurance value is derived from insurance. I've been asked about whether the combined insurance entity can durably underwrite at 5% pretax in a low interest rate world. Two comments here. One, the reinsurance group intermittently underwrites retroactive reinsurance policies and periodic payment annuity coverage. Both involve large upfront premium payments, with capped losses developing over time. On a GAAP reported basis, yearly reported losses will nearly always pull downward overall underwriting margins, even if over time the benefit of use of float greatly exceeds actual losses paid. We ignore the premiums received here and reported losses as they develop. Doing so properly casts the reinsurance group in a much more profitable and correct light.

Insurance Operations - Estimated at December 31, 2021		**Insurance Investments (December 31, 2021 estimated)**	
Premiums Earned (Excludes Retroactive Premiums Earned)	$69.3 B	Equity Securities (Includes JPN Trade; DEO; IAG AU) 269.4 - OXY '20	$324.6 B
Statutory Surplus (Equity) $237B 2020	$272 B	Fixed Income Securities	$18.0 B
Book Value GAAP	$275 B	OXY Pfd/Wts (Included in Insurance Investments Footnote) 9.284 B	$12.1 B
		Cash	$92.0 B
Float (84 2014, 88 B 15, 91 B 16, 114.5 B 2017, 123 18, 129 19; 138 20)	$148 B	Other (3.75B BHE Pfd: 1.45 paid 2021; 2B Seritage Term Loan	$5.8 B
Losses Paid	$42 B	**Total Investment Assets** (326.1 Y/E 2019; 363.1 2020)	**$452.5 B**
Expected After-Tax Underwriting Gain 2021:	$1.04 B	Investment Income and Earnings (to reconcile)	
Normalized Underwriting Margin: 5% Pre-tax (Ex Retro and PPA Amortization)	$3.5 B	Dividends (annualized at 12/31 estimated)	$5.0 B (1.54% div yield)
Normalized Underwriting Net Profit	**$2.7 B**	Retained Earnings of Common Stocks	$11.7 B (3.60% REY)
Capitalized Value from Underwriting ***	$41 B	Total Earnings of Common Stocks	$16.7 B (19.4 P/E; 5.14% EY)
Goodwill (Other Intangibles immaterial)	$15.2 B		
DTL (Investment Gain+Def Charges Reins-Unpaid Losses/LAE-Unearned Premiums)	$52 B	Divs on OXY (paid as shares and sold)	$0.8
		Interest on Fixed Income and Cash	$0.084 B
Insurance Estimated Value			
Total Investment Assets	**$453 B**	Total Pre-Tax Earnings of Investments ($17.3B 2019)	$18.1 B
Equity securities valuation premium/discount 15% 2021 (-19B 2019; -39B 2020)	**- 50 B**	Optionality of Cash > One-Year Losses Paid #	$3.5 B
Capitalized Value from Underwriting	**$41 B**	Pre-tax Earnings with Optionality of Surplus Cash **	$21.6 B
Estimated Value	**$444 B**	Paid and Hypothetical Taxes (11.0% blended; RE of stocks 3%)	$1.4 B
		Investment Net Income	**$20.2 B**

Two, whether Berkshire underwrites at a pre-tax 5% or at breakeven really doesn't matter. Where underwriting drives the profitability bus in insurance, investments drive the bus in Berkshire's massively overcapitalized insurance group. Two aspects of the appraisal are conservative. To the extend the equity appears overvalued, a discount is applied in the appraisal, $50 billion or more than 15% at yearend. The figure randomly matches the deferred-tax liability sitting under the equity portfolio, even if Berkshire never incurs material gains or does so years from now. Finally, when assessing the earning power of the insurance enterprise, investment income consists of interest and dividends received, not quite $6 billion (including $800 million in dividends on an Occidental preferred). The balance comes from ignoring unrealized gains and losses and recognizing retained earnings of the stock market holdings, totaling $11.7 billion today. Adding the dividends to retained earnings totals earnings on the stock portfolio. The earnings yield of 5.1% is the only amount derived in the appraisal of group earnings from the stock portfolio. If the portfolio earns more than 5.1% over time, then the appraisal is conservative.

One final element in deriving net investment income at the insurance operation. The assessment assumes Berkshire will always maintain a cash balance within the insurance group equal to one year's balance of losses paid in cash, $42 billion at yearend. Any cash above that figure, an estimated $92 billion, is hypothetically assumed to eventually be invested in something higher yielding than cash. A 7% return is used minus any yield currently earned on Treasury bills and cash. With cash yields at nearly zero (until the Fed raises this year), $3.5 billion in pre-tax hypothetical earning power is picked up and taxed as though Berkshire buys common stocks and earns entirely dividends. Those disagreeing with the method can surely ignore the hypothetical income but must remember to immediately add the yield of any net new investments. Already being at a gross 7%, no such day-to-day or quarter-to-quarter jumping around is necessary.

Those backing off a capitalized value for underwriting, also charging 15% against current valuation of the stock portfolio and eliminating the optionality premium on cash expected to be eventually invested will come up with a modestly lower appraisal of the insurance group. Taking the more "conservative" tack, skeptics will always scratch their heads wondering how Berkshire compounds by more than 10%. Take note, the insurance company can and does occasionally distribute dividends to the holding company or make wholly owned investments in subsidiaries. The capital to purchase BNSF, BHE and myriad of the Manufacturing, Retail, Service and Finance businesses wasn't created out of thin air. It came from Berkshire's overcapitalized insurance operation, whose value is largely derived from investments and not underwriting. That the insurers happen to be underwriting powerhouses, underwriting profitably over decades (providing float that is better than free) and willingly conservative when pricing doesn't compensate for risk. They can also back the truck up when appropriate to do so. We should see material premium growth in the present environment.

One final note, there are now three Chinese insurance companies larger than Berkshire's collection of insurers (measured by premium volume, not by capital). Ping An, China Life and People's Group are growing revenues materially faster than any large global underwriters and all three are now among the ten largest insurers in the world. Berkshire is famous for noting that anybody can write a lot of business. What matters is the insurer's ability *and* willingness to pay. Always be wary the fast-growing insurer.

Holding Company Assets and Liabilities

Berkshire controls several assets and houses certain liabilities at the holding company level that don't get assigned to the subsidiaries. Assets include a sizable portion of cash, a small group of publicly traded stocks and Berkshire's interest in several partially owned companies where Berkshire owns more than 20% and is deemed in a control position. This latter group are carried with accounting treatment known as equity method, which essentially adds prorata profit to cost basis and likewise subtracts any portion of profits received as dividends. Liabilities include $21.8 billion in debt not assigned to any subsidiary and a nominal $1.2 billion portion of Berkshire's total net deferred-tax liability, likewise unassigned. The annual reconciliation has $27.8 billion in net asset value held at the holding company producing $2.2 billion of Berkshire's $47.8 billion normalized profit for 2021.

HoldCo	
KHC 26.7%; 325,635m shares (MV 11.690 2021; cash cost $9.8 B)	$13.300
KHC Market Value Adjustment	-$1.310
Other Equity Method (PFJ, Berkadia, ETT(in BHE)) from 4.0 roc	$3.400
Itochu, Mitsubishi, Mitsui, Sumitomo, Marubeni) ($8.640B in Insurance)	$0.000
Diageo $912M, IAG AU $302M (In Insurance)	$0.000
Other Non-13-F Holdings (total $14.701B 202e: BYD/Rabbi NDCs in BHE;)	$6.868
Cash (MSR cash assumed to offset MSR debt; Annual in HCO financials)	$28.527
TOTAL HOLDCO ASSETS	**$50.785**
Debt (Interest Paid MSR 66.8% of MSR + Not segment allocated)	$21.779
Deferred Tax Liability (All balance to MSR)	$1.175
HoldCo Net Assets	**$27.831**
KHC Eq Method Earnings (increase cost basis; (e) full 21% tax difference)	$0.902
Divs KHC (reduce basis of investment: $521m can't count here but taxed)	$0.000
Additional KHC Deferred Tax Liability/Asset not on BS	$0.000
Other Equity Method Earnings ($683m 2019 increases basis)	$0.933
Dividends of equities (recorded as income at subs)	$0.106
Interest Income	$0.600
Retained Earnings of Holdco Stocks and BHE Stocks	$0.247
Retained Earnings of BYD; Owned in BHE but earnings not attributed to BHE	$0.056
Optionality of holdco cash with $30B permanent: $7.4B @ 7% - .1%	$0.511
Interest Expense (not allocated to subs)	-$0.326
Normalizing Net Pension Expense for GAAP Adjustment	-$0.439
Net Investment Income Pre-Tax	$2.6
Net Investment Income After-Tax	**$2.2**
Estimated Value (Investments - HoldCo Debt)	**$27.8 B**

Equity Method Investments

Kraft Heinz –

Kraft Heinz's common shares posted an 8% total return for 2021, including dividends. As an equity method investment, the gain isn't reflected in Berkshire's financial statements. Berkshire owns 325.6 million shares of Kraft Heinz, 26.6% of the outstanding shares. The cash cost basis is $9.8 billion. Carrying value under the equity method reflects a tax value markup (non-cash) when Heinz bought Kraft, with book carrying value increased quarterly for Berkshire's proportionate share of reported earnings minus dividends received. Kraft Heinz has also taken writedowns, which Berkshire proportionally reflected. On September 30, equity method carrying value was $13.3 billion and the market value of the position was $11.7 billion. The stock plummeted 70% from its 2017 high, closing 2020 at $34.66 per share. Carrying value includes Berkshire's proportional share of Kraft's earnings, even if retained, and are

added to cost basis. Basis is reduced by dividends received. Our holding company value includes a mark-to-market adjustment reflective of market value. Effectively, equity method accounting is a decent proxy for the way we value Berkshire's profits. By stripping market value movement but picking up dividends and retained earnings by the investee, you get to a similar place. No deferred-tax liability is created on unrealized gains using the equity method.

Berkshire has three additional equity method investments, deemed to have significant influence but owning less than 50% of each (and generally more than 20%). Control positions of more than 50% ownership would be consolidated in Berkshire's financial statements, with balance sheet and income statement offsets for noncontrolling interests (which is how the 8.9% of BH Energy that Berkshire doesn't own is treated). Instead, like Kraft Heinz, pro rata profit is added to carrying value, offset by dividends, which reduce carrying value and are taxed. Carrying value for these three businesses was $3.4 billion at September 30, down from $4.1 billion in 2020, $3.7 billion at year-end 2019 and $3.5 billion the year before that. Collectively, Berkshire's share of these three investees' earnings is approaching $700 million, annual returns of approximately 17%. These businesses have been home runs for Berkshire. The decline in basis in 2021 reflects a $1 billion distribution received, which included a non-recurring distribution of $849 million.

Pilot Flying J

Pilot Flying J is a great, evolving acquisition. While small inside the whole of Berkshire, Berkshire's ownership will increase from its original 38.6% investment for $2.8 billion in 2017 to 80% in 2023. The 2017 price paid valued the entire business at $7.2 billion. With 750 locations across the US and Canada, the travel center business generates $30 billion in revenues. Pilot Flying J is opening new locations, presumably financed internally with retained cash flow. Pilot Flying J's website identifies new location information. Most are smaller format centers located away from the interstate highway system. In late 2019 Pilot Flying J launched the "One9 Fuel Network," which gives drivers and smaller truckers access to personalized credit and consolidated rewards points at smaller locations under the Speedway, Mr. Fuel, Pride and Stamart travel center brands. 250 locations will either be acquired or partnered with, with Pilot Flying J operating the stores. The bulk of the stores are/were under the Speedway umbrella, owned by Marathon Petroleum.

Berkadia

Berkshire owns a 50% interest in a commercial real estate loan servicer with Jefferies as the partner and operator. Long-standing clients will remember we had owned Leucadia, run by two outstanding investors, Ian Cumming and Joe Steinberg. The duo had no succession plan, so they bought Jefferies, making the investment bank's CEO Dick Handler the succession plan. Berkadia purchased Capmark Financial Group's mortgage loan and servicing business for $437 million in 2009. Over the years, Berkshire provided a secured credit facility of $1 billion, later increased to $1.5 billion, to fund mortgage loans, servicer advances, purchase servicing rights and to fund working capital. We rounded up summary figures from Leucadia and then Jefferies for their 50% share of carrying values and earnings to infer Berkshire's piece. Updated numbers can be found in the appendix and presume Berkshire's equity share are identical.

Electric Transmission Texas (ETT)

ETT is a joint venture with American Electric Power created in 2007 to construct and manage transmission assets in AEP's territory in Texas. Berkshire's piece of the JV is owned by MidAmerican. The venture operates as a regulated transmission-only utility. Total investments between the partners were announced to total approximately $7 billion over many years. In 2007 the utility was granted an allowed return of 9.96% by the Public Utility Commission of Texas. It appears combined investment capital totals

$3.5 billion. A summary of AEP's carrying value and income can be found in the appendix, and we'd infer that Berkshire's position would look the same.

Our subsidiary appraisals are conservative, and we have not fully moved multiples upward to capture the full effect of the tax code change. Even without the tax changes, our valuations are very conservative. If the subsidiaries were publicly traded, they would command much higher valuations.

The valuations for each operating group are included in the Net Income Basis table seen at the beginning of this section. More granular data for each reporting group is in the appendix.

Simple Price to GAAP Book Value Basis

Simple Per-Share Price to Book Value Basis- "A" Share Data

	BVPS	Avg BVPS	1x BVPS	1.2x BVPS*	1.75x BVPS	2x BVPS	High	Low	Range vs.	Avg
1994	10,083	9,469	10,083	12,100	17,645	20,166	20,800	15,150		
1995	14,426	12,255	14,426	17,311	25,246	28,852	30,600	20,250	250%	165%
1996	19,011	16,719	19,011	22,813	33,269	38,022	38,000	31,000	227%	185%
1997	25,488	22,250	25,488	30,586	44,604	50,976	48,600	33,000	218%	148%
1998	37,801	31,645	37,801	45,361	66,152	75,602	84,000	45,700	265%	144%
1999	37,987	37,894	37,987	45,584	66,477	75,974	81,100	52,000	214%	137%
2000	40,442	39,215	40,442	48,530	70,774	80,884	71,300	40,800	182%	104%
2001	37,920	39,181	37,920	45,504	66,360	75,840	75,600	59,000	193%	151%
2002	41,727	39,824	41,727	50,072	73,022	83,454	78,500	59,600	197%	150%
2003	50,498	46,113	50,498	60,598	88,372	100,996	84,700	60,600	184%	131%
2004	55,824	53,161	55,824	66,989	97,692	111,648	95,700	81,150	180%	153%
2005	59,337	57,581	59,337	71,204	103,840	118,674	92,000	78,800	160%	137%
2006	70,281	64,809	70,281	84,337	122,992	140,562	114,500	85,400	177%	132%
2007	78,008	74,145	78,008	93,610	136,514	156,016	151,650	103,800	205%	140%
2008	70,530	74,269	70,530	84,636	123,428	141,060	147,000	74,100	198%	100%
2009	84,487	77,509	84,487	101,384	147,852	168,974	108,450	70,050	140%	90%
2010	95,453	89,970	95,453	114,544	167,043	190,906	128,730	97,205	143%	108%
2011	99,860	97,657	99,860	119,832	174,755	199,720	131,463	98,952	135%	101%
2012	114,214	107,037	114,214	137,057	199,875	228,428	136,345	113,855	127%	106%
2013	134,407	124,311	134,407	161,288	235,212	268,814	178,900	136,850	144%	110%
2014	145,619	140,013	145,619	174,743	254,833	291,238	229,374	163,039	164%	116%
2015	154,935	150,277	154,935	185,922	271,136	309,870	227,500	190,007	151%	126%
2016	171,542	163,239	171,542	205,850	300,199	343,084	249,711	187,001	153%	115%
2017	211,750	191,646	211,750	254,100	370,563	423,500	299,360	238,100	156%	124%
2018	212,503	212,127	212,503	255,004	371,880	425,006	335,900	279,410	158%	132%
2019	261,417	236,960	261,417	313,700	457,480	522,834	341,785	287,000	144%	121%
2020	287,031	249,767	293,698	344,437	502,304	574,062	352,450	239,440	141%	96%
2021^	340,716	301,067	293,698	408,859	596,253	681,432	454,550	341,820	151%	114%

Source: Semper Augustus; Berkshire Hathaway

Berkshire's shares closed 2021 trading at 132% of expected year-end book value. The shares traded in a range of 114% to 151% of book value during the year. The shares traded in a range from 0.5 times to 3.0 times book value over the past 57 years. In its earlier years, the lower bound more closely approximated intrinsic value at the time, while three times book value in 1998 most certainly did not. A 1.75 multiple to book value approximates fair value today. In any given year, book value can get ahead of itself or behind, largely due to period volatility in the stock portfolio. It can also get distorted at times such as year-end 2017 when the new marginal tax rate saw deferred-tax liabilities rerated downward and deferred-tax assets revalued upward. Berkshire properly points out that if it is going to become a large repurchaser of its shares at premiums to book value, then book value and book value per share will decline. Subsequent repurchases at increasing premiums will further and more quickly erode book value.

In a normalized steady state Berkshire conservatively earns 10% on unleveraged net equity. Thanks to the durability and knowability of the earning power we are comfortable with a 75% premium to book as a

reasonable valuation. If the sustainable return on equity as projected changes, upward or downward, the valuation would be affected. Likewise, if book value becomes so diminished, it will be properly be eliminated as a valuation proxy, looking to ongoing absolute profitability relative to retained and past profit.

Two-Pronged Approach

Two-Pronged Basis #

(dollars in millions)

	Per-Share Pre-Tax Earnings					Per-Share Investments	Per-Share Investmens + Capitalized Pre-Tax Earnings					Market Cap Intrinsic Value				5% UW	Add Cap UW
		10x	12x	13.5x	15.4x ^		plus 10x	plus 12x	plus 13.5x	plus 15.4x^	shares out M	at 10x	at 12x	at 13.5x	at 15.4x^	Capped	
2005	2,441	24,410	29,292	32,954	37,591	74,129	98,539	103,421	107,083	111,720	1.541	151,849	159,372	165,014	172,161	10,998	176,012
2006	3,625	36,250	43,500	48,938	55,825	80,636	116,886	124,136	129,574	136,461	1.543	180,355	191,542	199,932	210,559	11,982	211,914
2007	8	80	96	108	123	90,343	90,423	90,439	90,451	90,466	1.548	139,975	140,000	140,018	140,042	15,891	155,909
2008	3,921	39,210	47,052	52,934	60,383	77,793	117,003	124,845	130,727	138,176	1.549	181,238	193,385	202,495	214,035	12,763	215,258
2009	2,250	22,500	27,000	30,375	34,650	90,885	113,385	117,885	121,260	125,535	1.552	175,974	182,958	188,196	194,830	13,942	202,138
2010	5,926	59,260	71,112	80,002	91,261	94,730	153,990	165,842	174,732	185,991	1.648	253,776	273,308	287,958	306,513	15,375	303,333
2011	6,990	69,900	83,880	94,365	107,646	98,366	168,266	182,246	192,731	206,012	1.651	277,807	300,888	318,199	340,126	16,038	334,237
2012	8,085	80,850	97,020	109,148	124,509	113,786	194,636	210,806	222,934	238,295	1.643	319,787	346,354	366,280	391,519	17,273	383,553
2013	9,116	91,160	109,392	123,066	140,386	129,253	220,413	238,645	252,319	269,639	1.644	362,359	392,332	414,812	443,287	18,342	433,154
2014	10,847	108,470	130,164	146,435	167,044	140,123	248,593	270,287	286,558	307,167	1.643	408,438	444,082	470,814	504,675	20,627	491,441
2015(S)	11,562	115,620	138,744	156,087	178,055	148,675	264,295	287,419	304,762	326,730	1.643	434,237	472,229	500,724	536,817	20,647	521,371
2015(B)	11,186	111,860	134,232	151,011	172,264	159,237	271,097	293,469	310,248	331,501	1.643	445,412	482,170	509,737	544,657		
2016(S)	10,421	104,210	125,052	140,684	160,483	168,902	273,112	293,954	309,586	329,385	1.643	448,723	482,966	508,649	541,180	22,941	531,590
2016(B)	11,718	117,180	140,616	158,193	180,457	186,520	303,700	327,136	344,713	366,977	1.643	498,979	537,484	566,363	602,944		
2017(S)	11,123	111,230	133,476	150,161	171,294	190,161	301,391	323,637	340,322	361,455	1.644	495,427	531,995	559,420	594,160	25,199	584,619
2017 (B)	15,002	150,020	180,024	202,527	231,031	202,322	352,342	382,346	404,849	433,353	1.644	579,180	628,500	665,491	712,345		
2018(S)	13,037	130,370	156,444	176,000	200,770	174,846	305,216	331,290	350,846	375,616	1.641	500,838	543,623	575,713	616,359	33,000	649,359
2018(B)	14,697	146,970	176,364	198,410	226,334	188,626	335,596	364,990	387,036	414,960	1.641	550,689	598,923	635,098	680,920		
2019(S)	14,052	140,520	168,624	189,702	216,401	235,822	376,342	404,446	425,524	452,223	1.625	611,540	657,208	691,459	734,843	36,000	770,843
2020(B)	14,309	143,090	171,708	193,172	220,359	253,676	396,766	425,384	446,848	474,035	1.625	644,728	691,231	726,108	770,286		
2020(S)	13,399	133,990	160,788	180,887	206,345	297,636	431,626	458,424	478,523	503,981	1.544	666,413	707,788	738,820	778,126	39,000	817,126
2020(B)	13,924	139,240	167,088	187,974	214,430	314,600	453,840	481,688	502,574	529,030	1.544	700,711	743,707	775,954	816,801		
2021(Se)	17,825	178,250	213,900	240,638	274,505	341,299	519,549	555,199	581,937	615,804	1.475	766,570	819,169	858,619	908,589	41,000	949,589
2021(Be)	18,773	187,730	225,276	253,436	289,104	356,820	544,550	582,096	610,256	645,924	1.475	803,457	858,855	900,403	953,030		

Two-Pronged basis intrinsic value excludes capitalized value for ongoing insurance underwriting profitability, $2.6 billion currenty valued at $30 billion, or $18,240 per-share

**Berkshire changed the methodology for calculating both earnings and investments per-share. See "Moving the Goalposts". Semper estimates use our traditioinal methods.

(S) is our SAI method which excludes underwriting profit and loss from earnings. We exclude cash inn MSR, Finance and Energy/Rail groups and include equities and other investments in non-insurance

(S) Our earnings exclude underwriting profit or loss. Instead we capitalize at 11.5 pretax (was 10x pretax pre 2017 TCJA tax reform) Excuded from table.

(S) As of 2015, we now include, as does Berkshrie, warrants, preferreds, equities and fixed from finance group

(S) Underwriting profit at 5% capitalized at 11.5x beginning 2018 and 10x 2017 and prior adds to IV: 2013 18.3B; '14 $20.6 B; '15 20.7B; '16 22.9B; '17 25.2B; '18(e) 33.0B ($1,804 per A share '18)

(B) is the new Berkshire methodology beginning 2015 which includes underwriting profit or loss in earnings and now includes cash from MSR, Rail and Energy, and Finance businesses

^ New 15.4 multiple in 2017 applied to earnings reflects 12.4% increase in after-tax earning power from a lower tax rate, requiring a like 12.4% increase in the multiple to pre-tax earnings

(S&B) Excludes KHC but Included Pretax Earnings of Equity Method Investments

Source: Semper Augustus; Berkshire Hathaway

The Two-Pronged Approach begins with two simple figures, per-share pre-tax earnings of all subsidiaries excluding gains and income from marketable securities and a per-share value for all marketable securities. Berkshire provided the two per-share figures for the better part of two decades to help investors assess fair value. The figures disappeared from the Chairman's letter for five years and then reappeared. The method proves durable but requires some understanding and adjustment of certain data points. The method was covered in detail in our 2016 letter and in the appendix to the 2017 letter. Our method differs from the one used by Berkshire and altered over the years. Berkshire's method included underwriting gains and losses, then did not, and then did again. Ours eliminates current underwriting, substituting a capitalized value to a normalized underwriting profit margin. We'd also look to the stock portfolio to determine any degree of material under or overvaluation. Berkshire's method included cash held at non-insurance subsidiaries. Ours does not. It's a nice reconciling tool but required alteration to its original presentation by Berkshire beginning in 1995. It's a simple tool that happens to still get in the ballpark.

GAAP Adjusted Financials Approach

The GAAP or IFRS statement of earnings can only be a starting point for the investor seeking to measure economic profitability and the capital required to produce it. Reported profits only ever approximate economic profitability by coincidence at Berkshire. At some companies reported profits more closely align with genuine profitability. The majority of companies strive to present their affairs in the most favorable light, even if distortive. Berkshire's financial reporting and the derivation of earning power

proves a wonderful case study in how useless financial statements can be without diving deep into the footnotes and into the moving parts of the business. Berkshire's require so many adjustments that any student of investing should endeavor to understand the steps required in doing so. Our adjustments are by no means authoritative, and each can be debated as to merit. Much of the process smooths volatility-distorting aspects that make Berkshire's GAAP consolidated financial statements, particularly the statement of income, of little utility.

Primary adjustments to the GAAP financials are:

- Remove realized (and now unrealized) gains and losses on the investment portfolio of the insurance companies and other groups.
- Remove derivative contract gains and losses.
- Add retained earnings of equity investees in the investment portfolio (this is the offset to the removal of realized and unrealized gains and losses). It is a normalizing factor that assumes retained earnings will translate into at least an equal dollar of market value.
- Remove underwriting gains and losses.
- Add a normalized underwriting profit margin.
- Add income for deferred-tax liabilities that are created with property, plant and equipment capital expenditures, reflecting the degree to which cash taxes paid are less than reported GAAP taxes.
- Add a portion of any amortization charges against intangible assets created in acquisitions not reflective of economic decay.
- Add the present value of an optionality premium to the portion of cash balances likely to be invested at higher yields in the near to intermediate future.
- Reduce net income to reflect a higher normalized pension expense and cash outlay than assumed.
- Other adjustments that are one-off are made as needed (the above are more recurring in nature).
    - 2020 saw a $10.6 billion pre-tax and $10.4 billion after-tax write-down of Precision Castparts. $10 billion of the charge was a non-tax-deductible reduction of goodwill. The analyst should not be fooled by apparently higher future profitability by ignoring the charge.
    - 2017 required a $28.2 billion non-taxable downward adjustment to restate net deferred-tax liabilities, which increased taxable income by the same non-taxable amount.
    - The equity method treatment of Kraft Heinz required a one-time 2017 downward income adjustment of $2.9 billion pre-tax, $1.2 billion after-tax, reflecting investee Kraft Heinz's similar non-cash gain in net income for revaluation of net deferred-tax liabilities.

The balance of this section is repetitive from last year's letter with updated figures for each 2021 adjustment. Consider it my contribution to little-changing footnote disclosures. The analyst can save time with a redline comparison!

Remove Realized and Unrealized Investment Gains and Losses

FASB rule ASU 2016-1 required the income statement under GAAP accounting to include unrealized gains and losses each quarter in the income statement beginning in 2018. Previously only realized gains and losses were included in income. Unrealized gains and losses were recognized on the balance sheet, net of a deferred-tax liability for taxes to be paid if, or when, holdings are sold. Unrealized gains and losses naturally remain a balance sheet item. In periods of price declines, as in 2018 and the first quarter of 2020, declines are offset by a correspondent reduction of the portion of deferred taxes no longer carried as a liability. These unrealized gains and losses are taxed as deferred at 21%, where prior to the 2017 TCJA tax change were taxed at 35%. In other words, investment securities move up and down in price, and the movement in either direction is offset by a 21% tax now, with the net amount impacting

shareholder's equity only by the net amount. Deferred taxes mute the impact of stock volatility on the balance sheet.

We remove a not insignificant $75.5 billion in pre-tax gains and $60.3 billion after-tax from the projected 2021 income statement, which included both realized and unrealized gains. By September 30, Berkshire had sold $7.0 billion of common stocks but only realized modest gains of $889 million. We make no assumptions about realized gains during the fourth quarter, so the entire portfolio gain as estimated is assumed unrealized.

Our treatment always removed realized gains and losses from the income statement. Their timing can be arbitrary and controlled by management. It's not uncommon to see a management book gains to mask a decline in profitability. Numerous companies mastered this trick over the years. Prior to the tax code change, realized gains always helped the reported result. Portfolios could decline in value and managements had the discretion to realize gains large enough to offset or more than offset any unrealized losses. Alternatively, you see subsidiaries or assets sold or accounted for as to be sold and excluded from "adjusted" results. The most redeeming aspect of marking to market unrealized gains and losses for income statement purposes was to limit the hijinks of selecting gains in an investment portfolio to augment results. Companies would book gains and write checks for taxes just to boost short-term profits. There is zero history of Berkshire having done this. Rather, Berkshire historically goes out of its way to avoid paying cash taxes.

Including both realized and unrealized gains and losses in the income statement *is* more economically correct than excluding them as irregular. It's just that inclusion is correct but comes with volatility that can distort operating results. If stock prices reflect the earning power of the business over time, then inclusion of gains and losses, whether realized or unrealized, will be correct – over time. It's "over time" that's the problem. To satisfy the logic for removal, eliminating short-term price volatility, we must offset the removal with a better proxy for tracking economic gains and losses. To serve that purpose, we add the retained earnings not paid as dividends by Berkshire's investees in common stocks.

Add Retained Earnings of Holdings

Offsetting the removal of realized and unrealized gains, add back the portion of profits earned by Berkshire's publicly traded investees not paid as dividends. For 2021 we added back $11.8 billion, which is net of assumed taxes paid at 3%. The de minimis 3% rate is used in recognition that taxes owed on realized gains will be paid *later* and probably many years in the future, if ever (it's discounting for the time value of the 21% tax rate). The deferred-tax liability assumes immediate liquidation of the portfolio, taxed at 21%. Berkshire minimizes realized gains paid as cash, and the present value aspect accounts for the difference in our assumption.

The removal of gains and losses as irregular and unpredictable, whether realized or unrealized, requires an offset when assessing earnings power. The offset is the addition to reported earnings of the retained earnings of publicly companies not paid to Berkshire as dividends. Profits retained should (and need to) inure for the ultimate benefit of the shareholder. It is simply a reinvestment of shareholder profits, a choice made by others if you happen to not be in control. This is a normalizing factor that assumes retained earnings will ultimately translate into at least an equal dollar of market value. At Berkshire, these retained earnings are a significant component of Berkshire's overall profitability. The stock portfolio will likely total 37% of Berkshire's total assets at yearend, the highest proportion since totaling 65% prior to Berkshire's acquisition of General Re in 1998. As a percentage of overall profit, $11.8 billion in retained earnings represents a quarter of total normalized profit. As a mental reconciling item, when $11.8 billion in retained earnings is added to after-tax dividends received, "earnings" from the stock portfolio total 36% of total after-tax earnings, very close to stocks as 37% of total assets.

Despite selling $7.0 billion in stocks through the third quarter, the stock portfolio grew by $68.4 billion. These figures exclude Berkshire's investments in Occidental preferreds and warrants as well as the Kraft Heinz position which is carried using the equity method of accounting. Since it's publicly traded, the KHC position should probably be included here. Retained earnings of portfolio holdings grew by $1.7 from 2020.

Berkshire owns 907.6 million Apple shares, valued at $161.2 billion on December 31. At $6.03 in 2021 earnings and the current $0.88 dividend, Berkshire's share of Apple's estimated $100 billion in 2021 profit amounts to $5.5 billion, up from $4.2 billion in 2020. At the current run rate, Apple produces 33% of current year portfolio earnings, a much smaller proportion of its 49.6% portfolio weight. High price? Yes. High growth? Hopefully for the foreseeable future, that is until Berkshire cozies up to the concept of paying taxes or finds some assets to take in exchange for shares.

Berkshire's Stock Market Investments, Dividends and Retained Earnings

	12/31/17	12/31/18	12/31/19	12/31/20	12/31/21
Market Value **	$170 B	$173 B *	$237 B ^	$278 B ^	$325 B ^
Earnings	$9.5 B	$13.5 B	$14.8 B	$14.4 B	$16.8 B
Dividends	$3.7 B	$3.7 B	$4.5 B	$4.3 B	$5.0 B
Retained Earnings of Investees	$5.8 B	$9.8 B	$10.3 B	$10.1 B	$11.8 B
Earnings Yield (E/P)	5.6% (P/E 17.8x)	8.0% (P/E 12.4x)	6.1% (P/E 16.3x)	5.2% (P/E 19.3x)	5.1% (P/E 19.4x)
Dividend Yield	2.2%	2.2%	1.9%	1.5%	1.5%
Retained Earnings Yield	3.4%	5.8%	4.2%	3.6%	3.6%
Dividend Payout Ratio	39%	27%	30%	30%	30%

* Berkshire paid $24.4 billion for net additions to the stock portfolio in 2018; $8.0 B 1st 3Q's of 2019
** Market Value here includes stocks in insurance group plus $5.1 billion at 12/31/18 in rail and finance groups, $6.2 billion at 2017. MV excludes market value KHC at $11.7 billion at 2021, $11.3 billion at 2020, $10.4 billion at 2019, $14.0 billion at 2018 and $17.9 billion at 2017. KHC earnings are picked up as equity method. KHC economic cost basis is $9.8 billion. Balance sheet cost $17.4 billion now $13B.
** Market Value estimated for 12/31/21 and assumes no net 4Q purchases
^ Excludes Occidental preferreds and warrants $10.8 B 2019, $9.3 B 2020, $12.1B 2021, and KHC
Source: Semper Augustus

Remove Derivative Contract Gains and Losses

Realized and unrealized gains and losses on derivative contracts are removed from GAAP earnings along with those on investment securities.

Berkshire wrote a series of put option contracts just prior to the financial crisis with several life insurance companies as counterparties. The life insurers write a type of annuity that guarantee a smaller percentage of the gain on named stock market indices accompanied by a base minimum annual return and a guarantee of either no loss or a loss capped at a certain percentage. Naturally the insurers lose big if the stock indices decline, and so look to hedge their downside exposure. For a price, Berkshire provided the protection. The options written were European style, meaning they are payable only at the expiration of the option, which in the case of those Berkshire wrote were all well over ten years. Berkshire received $4.9 billion upfront as a premium between 2004 and 2008 and unwound 8 of the original contracts in 2010 at a gain of $222 million. Several the contracts subsequently expired worthless, which means Berkshire keeps the entire premium, plus the gains and income on invested float, and pays no losses. Most contracts are already expired. The balance will expire by February 2023 and contain no collateral posting requirements. The balance sheet liability was $1.1 billion at the outset of 2021 and should be under $100 million on December 31. The liability reflects the undiscounted value of the amount they would have to pay out today calculated using the Black-Scholes option pricing formula to determine fair value. Declining European markets and surging volatility combined to balloon the liability in March

2020 as the market fell. Thanks to the subsequent rally in stocks, the liability will be nearly gone by yearend and barring a 1929 crash will be eliminated in a year, Berkshire having pocketed the entire premium, using the capital in the interim and incur not a dime of losses.

It is extremely unlikely that Berkshire would incur a loss on these remaining contracts. The options were written "at the money," meaning the strike price was set at the market price of the indices at the time the contracts were written. The strike for all four (three were European indices) were written at a time when the S&P traded for no higher than 1,400. Changes in the currencies underlying the contracts also bear on potential losses, but with the massive surge the prospects of remote is extremely slim. Of course, the derivative contracts didn't look so good at the depths of the crisis – at year-end 2008, the liability on the contracts outstanding at the time was $10 billion with a notional value of $37 billion. The notional value would be the amount owed to the insurance companies if each stock market index was at ***zero*** at expiration.

We've always believed writing the contracts was brilliant, a great risk assumed. The length of the contracts and the fact that retained earnings over a long enough period invariably push share prices upward provided margins of safety. With the options being European style, the indices would have to be *below* the strike price on the *exact day* of exercise. These contracts were originally written with 12 to 19 years to maturity. Sure, markets were negative in price for more than 12 years before, and in fairness the options were written close to a cyclical/secular peak, but they would have to be negative on the specific day, *and* the contracts have staggered maturities.

There does remains a minute chance that Berkshire pays at expiration on some of the remaining index put contracts. It's not a zero chance. We saw how quickly assets can lose value in March 2020. Stock markets were negative for periods of 12 years or more in our markets several times. Japan remains materially underwater since 1989, which is extraordinary. Our markets were negative from 2000 to 2012, traded consistently below 1966's high until 1982, and took 25 years to regain 1929's peak. With the strikes written at the money, to lose would require declines of 50% to 70% from now to the precise day of expiration. We believe writing the index puts were great wagers by Berkshire – a permanent collection of $4.9 billion in put option premium, the use of the entire $4.9 billion for 12 to 17 years and losses risked that would never be paid. Lots of interesting conversations over the years since the contracts were written with some thinking these were terrible investments.

Adjust Earnings to Reflect Accelerated Depreciation Tax Treatment for Capital Expenditures

Berkshire spends enormous sums on capital expenditures, much of which takes place in its energy and railroad businesses. Deferred-tax liabilities are created on qualifying investments in property, plant, and equipment. Companies like railroads and utilities are incentivized to make infrastructure investments for the public good. The use of accelerated depreciation for tax purposes arises from higher depreciation of fixed assets allowed for tax purposes in the early years of amortizing an asset's life, made up for with lower tax-deductible depreciation expense in later years. The higher early depreciation results in lower taxes paid in the early years and consequently higher taxes in later years. The future higher taxes are carried on the balance sheet as a deferred liability. It's a present value benefit, and we adjust net income upward reflecting the benefit.

The 2017 TCJA tax code change more broadly expanded the allowed use of accelerated depreciation to most industries, instead of limited to those such as rails and regulated utilities. The code change allows for depreciable assets (excluding structures) to be expensed in one year instead of being amortized over many years, effectively accelerated depreciation on steroids for many businesses. Equipment must have been purchased after September 27, 2017, and by December 31, 2022 (with an additional year for longer production property and certain aircraft). The immediate 100% expensing is reduced by 20% annually

beginning next year, in 2023, and is to be phased out entirely after 2026. Regulated *public* utilities were largely excluded from the new benefit – having already applied the tax treatment, albeit over more years. With the change in the tax rate to 21% from 35%, regulators logically made downward adjustments to customer electricity rates or to the rate base to maintain allowed returns on equity. Said differently, the tail of lower future depreciation expense had been determined using a 35% rate. The new lower rate would have unfairly benefited a utility at the expense of the customer.

The recent election brings proposals to alter or eliminate many aspects of the tax changes introduced by TCJA. An early end of accelerated depreciation for non-rail and utility industries may transpire. We don't expect a change to current treatment for utilities (who already used the tax method but were compelled to refund or lower prospective rates due to the change in the tax rate applied to the carried deferred-tax liability). As of now it's too early to have any color on prospective changes.

For 2021 after-tax net income is increased by $1.4 billion, down from $1.7 billion reflecting lower amounts of growth capital expenditures at BNSF. The deferred-tax liability for property, plant and equipment is expected to grow to more than $31.5 billion.

Over the last four years since TCJA, the use of accelerated depreciation benefitted not only the railroad, but also Berkshire's other non-regulated businesses that in many cases are also now enjoying the tax benefit of accelerated depreciation where previously they weren't. Berkshire's non rail and energy businesses will have spent about $18.6 billion on capital expenditures, with much of that qualifying for one-year expensing. As assets depreciate over their actual useful lives, approximated by depreciation charges in the GAAP income statement, the beneficial tax benefit eventually runs its course, and in the later years of an asset's useful life, an even higher effective tax rate than the marginal rate will be applied for the tax books. Total capital expenditures will be $15 billion in 2021 against GAAP depreciation expense of $8.4 billion. BH Energy and the rail will spend $6.8 billion and $3.0 billion respectively, $3.6 billion above depreciation. Some of the capex is genuinely spent on maintenance, but in the case of the energy businesses largely increases the rate base, against which regulated utilities are allowed to earn up to an established return on equity.

Berkshire will continue spending large amounts of capital expenditures, much of which drives down the current cash tax bill. The appetite for capital expenditures above maintenance outside of the rail and energy businesses is likely to wane over the course of the phaseout beginning in 2023. For the balance of 2022 we should see large expenditures barring the passage of unfavorable tax legislation.

Remove Underwriting Gains and Losses; Add a Normalized 5% Underwriting Profit

Underwriting profits can be extremely volatile from year-to-year, not unlike stock prices. Our method for valuing Berkshire's insurance operations removes reported underwriting profits and replaces them with a normalized 5% pre-tax underwriting profit on premiums earned. It's a similar approach to removing investment gains and losses and replacing them with the retained earnings of the stock market holdings. The volatility of the underwriting cycle is stripped in favor of estimating what we think is a sustainable and achievable profit earned *over time*. Our 5% pre-tax underwriting estimate is a blended rate across all of Berkshire's insurers and types of business written *over time*. Under time is emphasized via an example. Catastrophe reinsurance can produce large underwriting gains for many years. A single year of large losses producing an underwriting loss must be averaged among the majority of years with gains.

The low interest rate environment makes underwriting at a profit imperative. Berkshire enjoys unusual advantages thanks to surplus capital built over the years. It can retain more business than its competitors and maintain much larger allocations to common stocks. Surplus capital derived from best-in-class underwriting and higher returns from longer duration investment assets allowed dividend and capital

distributions to the holding company and into its non-insurance businesses. We'll closely watch developments like GEICO's growing market share and the progress of the new specialty business. We may well alter our profit assumption. A more conservative approach would assume breakeven underwriting over time, which strips $39 billion from the capitalized value of underwriting profit that gets included in our appraisal of Berkshire's intrinsic value.

Berkshire has a history of including, then excluding, then including then dropping altogether underwriting profit in their dual yardstick method of calculating intrinsic value from 1995 to 2015. Our method of removing volatility and replacing it with what we think Berkshire will earn on underwriting allows us to determine the worth of the insurers, and the business at large, without having to think about the degree to which insurance profits are under or over a "normal" level of underwriting for a year or period of years.

When we analyze property casualty insurers and reinsurers, we spend a lot of effort trying to determine sustainable underwriting margins, which can be positive or negative depending on the type of insurance written and the economic climate, particularly with interest rates, inflation, capital required and competitive capacity.

Berkshire's collection of insurers will likely report an underwriting profit in 2021 unless the fourth quarter produces an underwriting loss, which can be a current year loss or adverse reserve development from prior period's insurance written. Through September 30, the insurers earned a collective underwriting profit of 0.7%, $356 million, close to breakeven and well below our long-term target. 2020 produced a 1.0% underwriting versus 0.5% in 2019, 3.5% in 2018 and a loss of 6.5% in 2017. 2016's margin was 4.6%, close to target. The five years through 2021 were marked by higher-than-average catastrophe losses, largely from hurricanes and California wildfires during three years, Asian typhoons in 2018 and 2019, wildfires in Australia in 2019 a Mexican earthquake in 2017 and COVID-19 losses in 2020. Mercifully escaped with no major storms in the second half of the year given early year pandemic losses. The first half of the year is conventionally the time to get fat in reinsurance. Despite five years of underwriting below our long-term estimate, aggregate profitability exceeds most industry participants across the lines that Berkshire writes. Beyond underwriting, Berkshire's outsized allocation of insurance reserves and capital to common stocks has driven overall profitability far ahead of peers. Berkshire's insurers play the long investing game while competitors are forced to the short game of underwriting and market share. I'm sure I've said this at least three different ways in the letter.

For 2021, the first step of removing actual underwriting profit eliminates an estimated after-tax $1.0 billion from GAAP earnings. The next step of adding our 5% normalized pre-tax underwriting profit adds $3.5 billion pre-tax and $2.7 billion after-tax underwriting profit on $69.3 billion in anticipated premiums earned, up from $63.4 billion in 2020. The quarter just ended lacked major catastrophes, so reported underwriting profit may come in higher than projected.

Add a Portion of Intangibles Amortization Expense to Income

Economic earnings are increased by $1.1 billion to reflect the amortization of intangibles created in acquisitions that do not economically decay. Berkshire recognizes this reality each year, formerly in a supplemental presentation in the Chairman's letter and beginning last year in the MD&A segment presentation of the Manufacturing, Service and Retail group in the 10-K. Unlike many public companies, Berkshire does not present a pro-forma or supplemental set of financials excluding various expenses. The goodwill and intangibles footnote make clear the types and amounts of intangibles being amortized. The balance of intangibles being amortized with no economic decay is now much larger and growing. We had been adding back 80% of the amortization charge for intangibles, which resulted in economic earnings being roughly $600 million higher after-tax than GAAP profits for 2010 to 2015. We are now adding

back 90% of the intangibles charge thanks to ongoing amortization and a lack of recent acquisition activity.

Gross intangibles were $42.3 billion on September 30, 2021. Accumulated amortization is $12.5 billion. In addition to trademarks, intangible assets such as trade names and customer relationships generally lose little, if any, economic value over time.

Add an Optionality Premium to a Portion of Cash Balances

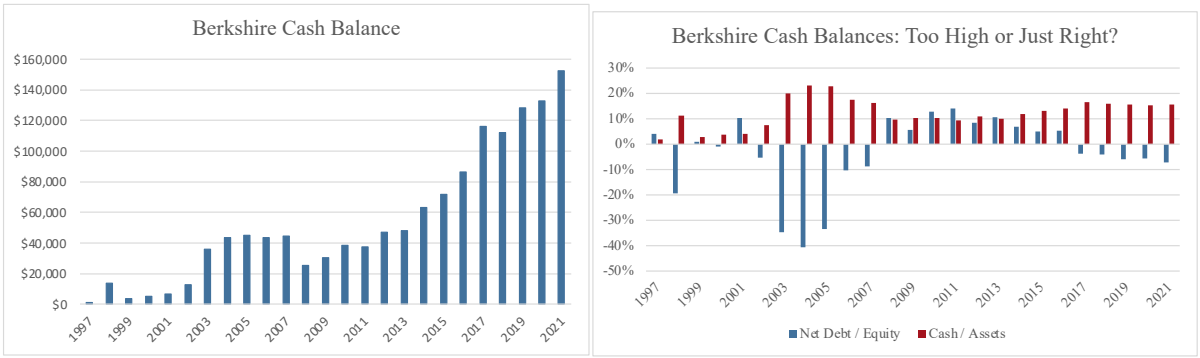
We make a material upward adjustment to Berkshire's reported profits that assumes much of Berkshire's cash will be put to good use, and reasonably soon. The adjustment adds $3.2 billion to GAAP earnings, a not insignificant 6.7% of $47.8 billion in normalized earnings. The upward adjustment is earnings based only. It does not double count marketable securities or firm assets in a balance sheet analysis. The base assumption is that a portion of invested assets in cash are earning less than they will over time. Depending on whether higher-yielding investments are made and at what yields makes the adjustment worthy of critique, in whole or in part.

Berkshire's cash position merits more media attention than it deserves – cash earning nearly nothing today in U.S. Treasury bills. The cash balance will likely total perhaps $154 billion at yearend, a modest increase from $149 billion at September 30.

At U.S. T-bill rates of 0.1%, pre-tax interest is now a whopping $154 million (higher since yearend). Interest rates on bills were 1.5% two years ago and 2.4% the year before that. At 2% Berkshire would be earning nearly $2.7 billion on its cash balances. Call the drop to $154 million material. Berkshire would undoubtedly prefer a higher earning opportunity set.

Berkshire states it will maintain cash on hand of $30 billion as a permanent reserve. That leaves $119 billion (excluding cash used in the railroad, utility, and energy businesses) for investment in longer duration assets. Our method also presumes the insurance operation will not allow cash to fall below one year's worth of insurance losses paid in cash, $42 billion at today's level. We are thus calling $72 billion a more or less permanent cash reserve.

Below is an updated chart of Berkshire's cash position from 1997 through our 2021 estimate.



Source: Berkshire Hathaway; Semper Augustus

The chart above takes the shape of a ski jump, causing anxiety among Berkshire watchers. $154 billion sounds like a lot of money, but next to total firm assets of $969 billion not so much.

Berkshire's $149 billion cash balance (excludes cash held at BHE and BNSF) is within a normal range when measured against equity and assets since the General Re deal. Cash today is 16% of total firm assets, matching last year's level. Cash as a percentage of total assets is immaterially higher than its 12% average since 1997. How about firmwide leverage? Berkshire maintains a net unleveraged but not too-cash-heavy capital structure. Net debt to equity is -7% today, reflective of modestly more cash on hand than balance sheet debt.

Progression of Berkshire Stock Portfolio as a Percent of Book Value and Assets

Year	Stocks	Cost Basis	Unrealized Gain/Loss	Realized Gain	Net Purchases	Net as % of Avg	Equity	Stocks as % of Equity	Total Assets	Stocks as % of Assets
1997	$36,248	$7,207	$29,041	$1,106	-$1,302	-3.6%	$31,455	115%	$56,110	65%
1998	37,265	7,044	30,221	2,415	-2,823	-7.7%	57,403	65%	122,237	30%
1999	37,008	8,203	28,805	1,247	-691	-1.9%	57,761	64%	131,416	28%
2000	37,619	10,402	27,217	4,499	-2,725	-7.3%	61,742	61%	135,792	28%
2001	28,675	8,543	20,132	1,488	-2,806	-8.5%	57,950	49%	162,752	18%
2002	28,363	9,164	19,199	918	416	1.5%	64,037	44%	169,544	17%
2003	35,287	8,515	26,772	4,129	6,765	21.3%	77,596	45%	180,559	20%
2004	37,717	9,056	28,661	3,471	-578	-1.6%	85,900	44%	188,874	20%
2005	46,721	15,947	30,774	5,408	6,392	15.1%	91,484	51%	198,325	24%
2006	61,533	22,995	38,538	2,635	5,395	10.0%	108,419	57%	248,437	25%
2007	74,999	39,252	35,747	5,509	11,057	16.2%	120,733	62%	273,160	27%
2008	49,073	37,135	11,938	-7,461	3,300	5.3%	109,267	45%	267,399	18%
2009	59,034	34,646	24,388	787	-1,056	-2.0%	131,102	45%	297,119	20%
2010	61,513	33,733	27,780	2,346	-1,621	-2.7%	157,318	39%	372,229	17%
2011	76,991	48,209	28,782	-830	1,497	2.2%	164,850	47%	392,647	20%
2012	87,662	49,796	37,866	3,425	-712	-0.9%	187,647	47%	427,452	21%
2013	117,505	56,581	60,924	6,673	4,689	4.6%	220,959	53%	484,624	24%
2014	117,470	55,056	62,414	4,081	1,118	1.0%	239,239	49%	525,867	22%
2015	136,017	68,412	67,605	10,347	1,473	1.2%	254,619	53%	552,257	25%
2016	150,432	75,628	74,804	8,304	-11,596	-8.1%	282,070	53%	620,854	24%
2017	195,840	84,476	111,364	2,128	814	0.5%	348,296	56%	702,095	28%
2018	186,764	112,667	74,097	291	24,427	12.8%	348,703	54%	707,794	26%
2019	258,527	120,140	138,387	1,585	4,306	1.9%	424,791	61%	817,729	32%
2020	292,257	118,420	173,837	-14,036	-8,595	-3.1%	443,164	66%	873,729	33%
2021	360,690	113,988	246,702	889	-6,971	-2.1%	510,431	71%	969,212	37%

Source: Berkshire Hathaway; Semper Augustus Calculations
Net purchases and realized gain for 2020 through September 30. All others through yearend.

It's this historical perspective that allows doubt to creep into the method for assuming a higher return on much of the cash balance. The counterpoint is most of the debt on the consolidated balance sheet is held in the railroad and the energy businesses. The debt in in these groups is *not an obligation* of Berkshire – it's standalone to the subsidiary and not hypothecated to the parent. It's also geared at a proper level for those business. If you hold those two subsidiaries aside from consideration, then the rest of Berkshire is quite liquid and has room to invest a substantial portion of cash reserves.

Berkshire will undoubtedly invest a portion of its T-bill and cash balance in higher yielding assets. They may bag elephants, find more homes for capex, or repurchase more shares. The field of opportunity includes partial ownership of publicly traded companies (stocks), a control or shared equity interest in privately held businesses, or various iterations of higher yielding fixed-income or equity hybrid securities, such as warrant investments made since the financial crisis, most recently in Occidental Petroleum.

Is it aggressive assuming a return that's not being earned currently? We don't think so. When Berkshire invests in Occidental preferreds at 8%, callable later at a premium (plus warrants), there is very little net yield pickup versus our 6.9% optionality premium to bills. The optionality premium shrinks as T-bill rates rise. If T-bills rise to 2%, the optionality premium shrinks to 5%. Similarly, when common stocks are purchased, Berkshire picks up the earnings yield, not counting whatever happens to the share price or

future growth. Apple at 13 times earnings is a 7.7% earnings yield. Of course, the annual gain on the Apple investment *far* exceeds both the earnings yield *and* the Semper opportunity cost yield. With more Apples the Semper 7%, or 5%, looks rather puny. Share repurchases are retired at Berkshire's earnings yield. The "income" picked up with the method breaks down if investable cash lingers permanently, a genuine risk if the two-decade range for cash to assets or net debt to equity are any barometer. In the grand scheme of things, we're talking about half of current cash balance genuinely investable. That's 8% of total firm assets. Easy, tiger.

Reduce Net Income to Reflect Higher Normalized Pension Expense

The pension adjustment methodology we've used for two decades was covered in past letters. Here we'll just overview the earnings adjustment for Berkshire in 2021. If you own or analyze companies with large legacy defined benefit plans, I encourage you to read our old letters. In a nutshell, we generally apply a 4% assumed rate of return on the fair value of pension assets versus Berkshire's 6.4% and run the difference as an annual expense through the income statement. We do the same by amortizing the collective pension underfunded status of $2.5 billion over ten years, assuming a full funding over a decade. The combination suggests Berkshire will commit an additional $680 million pre-tax and $537 million after-tax to its pension funds annually. These figures use 2020's published financials. This adjustment is immaterial enough that we don't try to figure out what 2021's plan will look like until the 10-K is released at month's end. Given the combined plans' 79% allocation to stocks and with the strong stock market, the underfunded status ought to drop to perhaps $2.0 billion or lower. It's hard to make headway because combined plan assets of $17.9 billion distribute annual benefits of $1 billion, requiring every inch of assumed return. Low interest rates combine with rich stock prices to make our very long-standing 4% assumed return conservatively realistic, even with a company such as Berkshire which regularly assumes both lower expected investment returns and allocates more to public equities than most.

Our method is *far* from actuarially correct but has proven reliable. What the method has done is kept us out of old businesses where the pension plan rivals the business in size and importance. It captures the huge one-off funding that takes place periodically, with the CFO suggesting analysts *ignore* the $4 billion we just borrowed and "invested" in the pension. No, no, no. Rather, $400 million ought to have been contributed annually for a decade. With nearly all plans failing to achieve their return assumptions for the past twenty years, it's been a useful tool. Overall, the pension situation has improved for investors. The number of companies with defined benefit plans is lower and return assumptions have come down from approximately 9% to 6.5%. With some companies it's a big deal. When interest rates require a microscope to identify and stock markets are at levels consistent with historical secular peaks, the issue is worth considering for the investor in companies with pension fund obligations.

Other Non-Recurring Adjustments

From time-to-time additional adjustments are necessary. Non-tax adjustments at year-end 2017 for the TCJA can be seen in the five-year summary table below. One adjustment irregularly occurs if the stock portfolio trades at a level we find dramatically overvalued or undervalued, where market value is adjusted with a discount or premium. This adjustment does not impact our earnings-based approach.

2020 required a non-cash adjustment reflecting a non-cash, non-tax-deductible write-down of $10 billion in Goodwill at Precision Castparts, plus another $400 million after-tax charge against other intangibles. These "expenses" were properly dismissed as non-operating but cannot be ignored. The analyst cannot ignore the write-down and apply current and future profitability against a now lower equity balance, crediting the sinning management that overpaid for the assets requiring the charge. "Thou shalt not forget the price paid for an acquisition." Fortunately, you'd have to look and keep looking for these charges at Berkshire over the 57 years present management has run the place. They don't exist. Ignore the expense

as non-cash, suggests the convincing CFO, but let me show you our return on equity, albeit written down. Lest you think the charges are immaterial, in 2020 write-offs and write-downs amounted to 23% of operating earnings, shrinking book value of the index by 2.9%. I highly recommend taking a meat cleaver to the 19.7% return on equity of the index. 2021 write-offs were at a much more modest clip, typical during good times. When charges are low, get ready.

Final periodic adjustments made, and here they do reflect earning power, are if a business or group is under earning or over earning relative to normalized potential. For several years, BNSF and a handful of the manufacturing and industrial businesses were adjusted upward because current profitability was depressed. These subsidiaries improved back to a normalized steady state as of 2018 and again in 2021. The pandemic harmed many MSR businesses badly during 2020. A trade war and pandemic jointly worked against the railroad. Combining the modestly depressed profits with the more severely impacted earnings at MSR, we measured normalized GAAP adjusted after-tax profitability as depressed by $2.9 billion. The need for markup was gone in 2021, with nearly all Berkshire operations in high gear.

The final adjustment under consideration to Berkshire's GAAP financials (and beyond) is the degree to which improved profitability thanks to the TCJA tax changes will phase out, expire, and be competed away. We attempt to capture the decline in the benefit in our sum of the parts method for calculating Berkshire's intrinsic value. To date, little loss from competition is apparent, at least in the aggregate.

Summary of GAAP Adjustments to Economic Earnings

After-Tax GAAP Adjustments to Economic Earnings: 2021 Expected (in billions)	**2017**	**2018**	**2019**	**2020**	**2021 (e)**
Normalized Recurring GAAP Adjustment to Economic Earnings					
Add retained earnings of equity investees, taxed at 3% (1/7th of new 21% federal rate)	5.3	10.0	10.0	10.0	11.8
Add income for DTL's created with PP&E capex to reflect cash tax<GAAP tax	1.4	1.4	1.7	1.7	1.4
Add 90% of amortization charge for intangibles (was 80%)	0.9	0.9	0.9	1.1	1.1
Add optionality premium for near/intermediate investments with cash>(1-year insurance losses + cash at subs)	2.7	2.3	3.8	5.5	3.2
Reduce net income to reflect higher normalized pension expense	-0.5	-0.5	-0.4	-0.4	-0.4
Normalized Recurring GAAP Adjustment to Economic Earnings (before removing realized g/l)	**$ 9.9**	**$ 14.1**	**$ 16.0**	**$ 17.9**	**$ 17.1**
Periodic or Irregular in Amount or One-Time Adjustments to GAAP Net Income					
Remove realized and unrealized gains/losses, including from derivative liabilities	-1.4	17.7	-57.4	-31.6	-60.3
Remove reported underwriting gain/loss	2.2	-1.6	-0.3	-0.7	-1.0
Add normalized 5% underwriting profit	2.1	2.2	2.4	2.6	2.7
Berkshire TCJA Adjustment one-time non-cash	-28.2				
Kraft Heinz TCJA Adjustment one-time non-cash	-1.7				
Write-down after-tax of PCC 2020 ($10B goodwill and $0.4B net intangibles)				10.4	
Total Periodic or Irregular in Amount or One-Time Adjustments to GAAP Net Income	**$ (27.0)**	**$ 18.3**	**$ (55.3)**	**$ (19.3)**	**$ (58.6)**
GAAP Net Earnings (From Income Statement)	**$ 44.9**	**$ 4.0**	**81.4**	**42.5**	**89.4**
Total Adjustment (assumes no 4Q18 gain/loss on investments or irregular underwriting gain/loss	**$ (17.2)**	**$ 32.4**	**$ (39.3)**	**$ (1.4)**	**$ (41.6)**
Semper Adjusted Net Income; Economic Earnings ^*	**$ 27.8**	**$ 36.4**	**$ 42.1**	**$ 41.1**	**$ 47.8**

* Does not reflect degree to which subsidiary earnings or securities are under or over valued (roughly **$2.9 billion depressed in rail and industrial for 2020**)

^ May not sum due to rounding

Source: Semper Augustus; Berkshire Hathaway and Subsidiary SEC Filings

Annual adjustments are all over the map. Big movers are removing year-to-year gains and losses from investments and to a lesser degree short-term underwriting results, replacing each with logical normalization factors. Volatility in marketable securities and underwriting make analyzing the operations of Berkshire's reported results impossible. Assessing economic profitability requires an understanding of accounting strengths and weaknesses. Sometimes GAAP is CRAAP.

In total, the process eliminates the reported volatility that comes with owning a large portfolio of common stocks as well as the period-to-period swings in underwriting profitability among a diverse group of insurers. We capture the degree to which some intangibles do not decay in value; whether or when Berkshire will invest its cash reserves and into how much incremental earning power; the proper economic versus accounting treatment of insurance "float"; the difference between reported and cash taxes actually paid, now and prospectively. The process gets us to a durable appraisal of earning power.

Methods and granular estimates used in our process are open to debate. Berkshire is so diverse that the number of adjustments required in arriving at an understanding of durable earning power makes for quite an exercise. An equally important method for valuing Berkshire is through an analysis of its individual components, or at least large clusters of groups. A sum of the parts analysis reconciles closely with GAAP adjustments made to the rolled-up consolidated financial statements because adjustments made within the "parts" are also incorporated top down. Accounting adjustments applied to the whole also apply individually to the segments. The analyst can choose to modify assumptions used at each step, adopt some, or dismiss the method entirely. The GAAP adjusted approach reconciling against other methods used discerns what we believe is a conservative appraisal of Berkshire Hathaway's intrinsic value. Following the adjustments allows for a straightforward method of converting GAAP reported quarterly and annual figures to normalized.

It's important that our clients understand how we view measurement of earning power at what has been Semper's largest holding for more than two decades. Any concern that a public presentation of the approach would drive the stock up to fair value and make the shares unbuyable has been proven not a concern. Warren Buffett and Charlie Munger have long wondered at Berkshire's annual meeting why so few emulate a system that's worked so well for what's now nearly six decades. To the extent the shares trade with a sizable and persistent discount to a reasonable appraisal of intrinsic value suits us just fine. Price matters, but only if one appreciates value.

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SUMMARY

"It doesn't really change, actually. I think The Rolling Stones have gotten a lot better. An awful lot better, I think. A lot of people don't, but I think they have, and to me that's gratifying. It's worth it." – Charlie Watts

You can't always get what you want, but if you try sometime, you'll find you get what you need. No doubt a borrowed line, classic at that, but well said. If you have a passion, and are lucky enough to pursue it, then life is not a grind. If you love what you do, I believe you perpetually improve, holding age and bodily decay aside. No way is Tom Brady playing at 45 – he was, honest to God – born the very *week* of my first football practice. Warren Buffett talks about tap dancing to work. Charlie Watts noted the Stones getting better with time. There's a lot to be said for working with people you enjoy and having the support of – family, community and whomever you work for. Nobody works for themselves. The Chairman and CEO at Berkshire works for his constituents. I'd wager if asked that he'd tell you he worked *for* the shareholders and *for* the employees of Berkshire.

There's a great story about Charlie Watts, told by Keith Richards in Keith's autobiography, *Life.* After a "late" night out following a show, Mick and Keith returned to their Amsterdam hotel. Mick wanted to call Charlie to have him join them. "I said, don't call him, not at this hour," suggested Keith. "But he did and said, 'Where's my drummer?"' Charlie appeared twenty minutes later. Per Keith, "There was Charlie Watts at the door, Savile Row suit, tie, shaved, the whole effing bit. I could smell the cologne! I opened the door, and he didn't even look at me, he walked straight past me, got hold of Mick and said, 'Never call me your drummer again.'" Charlie then punched Mick right in the face, "a punch I've seen a couple of times and it's lethal – it carries a lot of balance of timing. He has to be badly provoked." Where Charlie (Munger) and Warren claim never to have had a fight, Charlie (Watts) and Mick evidently did. Regardless, if you ask any of the Stones *who* they work for, they will undoubtedly say, and mean, the fans, and each other.

We are lucky to have the best clients in the world, many not only for the 23-year duration of the firm but of mine in my earlier life at the bank trust company. We owe an enormous debt of gratitude for years and decades of confidence, support, and trust. Most are as much friends and colleagues as they are clients. Our approach to the preservation and growth of capital is undertaken as a profession and not as a business. We've always felt an obligation to share our thinking as clearly and thoroughly as possible. The annual letter is a big part of that. I'm thrilled at the number that read it in full, and others in part. I'm happy the letter has grown beyond the clients and a few friends in the profession. That it finds its way to college campuses and is read by younger investors with a passion for learning is extremely gratifying. Investors like Benjamin Graham and Warren Buffett did not need to dedicate so much time and energy to sharing and teaching, but they did. While some would view teaching as giving away trade secrets, I'd counter that the teachers likewise owed debts of gratitude which they felt the responsibility to pass on. Not to mention that I learn a great deal as I write and teach. A win-win.

The investing climate grows increasingly inhospitable. Secular peaks mark parallel extremes in speculation and optimism. Too many have taken to trading as a sport and attempting to get rich quick. This was as financially unhealthy a take in the late 1920s and the late 1990s as it is precisely now. If Robert Brookings Smith was with us today, I'm certain he would share the sentiment. I want to thank Mr. Smith's daughter for blessing the brief telling of his investing life in this year's letter. Fiercely private and humble, his is a story I'm thrilled and honored to have told. If for no other reason, please take from the story the importance of saving, thrift and living well-within one's means. A life so lived will produce the wealth to give freely to those in need and to civic institutions making society a better place. Mr. Smith was as great a philanthropist as an investor. It was a privilege to know him, to work with him, and to call him friend. He confided in me shortly before he died that he was happy for our friendship, adding, "Of course, all my other friends are dead." Rarely is the obvious so poignant, and so Mr. Smith.

We couldn't be happier with the state of the portfolio. At 10.7 times earnings, less than half the multiple of the S&P 500, a third of the multiple to book, less than half of sales, with far better balance sheets, outstanding managements, and excellent prospects to reinvest retained earnings, we are in good shape to hopefully match returns earned over the past 23 years. The energy and cyclical portions of the portfolio are poised to reap rewards introduced by the law of unintended consequences. The capital cycle is at least interrupted for the moment. Price and rationality are our allies. In Berkshire, our largest holding, we own a diversified, durably predictable business earning an unleveraged 10% return on equity trading at a wide discount to intrinsic value. Modest use of leverage (offset with more cash), extremely conservative accounting and outstanding governance are all rare qualities. To have them all in one place at today's price suggests reliably predictable healthy returns for years. The stock will not be our highest performing investment, but it is the most knowable. As our base measure of opportunity cost, it remains a nice hurdle.

I'd like to extend a special note of gratitude to Lincoln Minor. Lincoln works for the USDA but has a deep passion for the investment world and all things Berkshire. He has graciously done more than yeoman's duty with the edit of the letter for the past few years. Thorough, detailed, he makes the nuns that taught me grammar by diagramming sentences seem illiterate by comparison (and they were good). I'm skeptical about the rest of government, but our agriculture department is in very good hands with Lincoln on board.

It's been 23 years since Chad and I launched this place, but it seems like yesterday. Truly. The team at Semper is exceptional and a joy to work with. All are committed to the task at hand. Stewardship of your capital comes with enormous responsibility, and we will never approach the mission with anything but our undivided care, focus and respect. We remain humbled by your confidence.

Whether you jumped to the summary or slogged through the whole thing, many thanks for the time you willingly devote to the letter. Comments and feedback are always welcome, particularly if favorable. We look forward to catching up during the year. Now, fully recovered from a modest bout with the COVID in September, and six weeks since the last sip of wine, I'm five minutes from testing whether a nice left-bank smells like Bordeaux, or like nothing at all. The deck is rich, however. I'd like to double down, dealer.

Christopher P. Bloomstran

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APPENDIX

Appendix A

Key Business Segment Information – Berkshire Hathaway 2021 Expected

Berkshire Hathaway Energy (91.1% owned)	
Revenues Total	$25.7 B
Energy Operating Revenue	$19.2 B
Real Estate Operating Revenue	$6.5 B
Pre-tax Income (excludes gain/loss BYD and invest.)	$4.0 B
Net Income (GAAP, net of non-controlled interest)	$4.7 B
Net Income (adjusted for cash taxes)	$5.4 B
Reported Tax Rate (derived MD&A-not cash adjusted)	-30.0%
Cash Tax Rate (deferred taxes exceed reported tax)	-47.0%
Goodwill (From BHE 10-Q, 10-K)	$11.6 B
Deferred Tax Liability (Including $1.7B for investments)	$13.2B
Depreciation and Amortization	$3.8B
Capital Expenditures (Mgt. Estimate)	$6.8 B
BYD and Other NDC Trust Stocks; BYD $6.868B)	$7.7 B
Equity (including BYD, NDCs, Rabbi and Non-Control))	$50.6 B
Equity Net of Non-Controlling Interests	$46.1 B
Equity (excluding $6.2 B investments net of DTL)	$44.4 B
Berkshire Equity After NCI and Net of BYD/Investments	$39.5 B
Total Assets (including BYD and Investments)	$132 B
Debt	$52.1 B
Cash	$2.9 B
Interest	$2.1 B
After-Tax Interest	$1.7 B
ROE GAAP w/ % DTL (includes $9.7 billion goodwill)	11.9%
ROE (adjusted for cash taxes)	13.7%
ROC Net of Cash	8.5%
Estimated Value (Net of Non-Controlling Interest)	$81-86 B
Estimated Value With BYD Net of Tax and NCI	**$87-92 B**
Implied P/E	15-16

BNSF	
Revenues	$22.5 B
EBIT	$8.1 B
Pre-tax Income	$7.9 B
Net Income (norm tax rate now 24.0%)	$6.0 B
Net Income (cash tax adjusted)	$6.7 B
Goodwill (BNSF SEC and STB filings)	$14.8 B
Equity (estimated from STB and GAAP filings)	$44.5 B
Total Assets	$90 B
Debt (ex-lease)	$23.3 B
Cash	$2.1 B
Interest	1.03 B
After-Tax Interest	$0.82 B
Deferred Tax Liability	$14.9 B
Equities as an Investment (None now)	n/a
Depreciation and Amortization	$2.4 B
Capital Expenditures	$3.0 B
ROE GAAP Net Income	13.5%
ROE Adjusted for Cash Taxes	15.0%
ROC Net of Cash	11.4%
Estimated Value	**$115-135 B**
Implied P/E (on net adjusted for cash taxes)	17-20

MSR Businesses + Finance & Financial Products	
Revenues	$151.6 B
Pre-tax Income	$14.4 B
Net Income at 23.4% assumed tax rate	$11.0 B
Profit margin	7.3%
Goodwill (net of 2020 PCP $10B write-down)	$31.9 B
Other Intangibles (net of 2020 PCP $600m write-down)	$27.2 B
Total Assets (Identifiable + Intangibles)	$196.3 B
Equity (Write-down 10.0 and 0.6 PCC 2020)	$113.6 B
DTL (Unallocated estimate)	$10.4 B
Depreciation of Tangible Assets	$3.5 B
Capital Expenditures	$3.9 B
Total Debt (allocated interest expense Ins & Other & Una	$17.9 B
Cash (Offset to Debt; Balance to HoldCo)	$28.8
Interest	$0.8 B
After-Tax Interest	$0.630 B
ROE (If equity 10.6B higher for PCP writedown: 8.8%)	9.6%
ROTE (excluding goodwill & other intangibles)	20.0%
ROC Net of Cash	11.1%
Estimated Value	**$200-210 B**
Implied P/E	18-19

HoldCo	
KHC 26.7%; 325,635m shares (MV 11.690 2021; cash cost $9.8 B)	$13.300
KHC Market Value Adjustment	-$1.310
Other Equity Method (PFJ, Berkadia, ETT(in BHE)) from 4.0 roc	$3.400
Itochu, Mitsubishi, Mitsui, Sumitomo, Marubeni) ($8.640B in Insurance)	$0.000
Diageo $912M, IAG AU $302M (In Insurance)	$0.000
Other Non-13-F Holdings (total $14.701B 202e: BYD/Rabbi NDCs in BHE;)	$6.868
Cash (MSR cash assumed to offset MSR debt; Annual in HCO financials)	$28.527
TOTAL HOLDCO ASSETS	**$50.785**
Debt (Interest Paid MSR 66.8% of MSR + Not segment allocated)	$21.779
Deferred Tax Liability (All balance to MSR)	$1.175
HoldCo Net Assets	**$27.831**
KHC Eq Method Earnings (increase cost basis; (e) full 21% tax difference)	$0.902
Divs KHC (reduce basis of investment: $521m can't count here but taxed)	$0.000
Additional KHC Deferred Tax Liability/Asset not on BS	$0.000
Other Equity Method Earnings ($683m 2019 increases basis)	$0.933
Dividends of equities (recorded as income at subs)	$0.106
Interest Income	$0.600
Retained Earnings of Holdco Stocks and BHE Stocks	$0.247
Retained Earnings of BYD; Owned in BHE but earnings not attributed to BHE	$0.056
Optionality of holdco cash with $30B permanent: $7.4B @ 7% - .1%	$0.511
Interest Expense (not allocated to subs)	-$0.326
Normalizing Net Pension Expense for GAAP Adjustment	-$0.439
Net Investment Income Pre-Tax	$2.6
Net Investment Income After-Tax	**$2.2**
Estimated Value (Investments - HoldCo Debt)	**$27.8 B**

Insurance Operations - Estimated at December 31, 2021	
Premiums Earned (Excludes Retroactive Premiums Earned)	$69.3 B
Statutory Surplus (Equity) $237B 2020	$272 B
Book Value GAAP	$275 B
Float (84 2014, 88 B 15, 91 B 16, 114.5 B 2017, 123 18, 129 19; 138 20)	$148 B
Losses Paid	$42 B
Expected After-Tax Underwriting Gain 2021:	$1.04 B
Normalized Underwriting Margin: 5% Pre-tax (Ex Retro and PPA Amortization)	$3.5 B
Normalized Underwriting Net Profit	**$2.7 B**
Capitalized Value from Underwriting ***	$41 B
Goodwill (Other Intangibles immaterial)	$15.2 B
DTL (Investment Gain+Def Charges Reins-Unpaid Losses/LAE-Unearned Premiums)	$52 B
Insurance Estimated Value	
Total Investment Assets	**$453 B**
Equity securities valuation premium/discount 15% 2021 (-19B 2019; -39B 2020)	**- 50 B**
Capitalized Value from Underwriting	**$41 B**
Estimated Value	**$444 B**

Insurance Investments (December 31, 2021 estimated)	
Equity Securities (Includes JPN Trade; DEO; IAG AU) 269.4 - OXY '20	$324.6 B
Fixed Income Securities	$18.0 B
OXY Pfd/Wts (Included in Insurance Investments Footnote) 9.284 B	$12.1 B
Cash	$92.0 B
Other (3.75B BHE Pfd: 1.45 paid 2021; 2B Seritage Term Loan	$5.8 B
Total Investment Assets (326.1 Y/E 2019; 363.1 2020)	**$452.5 B**
Investment Income and Earnings (to reconcile)	
Dividends (annualized at 12/31 estimated)	$5.0 B (1.54% div yield)
Retained Earnings of Common Stocks	$11.7 B (3.60% REY)
Total Earnings of Common Stocks	$16.7 B (19.4 P/E; 5.14% EY)
Divs on OXY (paid as shares and sold)	$0.8
Interest on Fixed Income and Cash	$0.084 B
Total Pre-Tax Earnings of Investments ($17.3B 2019)	$18.1 B
Optionality of Cash > One-Year Losses Paid #	$3.5 B
Pre-tax Earnings with Optionality of Surplus Cash **	$21.6 B
Paid and Hypothetical Taxes (11.0% blended; RE of stocks 3%)	$1.4 B
Investment Net Income	**$20.2 B**

Source: Semper Augustus

Appendix B – Capital Expenditures and Depreciation; Deferred-Tax Liabilities

CAPITAL EXPENDITURES AND DEPRECIATION; DEFERRED TAX LIABILITIES

(Dollars in millions)

Berkshire Total (All Operating Businesses)

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021 (E)	Total
Capital Expenditures	1,278	2,195	4,571	5,373	6,138	4,937	5,980	8,191	9,775	11,087	15,185	16,082	12,954	11,708	14,537	15,979	13,012	15,000	173,982
Depreciation	941	982	2,066	2,407	2,810	3,127	4,279	4,683	5,146	5,418	6,215	6,673	7,411	7,719	8,386	8,747	9,319	8,386	94,715
Difference	337	1,213	2,505	2,966	3,328	1,810	1,701	3,508	4,629	5,669	8,970	9,409	5,543	3,989	6,151	7,232	3,693	6,614	79,267

BHE

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021 (E)	Total
Capital Expenditures			2,423	3,513	3,936	3,413	2,593	2,684	3,380	4,307	6,555	5,876	5,090	4,571	6,241	7,364	6,765	6,843	75,554
Depreciation			949	1,157	1,128	1,246	1,262	1,333	1,440	1,577	2,177	2,451	2,560	2,548	2,830	2,947	3,376	3,800	32,781
Difference	-	-	1,474	2,356	2,808	2,167	1,331	1,351	1,940	2,730	4,378	3,425	2,530	2,023	3,411	4,417	3,389	3,043	42,773

BNSF

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021 (E)	Total
Capital Expenditures							1,829	3,325	3,548	3,918	5,243	5,651	3,819	3,256	3,116	3,608	3,063	2,957	43,333
Depreciation							1,221	1,480	1,573	1,655	1,804	1,932	2,079	2,304	1,890	2,350	2,423	2,440	23,151
Difference	-	-	-	-	-	-	608	1,845	1,975	2,263	3,439	3,719	1,740	952	1,226	1,258	640	517	20,182

BHE + BNSF

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021 (E)	Total
Capital Expenditures			2,423	3,513	3,936	3,413	4,422	6,009	6,928	8,225	11,798	11,527	8,909	7,827	9,357	10,972	9,828	9,800	118,887
Depreciation			949	1,157	1,128	1,246	2,483	2,813	3,013	3,232	3,981	4,383	4,639	4,852	4,720	5,297	5,799	6,240	55,932
Difference	-	-	1,474	2,356	2,808	2,167	1,939	3,196	3,915	4,993	7,817	7,144	4,270	2,975	4,637	5,675	4,029	3,560	62,955

DEFERRED TAX LIABILITIES *

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017 **	2018	2019	2020	2021 (E)	
Investments	11,020	11,882	14,520	13,501	4,805	11,880	13,376	11,404	16,075	25,660	26,633	36,770	27,669	24,251	17,765	32,134	40,181	51,419	
Def Ch Reinsurance Assumed	955	828	687	1,395	1,373	1,385	1,334	1,449	1,392	1,526	2,721	2,798	2,876	3,226	2,970	2,890	2,613	2,400	
PP&E	1,201	1,202	4,775	4,890	7,004	8,135	24,746	28,414	29,715	32,409	34,618	36,770	39,345	26,671	28,279	29,388	30,203	31,500	
Goodwill and Intang												2,770	11,344	7,204	7,199	7,293	6,753	6,100	
Other	1,174	1,165	2,591	2,743	4,024	4,236	5,108	6,378	6,485	6,278	6,396	4,555	5,550	3,216	3,187	3,144	3,736	3,900	
Total	14,350	15,077	22,573	22,529	17,206	25,636	44,564	47,645	53,667	65,873	70,368	83,663	86,784	64,568	59,400	74,849	83,486	95,319	Annual Update

Source: Semper Augustus

Appendix C – Cash and GAAP Tax Reconciliation

CASH TAXES AND GAAP TAXES

	Cumulative	2021e	2020	2019	2018	2017	2016	2015	2014	2013	2012	2011	2010	2009	2008	2007	2006	2005	2004	2003
Earnings Before Tax	571,341	111,186	55,693	102,696	4,001	23,838	33,667	34,946	28,105	28,796	22,236	15,314	19,051	11,552	7,574	20,161	16,778	12,791	10,936	12,020
GAAP Taxes **	143,595	20,982	12,440	20,904	- 321	*6,685*	9,240	10,532	7,935	8,951	6,924	4,568	5,607	3,538	1,978	6,594	5,505	4,159	3,569	3,805
Net Income *	427,746	90,204	43,253	81,792	4,322	17,153	24,427	24,412	20,170	19,845	15,312	10,746	13,494	8,441	4,994	13,213	11,015	8,528	7,308	8,151
Tax Rate	25.1%	18.9%	22.3%	20.4%	-8.0%	28.0%	27.4%	30.1%	28.2%	31.1%	31.1%	29.8%	29.4%	30.6%	26.1%	32.7%	32.8%	32.5%	32.6%	31.7%
Current Taxes	82,994	6,595	5,052	5,818	5,176	3,299	6,565	5,426	3,302	5,168	4,711	2,897	3,668	1,619	3,811	5,708	5,030	2,057	3,746	3,346
Deferred Taxes	60,601	14,387	7,388	15,086	- 5,497	3,386	2,675	5,106	4,633	3,783	2,213	1,671	1,939	1,919	- 1,833	886	475	2,102	- 177	459
Total Tax	143,595	20,982	12,440	20,904	- 321	6,685	9,240	10,532	7,935	8,951	6,924	4,568	5,607	3,538	1,978	6,594	5,505	4,159	3,569	3,805
Current as Percent of Total Tax	57.8%	31.4%	40.6%	27.8%	-1612.5%	49.3%	71.0%	51.5%	41.6%	57.7%	68.0%	63.4%	65.4%	45.8%	192.7%	86.6%	91.4%	49.5%	105.0%	87.9%
Deferred as Percent of Total Tax	42.2%	68.6%	59.4%	72.2%	1712.5%	50.7%	29.0%	48.5%	58.4%	42.3%	32.0%	36.6%	34.6%	54.2%	-92.7%	13.4%	8.6%	50.5%	-5.0%	12.1%
Current Tax Rate	14.5%	5.9%	9.1%	5.7%	129.4%	13.8%	19.5%	15.5%	11.7%	17.9%	21.2%	18.9%	19.3%	14.0%	50.3%	28.3%	30.0%	16.1%	34.3%	27.8%
Deferred Tax Rate	10.6%	12.9%	13.3%	14.7%	-137.4%	14.2%	7.9%	14.6%	16.5%	13.1%	10.0%	10.9%	10.2%	16.6%	-24.2%	4.4%	2.8%	16.4%	-1.6%	3.8%
Total Tax Rate	25.1%	18.9%	22.3%	20.4%	-8.0%	28.0%	27.4%	30.1%	28.2%	31.1%	31.1%	29.8%	29.4%	30.6%	26.1%	32.7%	32.8%	32.5%	32.6%	31.7%

* Before earnings attributable to noncontrolling interests

** GAAP Taxes for 2017 exclude one-time nontaxable gain of $28,200 for TCJA; Offset is deferred taxes as reported were (24,814) adjusted to $3,386; the $24,814 is a reduction of net DTL's

2020 Write-down Precision Castparts: $10 billion Goodwill (not tax deductible); $400 million after-tax other intangibles

Source: Semper Augustus

Appendix D -- Reported Segment Profit by Berkshire's JV Partners

Year	Berkadia Net Income	Berkadia Distributions	Carrying amount of Equity and Loans
2009	$20.8	$0.0	$240.0
2010	$16.2	$29.0	$475.1
2011	$29.0	$23.6	$193.5
2012	$38.0	$37.6	$172.9
2013	$84.7	$69.0	$182.6
2014	$101.2	$72.9	$208.5
2015	$78.1	$89.6	$191.0
2016	$94.2	$100.8	$184.4
2017	$93.8	$67.4	$210.6
2018	$80.1	$41.0	$245.2
2019	$88.2	$65.1	$268.9
2020	$68.9	$37.1	$301.2

Year	ETT Net Income	Carrying amount of ETT Investment	
2007			
2008			
2009		$53.5	Project Completion date 2017. Estimated cost, $3.1 billion (9.96% ROE)
2010		$110.3	
2011		$223.5	
2012	$41.0	$353.7	Project Completion date 2022. Estimated cost, $3.05 billion (9.96% ROE)
2013	$53.0	$455.0	
2014	$84.7	$527.0	
2015	$86.4	$609.8	
2016	$97.4	$725.5	
2017	$82.0	$664.0	
2018	$62.0	$666.0	
2019	$66.0	$695.0	
2020	$68.0	$732.0	Estimated cost, $3.5 billion (9.6% ROE)

Appendix E – Semper Augustus Investments Group Historical Returns

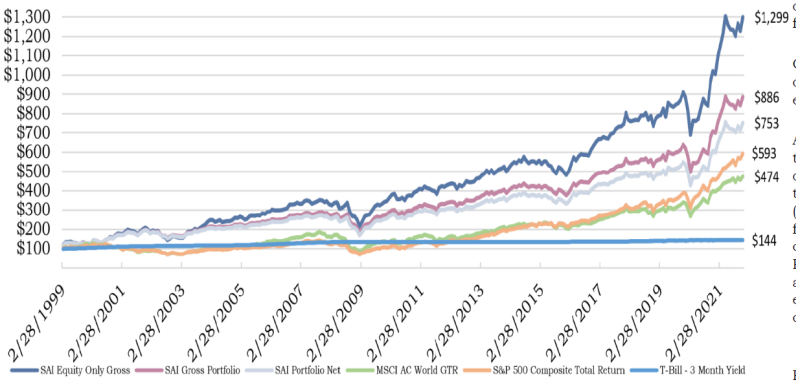
Composite Performance

Year End	Gross of Fees	Net of Fees	Gross of Fees Equities Only*	MSCI All Country World Index	S&P 500
1999**	29.9%	29.5%	29.1%	27.5%	19.9%
2000	26.8%	26.4%	30.7%	-14.0%	-9.1%
2001	20.8%	20.1%	23.1%	-15.9%	-11.9%
2002	-15.5%	-16.0%	-22.0%	-19.0%	-22.1%
2003	21.8%	20.7%	38.2%	34.6%	28.7%
2004	9.2%	8.2%	16.3%	15.8%	10.9%
2005	6.2%	5.6%	7.4%	11.4%	4.9%
2006	14.2%	13.4%	18.4%	21.5%	15.8%
2007	3.8%	3.1%	3.1%	12.2%	5.5%
2008	-20.3%	-21.3%	-21.6%	-41.9%	-37.0%
2009	22.0%	21.0%	27.9%	35.4%	26.5%
2010	12.8%	11.8%	14.4%	13.2%	15.1%
2011	6.9%	6.2%	7.1%	-6.9%	2.1%
2012	6.5%	5.7%	6.8%	16.8%	16.0%
2013	15.5%	14.7%	17.3%	23.4%	32.4%
2014	4.6%	3.9%	5.2%	4.7%	13.7%
2015	-8.7%	-9.3%	-10.3%	-1.8%	1.4%
2016	22.1%	21.3%	27.7%	8.5%	12.0%
2017	13.5%	12.7%	18.0%	24.6%	21.8%
2018	-1.3%	-2.0%	-1.4%	-8.9%	-4.4%
2019	20.4%	19.6%	23.6%	27.3%	31.5%
2020	11.2%	10.4%	11.9%	16.8%	18.4%
2021	24.9%	24.0%	27.3%	19.0%	28.7%

	Gross of Fees	Net of Fees	Gross of Fees Equities Only*	MSCI All Country World Index	S&P 500
Cumulative Since Inception**	786.2%	653.4%	1199.2%	374.4%	492.5%
Annualized Since Inception**	10.0%	9.2%	11.9%	7.1%	8.1%

* This is supplemental information

** Inception Date 2/28/1999. # Firm Assets at 12/31/21 is $390 million and at 12/31/20 was $305 million.



Firm Overview:

Semper Augustus Investments Group, LLC claims compliance with the Global Investment Performance Standards (GIPS®). For the purpose of complying with GIPS, SAI defines itself as Semper Augustus Investments Group, LLC, an independently registered investment adviser. For purposes of determining firm assets under management, SAI includes all discretionary and non-discretionary assets as well as all fee paying and non-fee paying.

Composite Description:

The Semper Augustus Fundamental Intrinsic Value Equity consists of portfolios managed for Semper Augustus' clients according to the firm's published investment philosophy. Semper Augustus employs a fundamental value investment strategy, identifying companies earning free cash returns in excess of a realistic estimate of the firm's cost of capital. Our firm defines risk as a permanent loss of capital, not as volatility around some mean. Portfolios have generally contained fewer than 30 holdings and are often concentrated in a small handful of businesses with high business quality and share prices at a significant discount to conservative appraisals of intrinsic business value. These dual margins of safety are crucial to the investment process, and lend themselves to generally long holding periods and low portfolio turnover. During periods of high volatility, turnover can be opportunistically higher. Investments are made across all market capitalizations, in both domestic and globally headquartered businesses. Our firm makes international investments in businesses domiciled in industrialized countries where the rule of law is strong and accounting standards are high. We are benchmark agnostic. Industry weightings are not a consideration. The composite includes the income and performance derived from various option-writing strategies in some client accounts. Allocations to cash are a byproduct of the investment process and not a permanent allocation. To be included in the composite, accounts must meet certain thresholds of equity securities purchased by SAI. This method generally excludes accounts that are managed as "balanced" accounts and client accounts that have not met the required threshold for inclusion. Cash and equivalents have been significant holdings at times.

Index Return Information:

The MSCI ACWI returns are gross of any fees required to replicate the index and are also pre-tax. The index is theoretically passive (unmanaged) but in reality, replication requires trading costs and some management fees. Fundamental Intrinsic Value Equity may differ materially from the index as the Fundamental Intrinsic Value Equity owns concentrated positions and the MSCI ACWI has a bias towards large cap stocks. Fundamental Intrinsic Value Equity has included varying investments in small, mid and large cap stocks in addition to investments in cash and short-duration fixed income securities. The MSCI ACWI is broadly used as an investment benchmark. The MSCI ACWI index is the benchmark for Fundamental Intrinsic Value Equity.

The S&P 500 returns are gross of any fees required to replicate the index and are also pre-tax. The index is theoretically passive (unmanaged) but in reality, replication requires trading costs and some management fees. The Fundamental Intrinsic Value Equity may differ materially from the index as the Fundamental Intrinsic Value Equity owns concentrated positions and the S&P 500 has a bias towards large cap stocks and holds only U.S. domiciled companies. Fundamental Intrinsic Value Equity has included varying investments in small, mid and large cap stocks, both foreign and domestic, in addition to investments in cash and fixed income securities. The S&P 500 is broadly used as an investment benchmark and is presented in this document to provide a clear measure of how the strategy did against the general stock market.

Composite Return Details:

Supervised assets are defined as assets acquired by SAI in client accounts based on the discretion granted in client agreements. This process involves the establishment of a model security and the dates whereby the security is held. For securities received into an account prior to or after the model period; directed purchases by a client; or corporate actions arising from non-model securities; these securities have been excluded from the supervised assets. SAI must have initiated the trade or the security was a model security when transferred into an account for its performance to be included in the composite.

Returns are presented both gross of management fee and net of management fees and performance fees and include the reinvestment of all income. The composite was created on March 1, 2018. The U.S. Dollar is the currency used to express performance.

Returns are presented net of all commissions and any margin interest expense incurred in the management of portfolio accounts. Actual returns will be reduced by investment advisory fees and any other expenses that may be incurred in the management of the portfolio accounts. The collection of fees produces a compounding effect on the total rate of return net of management fees.

Gross of Fees Equities Only: Represents the actual performance of all equity securities included in the composite, including reinvested dividends. It is a pure equity only return and does not have any cash equivalents or fixed income securities included.

Actual returns will be reduced by investment advisory fees and other expenses that may be incurred in the management of the account. The collection of fees produces a compounding effect on the total rate of return net of management fees. As an example, the effect of investment management fees on the total value of a client's portfolio assuming (a) quarterly fee assessment, (b) $1,000,000 investment, (c) portfolio return of 8% a year, and (d) 1.00% annual investment advisory fee would be $10,416 in the first year, and cumulative effects of $59,816 over five years and $143,430 over ten years. The annual composite dispersion presented is an asset-weighted standard deviation. To obtain a GIPS Composite Performance Report and/or the firm's list of composite descriptions, please contact Chad Christensen at csc@semperaugustus.com. GIPS® is a registered trademark of CFA Institute. CFA Institute does not endorse or promote this organization, nor does it warrant the accuracy or quality of the content contained herein.

Past performance is not indicative of future results.