Vibhu Janardhanan

# A Gentle And Practical Introduction To Value Investing

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# The Joys Of Compounding

If, in some cataclysm, all of investing knowledge were to be destroyed, and only one sentence passed on to the next generations, what statement would contain the most information in the fewest words? Without blinking my eye I would pass on the definition given by Benjamin Graham who is the father of value investing.



*An investment operation is one which, upon thorough analysis, promises safety of principal and an adequate return. Operations not meeting these requirements are speculative. - Benjamin Graham*

We will decipher the meaning of this definition later in the course. For now I'm going to play a game by copying the definition by hand. In the process of copying I would deliberately make a single character mistake. The copied statement with a single character mistake is given below.

*An inve**t**tment operation is one which, upon thorough analysis, promises safety of principal and an adequate return. Operations not meeting these requirements are speculative. - My copy with a single mistake*

This copied text is given to my friend who will copy it by hand and deliberately make a single character mistake at a different place. He passes his copy to his friend and this continues 150 times. The copy produced by the last person in the chain will appear as given below.

*Bo jowftunfou pqfsbujpo jt pof xijdi, vqpo uipspvhi bobmztjt, qspnjtft tbgfuz pg qsjodjqbm boe bo befrvbuf sfuvso. Pqfsbujpot opu nffujoh uiftf sfrvjsfnfout bsf tqfdvmbujwf. - Copy of 150th person with 150 mistakes*

If I show the last copy to a stranger and tell him that there is a relationship between this and the original definition produced by Benjamin Graham. How would he react? He would think that I'm mad and most likely he'll run away.

The rules I used to play this game, copying with a mistake, is what evolution, in the name of **mutations**, played for three billion years. The diversity of life we see all around us is a result of that. What's this got to do with value investing? Hang on to your thoughts and I'll make it all clear before the end of this lecture.

## Evolution: Who colored the mice in Arizona?

In the deserts of Arizona, million-year-old black lava flows are inhabited by rock pocket mice. In this region, the mouse can be seen in two colors dark black and sandy-colored. The dark color mouse are found most often in black lava rocks. And white color mouse are found most often in sandy-colored habitat. Take a look at the image given below. Before the lava flows all the mouse were sandy-colored. A curious mind should ask couple of questions **(1)** how did some mice manage to change from sandy-colored to black? **(2)** how did the mice organize itself according to its surroundings?



For the mouse to change from sandy to black color three things needs to take place. They are **(1)** mutations **(2)** natural selection and **(3)** time. Let us look at each one of them in detail.

**Mutations:** In order to reproduce, organisms must make copies of their DNA. The copying of DNA is a complex biochemical processes. And mistakes happen during the copying process. These mistakes are mutations and they are the source of all the varieties (plants, bacteria, fish, lion, monkey, and humans) that we see around us. The game that I played above contained one kind of a mistake - a typo or copying error. But during a DNA copying process many kinds of mistakes are possible.

*If we think of DNA as being like a written text, then the categories of mutations are just like the familiar kinds of word processing errors. The DNA of a given species ranges from millions to billions of permutations of the four letters A, C, G, and T. The most common mistake is the substitution of an incorrect letter—a typo.* **But there are many other kinds of events that also occur, such as deletions and insertions of blocks of letters. Copy and paste errors also occur; these result in duplications of text.** *Groups from just a few letters on up to entire genes, or large blocks of genes, are duplicated at a significant frequency. Blocks of DNA letters are also rearranged—by inversions and the breakage and joining of parts of text. As a result, in every new individual, there are some new mutations.* – *The Making of the Fittest*

In a mouse there is a gene called MC1R and when mutated turns the color of the mouse from white to black. What is the probability of this gene to mutate? In a gene the place where mutation can occur is called as a site. In a mouse, on average a mutation can occur in 2 out of every billion site. There are two copies of MC1R gene. And each MC1R gene has 10 sites. This tells us that there is about a 1 in 25 million chance of a mouse having a black-causing mutation in the MC1R gene. This shows how accurate DNA copying is. But it's not perfect.

Total no of mutations for every 1 billion site    = 2
Total sites in MC1R gene that can be mutated  = 20 (2 copies * 10 sites)
No of mutations that can happen in MC1R gene = [ $20 / 10^9$ ] * 2
No of mutations that can happen in MC1R gene = 0.00000004
One black mouse out of 25 million            = 1 (25 million * 0.00000004)

Imagine that there are 5,000 white female mice in the population and each one of them is capable of producing 5 offsprings. This means that every year there will be 25,000 offsprings and in 1,000 years a group of white female mice would have produced one black mouse just by random chance.

The lava in Arizona was formed over 1.7 million years and during this period the mutation would have produced 1,700 black mice. Our evolutionary clock is 3 billion years old. So don't be surprised of 1.7 million years as it represents only 0.056% of the total evolutionary time. Mutation is a random chance occurrence, remember in the game we played I made the mistake deliberately. After creating a variation it hands over the job to natural selection.

**Natural Selection:** Many think that the entire process of evolution is blind. But that's not correct. The mutational process is blind, natural selection is not. If the black mouse was born around black lava rocks then the predators like owls and snakes will not be able to spot it easily. So this trait (black color) gives it survival and reproduction advantage. On the other hand if it was born around sandy environment then it would have been killed before passing its traits to its offsprings. Thus the process of natural selection acts as a cop to favor mutations which suits the environment.

**Time:** Without mutation and natural selection there would be no variation and orderliness that we see in the world. People don't have problems understanding these two concepts. But their misunderstanding of evolution comes from the time factor. In order to understand the massive impact time had on evolution, let's go back to our middle school. If you were awake in middle school mathematics class then you shouldn't have any trouble recognizing the formula given below.



Hope you recognized compound interest without thinking too much. Compound interest is a concept from mathematics used extensively by bankers. Why am I referring to it to explain evolution which is a field of biology? Physics, mathematics, chemistry, biology, sociology, etc are nomenclatures created by us to aid our brain to understand them better.

But mother nature doesn't care about our categorization and compartmentalization. And she uses the right tools available at her disposal as long as they don't violate the first principles of physics. **The key takeaway is that if you want to understand nature better then you need to use the right tools across disciplines.**

Let me derive the compound interest equation in layman terms so that we know the innards of the equation instead of just knowing its name. Let principal (P) is $100 and rate of interest (r) per annum is 6% and duration of investment in number of years (t) is 2 and number of times per year interest gets compounded (n) is 1.

$Final\ Amount\ =\ 100\ +\ 100\ *\ 0.06\ +\ (100\ +\ (100\ *\ 0.06))\ *\ 0.06$

$Final\ Amount\ =\ 100\ +\ 100\ *\ 0.06\ +\ 100\ *\ 0.06\ +\ 100\ *\ (0.06)^2$

$Final\ Amount\ =\ 100\ *\ (1\ +\ 0.06\ +\ 0.06\ +\ (0.06)^2)$

$Final\ Amount\ =\ 100\ *\ (1\ +\ 2\ *\ (0.06)\ +\ (0.06)^2)$

$Final\ Amount\ =\ 100\ *\ (1\ +0.06)^2$

$Final\ Amount\ =\ P\ *\ (1\ +r)^t$

$Final\ Amount\ =\ 100\ *\ (1\ +0.06)^2$

$Final\ Amount\ =\ 112.36$

Let's apply the idea of compound interest to understand how time played a crucial role in changing the color of the mice from white to black. Let us assume that the black mice has a survival advantage in black lava rocks over white mice by 1.9%. Survival advantage in natural selection is akin to interest rate in finance. See how ideas interplay across disciplines.

Since mutation has already produced many black mice, let us assume that there are 9,992 white mice and 8 black mice. At the start the population will have 99.92% $(9992 / 10000)$ white mice and 0.08% $[8 / 10000]$ black mice. After 500 years with black mice growing at 2% there will be 159,653 $[8 * (1 + 0.02)^{500}]$ black mice. And with white mice growing at 0.1% there will be 16,470 $[9992 * (1 + 0.001)^{500}]$ white mice. This will result in population having 90.65% $[159653 / 176123]$ black mice and and 9.35% $[16470 / 176123]$ white mice.

Even though mutation and natural selection gave variation and orderliness it's time, 1.75 million years, which played a key role in producing such a dramatic result. **The key takeaway is that even tiny survival advantages (read it as very low rate of interest) will produce mind blowing results if it's done over long periods of time.** Hold on to this idea and we'll come back to it later in the lecture.

The reason why we have trouble understanding time is that our average lifetime is around 70 years. This is a tiny number when compared to 1.75 million years. Later in the lecture I'll give some examples to prove that our brain thinks linearly and it's default wiring is not good enough to see the power of exponents.

### Rock Pocket Mice population in %

A difference of 1.9% in selection rate shifted the population % in black mice favor in 500 years.
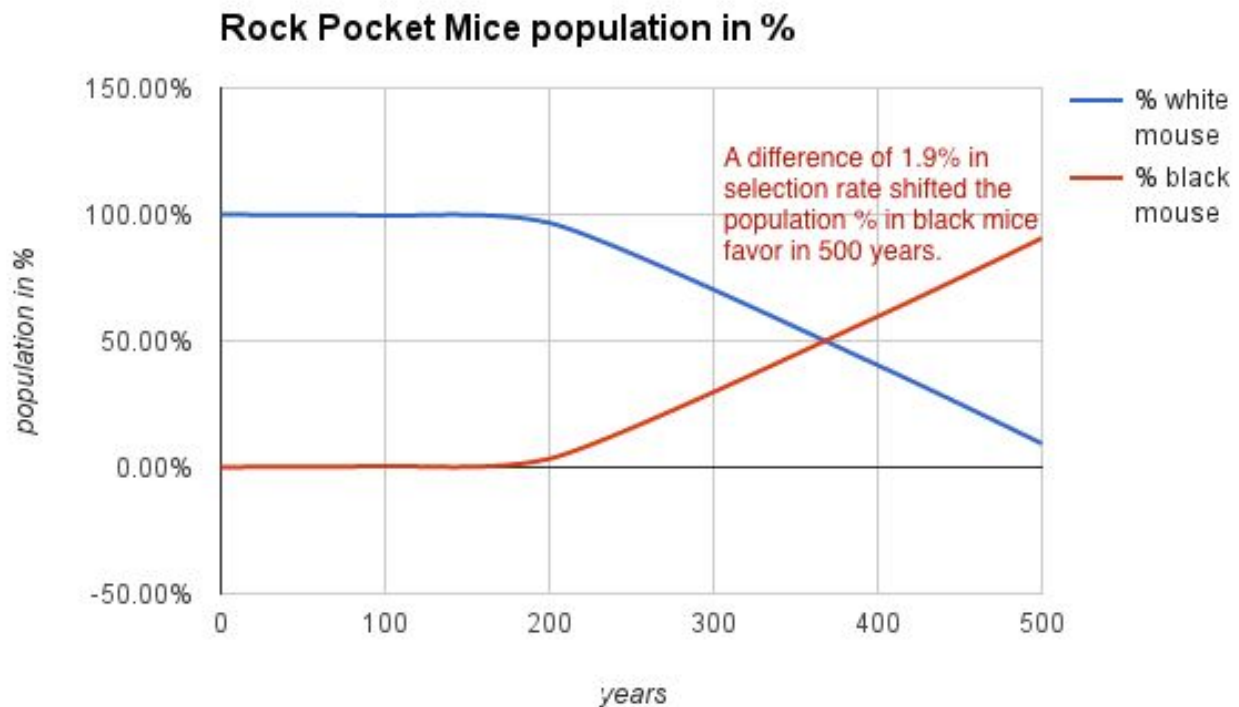
## Warren Buffett: A Learning Machine who ran at 19.6% for 50 years

After playing the game of compounding for 3 billion years evolution produced us with a three pound jelly; brain. Most of us without realizing the true power of our brain let it attenuate with disuse. But one man knew its power and worked hard at it to keep it sharp even at the age of eighty-five. His name is Warren Buffett, who was a student of Benjamin Graham, Chairman & CEO of Berkshire Hathaway. What is so special about him?

Over the last 50 years, since Buffett took over the company, its per-share book value has grown from \$19 to \$146,186. He compounded the per-share book value at 19.6% $[\$19 * (1 + 0.196)^{50}]$ for 50 years. If one compares 50 years with evolutionary time scale of 3 billion years then it would be miniscule; a rounding error. When compared with the average lifetime of humans, 70 years, we can see that Buffett took huge advantage of time. On interest rate Buffett beat evolution hands down; interest rate of 19.6% vs mutation rate of 0.000004% for pocket mice.
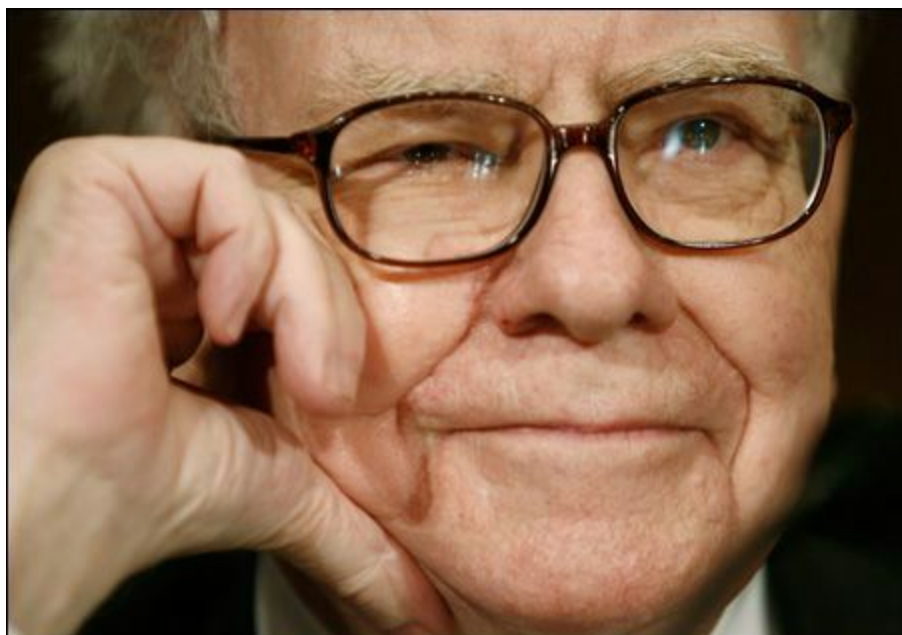


Why were Warren Buffett and his creation, Berkshire Hathaway, so unusually successful? This question was answered by Charlie Munger, Vice-Chairman of Berkshire Hathaway, in 2007 DJCO meeting. Read, reread, and reflect on Munger's response. They are golden nuggets and it contains all the information that one needs to lead a rational life.

> *A confluence of factors in the same direction caused Warren's success. It's very unlikely that a lollapalooza effect can come from anything else. So let's look at the factors that contributed to this result: The first factor is the mental aptitude. Warren is seriously smart. On the other hand, he can't beat all comers in chess blindfolded. He's out-achieved his mental aptitude. Then there's the good effect caused by his doing this since he was 10 years old. It's very hard to succeed until you take the first step in what*

*you're strongly interested in. There's no substitute for strong interest and he got a very early start.*

*This is really crucial:* **Warren is one of the best learning machines on this earth***.* **The turtles who outrun the hares are learning machines. If you stop learning in this world, the world rushes right by you.** *Warren was lucky that he could still learn effectively and build his skills, even after he reached retirement age. Warren's investing skills have markedly increased since he turned 65. Having watched the whole process with Warren, I can report that if he had stopped with what he knew at earlier points, the record would be a pale shadow of what it is.*

*The work has been heavily concentrated in one mind. Sure, others have had input, but Berkshire enormously reflects the contributions of one great single mind. It's hard to think of great success by committees in the investment world – or in physics. Many people miss this. Look at John Wooden, the greatest basketball coach ever: his record improved later in life when he got a great idea: be less egalitarian. Of 12 players on his team, the bottom five didn't play – they were just sparring partners. Instead, he concentrated experience in his top players. That happened at Berkshire – there was concentrated experience and playing time.*

*This is not how we normally live: in a democracy, everyone takes turns. But if you really want a lot of wisdom, it's better to concentrate decisions and process in one person. It's no accident that Singapore has a much better record, given where it started, than the United States. There, power was concentrated in one enormously talented person, Lee Kuan Yew, who was the Warren Buffett of Singapore.*

*Lots of people are very, very smart in terms of passing tests and making rapid calculations, but they just make one asinine decision after another because they have terrible streaks of nuttiness. Like Nietzsche once said: "The man had a lame leg and he's proud of it." If you have a defect you try to increase, you're on your way to the shallows. Envy, huge self-pity, extreme ideology, intense loyalty to a particular identity – you've just taken your brain and started to pound on it with a hammer. You'll find that Warren is very objective.*

*All human beings work better when they get what psychologists call reinforcement. If you get constant rewards, even if you're Warren Buffett, you'll respond – and few things give more rewards than being a great investor. The money comes in, people look up to you and maybe some even envy you. And if you buy a whole lot of operating businesses and they win a lot of admiration, there's a lot of reinforcement. Learn from this and find out how to prosper by reinforcing the people who are close to you. If you want to be happy in marriage, try to improve yourself as a spouse, not change your spouse. Warren has known this from an early age and it's helped him a lot. - [2007; DJCO Meeting](#)*

**The key takeaway from Warren Buffett is that if you want to create a huge impact in one's lifetime, like creating a successful conglomerate, then you need to compound at a high rates for a long time.**

## Moore's Law: The Second Half Of The Chessboard

In 1965 Gordon Moore, then working at Fairchild Semiconductor, wrote an article titled - "Cramming More Components onto Integrated Circuits". In it he made a famous forecast which later came to be known as Moore's Law. The forecast which he made is given below.

> ***The complexity for minimum component costs has increased at a rate of roughly a factor of two per year.*** *Certainly over the short term this rate can be expected to continue, if not to increase. Over the longer term, the rate of increase is a bit more uncertain, although there is no reason to believe it will not remain nearly constant for at least ten years. - Moore's Law*



The line marked in bold means that the amount of computing power which one could buy for $1 would double every year. How did he do on his predictions? He was too conservative in his predictions and his law held up for five decades instead of one. Over the years his law was corrected to account for doubling of computing power every 18 months instead of every year. If the chart shown below didn't give you goose bumps then it means that you don't understand logarithms well.

**Always Moore**

Number of transistors in CPU*
Log scale

*MOORE'S LAW*
*DEFINED*

$10^{10}$

$10^{8}$

$10^{6}$

$10^{4}$

$10^{2}$

1

1960   70   80   90   2000   10 14

Source: Intel                    *Central processing unit
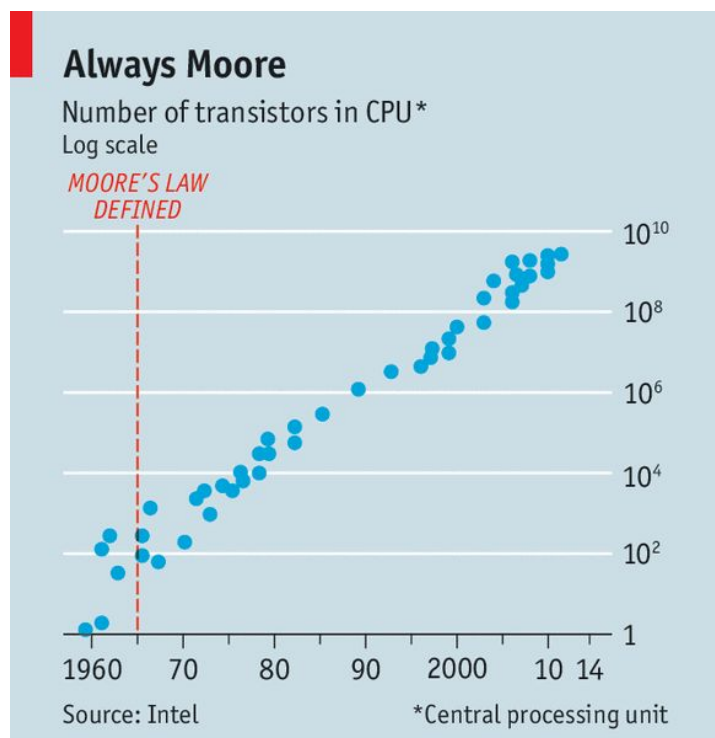
Economist.com

If you had started with a single transistor CPU in 1965 then after 50 years the total number of transistors in a CPU will be around 10.82 billion $[1 * (1 + 0.5874)^{50}]$. The number of transistors doubling every 18 months translates to an annual growth rate of 58.74%. Even a genius like Buffett couldn't come closer to that rate.

In order to really understand the impact created by doubling of transistors, visualize an empty chessboard. Keep a pawn in square A1 and for every doubling move the pawn to the next square. Since the number of transistors doubled every 1.5 years for 50 years, you would have moved the pawn to square thirty three $[50 / 1.5]$. In five decades Moore's Law covered the first half of the chessboard and now we're in the second half.
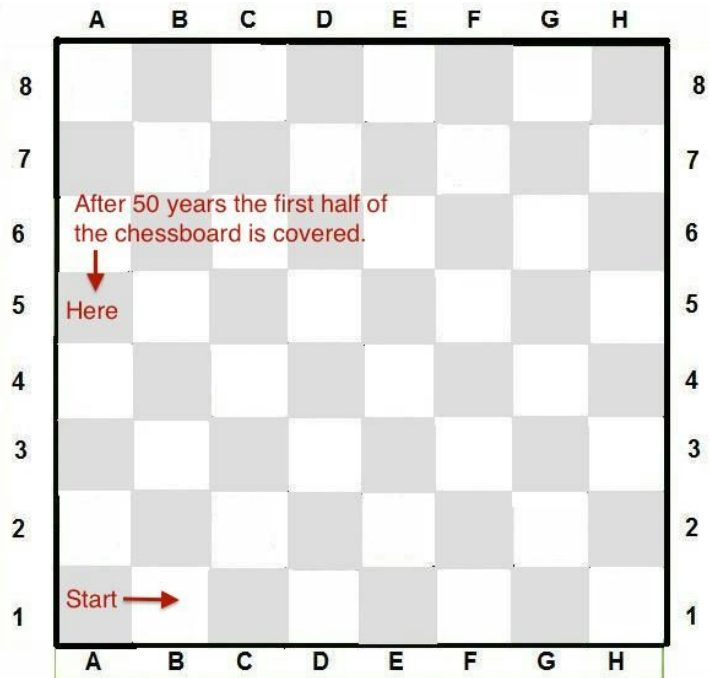
Many industries and companies got decimated as Moore's Law tsunami swept across the first half of the chessboard. The impact created by the tsunami is beautifully captured in the video given below. Click on it to watch the video.



Jeff Bezos, founder and CEO of Amazon, understood the impact of Moore's Law and he used this tsunami to Amazon's advantage by surfing along with it. Read, reread, and reflect on what he said.

> Industry growth and new customer adoption will be driven over the coming years by relentless improvements in the customer experience of online shopping. These improvements in customer experience will be driven by innovations made possible by dramatic increases in available bandwidth, disk space, and processing power, all of which are getting cheap fast.

> ***Price performance of processing power is doubling about every 18 months (Moore's Law), price performance of disk space is doubling about every 12 months, and price performance of bandwidth is doubling about every 9 months****. Given that last doubling rate, Amazon.com will be able to use 60 times as much bandwidth per customer 5 years from now while holding our bandwidth cost per customer constant. Similarly, price performance improvements in disk space and processing power will allow us to, for example, do ever more and better real-time personalization of our Web site.*
>
> *In the physical world, retailers will continue to use technology to reduce costs, but not to transform the customer experience. We too will use technology to reduce costs, but the bigger effect will be using technology to drive adoption and revenue. We still believe that some 15% of retail commerce may ultimately move online. -* [Jeff Bezos; 2000](#)

What happens if Moore's Law continues to operate in the same way for the next 35 years? If that happens then the tsunami would have almost swept the second half of the chessboard. At that point an average $1000 laptop would be performing $10^{26}$ calculations per second. And this would be equivalent to all the brains of the entire human race. Will humans be relevant if that happens?

> *Today's average low-end computer calculates at roughly 10 to the 11th ($10^{11}$) or a hundred billion calculations per second. Scientists approximate that the level of pattern recognition necessary to tell Grandfather from Grandmother or distinguish the sound of hoofbeats from the sound of falling rain requires the brain to calculate at speeds of roughly 10 to the 16th ($10^{16}$) cycles per second, or 10 million billion calculations per second. Using these figures as a baseline and projecting forward using Moore's law, the average $1,000 laptop should be computing at the rate of the human brain in fewer than fifteen years.* ***Fast-forward another twenty-three years, and the average $ 1,000 laptop is performing 100 million billion billion calculations ($10^{26}$) per second— which would be equivalent to all the brains of the entire human race.*** *-* [Abundance](#)

If the above paragraph didn't make you sweat then you should reread it. I don't know if Moore's Law will continue to operate for another 35 years. But if it happens for another 15 years then - **humans needn't apply** for jobs. And the odds of that happening seems reasonable. Click on the image to watch the video.

**The key takeaway from Moore's Law is that if you want to create a gargantuan impact in less than a century, like changing the way humans live, work, and think, then you need to compound at extraordinary rates for a very long time.**

In the table given below I have summarized what we learnt so far. In addition to that, we also learnt that compounding is used not just in finance but also in biology and technology. And ideas interplay across disciplines.

| Agent | Compounding Formula | Key Variables Used | Key Takeaways |
|-------|---------------------|--------------------|--------------------|
| Evolution: Mice | $[8 * (1 + 0.02)^{500}]$ | Long periods of time. For mice in Arizona it's 1.7 million years. Evolution as a whole used 3 billion years. In the formula, I used 500 years to demonstrate the effects of compounding over long periods of time. | The key takeaway is that even tiny survival advantages (read it as very low rate of interest) will produce mind blowing results if it's done over long periods of time. |
| Warren Buffett | $[\$19 * (1 + 0.196)^{50}]$ | Time and High rates of return. | The key takeaway from Warren Buffett is that if you want to create a huge impact in one's lifetime, like creating a successful conglomerate like Berkshire Hathaway |

| | | | which is America's 5th largest company measured by market capitalization, then you need to compound at a high rates for a long time. |
|---|---|---|---|
| Moore's Law | $[1 * (1 + 0.5874)^{50}]$ | Time and extraordinarily high rates of return. | The key takeaway from Moore's Law is that if you want to create a gargantuan impact in less than a century, like changing the way humans live, work, and think, then you need to compound at extraordinary rates for a very long time. |

## Our brain can't understand exponential growth

The default wiring of our brain supports linear thinking. And it's not well equipped to understand sustained exponential growth. We severely underestimate how big numbers can get. Let's look at the story of an emperor who almost lost his kingdom due to his inability to think exponentially.

### Story of an emperor who almost lost his kingdom

The game of chess originated in India during the 6th century. The clever inventor took his game and presented his invention to the emperor. The ruler was so impressed by the beautiful and difficult game that he invited the inventor to name his reward. The inventor being a clever guy, if not he couldn't have invented chess, asked -

> *"All I desire is some rice to feed my family." Since the emperor's largess was spurred by the invention of chess, the inventor suggested they use the chessboard to determine the amount of rice he would be given. "Place one single grain of rice on the first square of the board, two on the second, four on the third, and so on," the inventor proposed, "so that each square receives twice as many grains as the previous." - Second Machine Age*

The emperor didn't study Moore's Law like you. So his brain couldn't see the power of compounding at high rates of growth. Without thinking further he agreed to the inventor's

request. If the emperor request were fully honored then the inventor would have taken home eighteen quintillion grains of rice $2^{64} - 1$. How much rice would that be? That much rice would dwarf Mount Everest and it's more rice that has been produced in the history of the world. The emperor realized his stupidity and he got the inventor beheaded. Of the three models [Evolution, Warren Buffett, Moore's Law] that we studied which one does the emperor story relate to? If you answered Moore's Law then you're correct.

## How folding paper can get you to the moon

It's time to test your knowledge on compounding. Imagine that you have a piece of paper which is $10^{-3}$ $or$ $0.001$ $centimeters$ thick. How many times can you fold this piece of paper? What happens if you fold it 45 times? Trying to solve the problem before watching the video. Click on the image to watch the video.
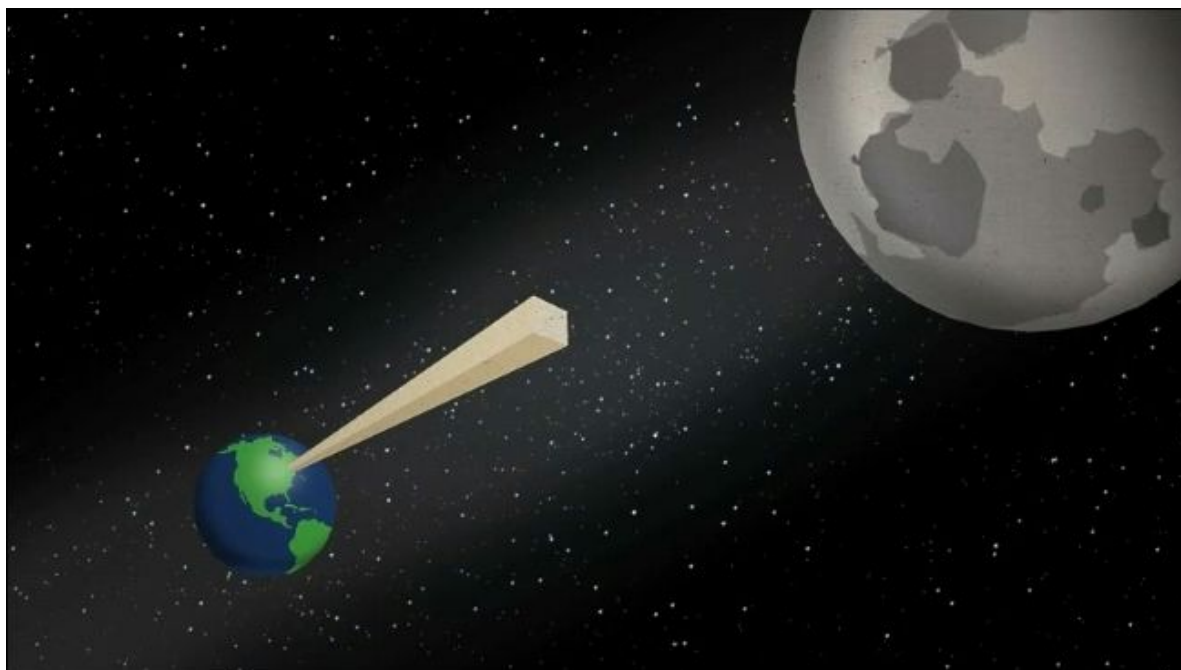


The compounding equation for the above problem would be $351,843$ $kms = 0.001$ $cm * (2)^{45}$. And if you were successful in folding the paper 45 times then you could have gone to the moon for $0. Of the three models that we studied which one does folding paper relate to? It's Moore's Law again.

## How much did VCs who funded the voyage of Columbus earn?

One more problem to test your skills on compounding. We all know that Columbus discovered America in 1492. The venture capitalists who sponsored the voyage spent $30,000 in the year 1492. If the descendents of venture capitalists were offered $17 trillion in 2015, current GDP of America, for their ancestral foresight.

What is the rate of return on their original investment? **Before solving the problem make a guess at the rate of return. After solving the problem compare the results with your guess.**

The rate of return would be 3.92%. Did you guess it right? I seriously doubt it. The compounding equation for this problem will be $\$17 \ trillion \ = \$30,000 \ * \ (1 \ + \ 0.0393)^{524}$. Of the three models that we studied which one does the story of VCs relate to? If you answered Evolution then you're correct.

## Compounding Is Backloaded

I got the story of VCs funding Columbus from a letter Warren Buffett wrote to his limited partners in 1963.

> *I have it from unreliable sources that the cost of the voyage Isabella originally underwrote for Columbus was approximately $30,000. This has been considered at least a moderately successful utilization of venture capital. Without attempting to evaluate the psychic income derived from finding a new hemisphere, it must be pointed out that even had squatter's rights prevailed, the whole deal was not exactly another IBM.*
>
> ***Figured very roughly, the $30,000 invested at 4% compounded annually would have amounted to something like $2,000,000,000,000 (that's $2 trillion for those of you who are not government statisticians) by 1962.*** *Historical apologists for the Indians of Manhattan may find refuge in similar calculations. Such fanciful geometric progressions illustrate the value of either living a long time, or compounding your money at a decent rate. I have nothing particularly helpful to say on the former point. - Buffett; 1963*

Reread the line marked in bold. Buffett wrote these lines fifty three years back. In the first 471 years, from 1492 to 1962, the initial investment went up from $30,000 to $2 trillion. This represents just 11.76% $\$2 \ trillion \ / \ \$17 \ trillion$ of the total proceeds.

In the next 53 years the remaining 15 trillion, which represents $88.24\%$, was earned. In other words the last 10% of the time earned around 90% of the total returns. The key takeaway is - **Compounding Is Backloaded**. Spend a lot of time to burn this, powerful and counterintuitive, concept into your brain.

## Compounding Is Backloaded



The last 53 years made 88.24% of the total proceeds.

The first 471 years made 11.76% of the total proceeds.
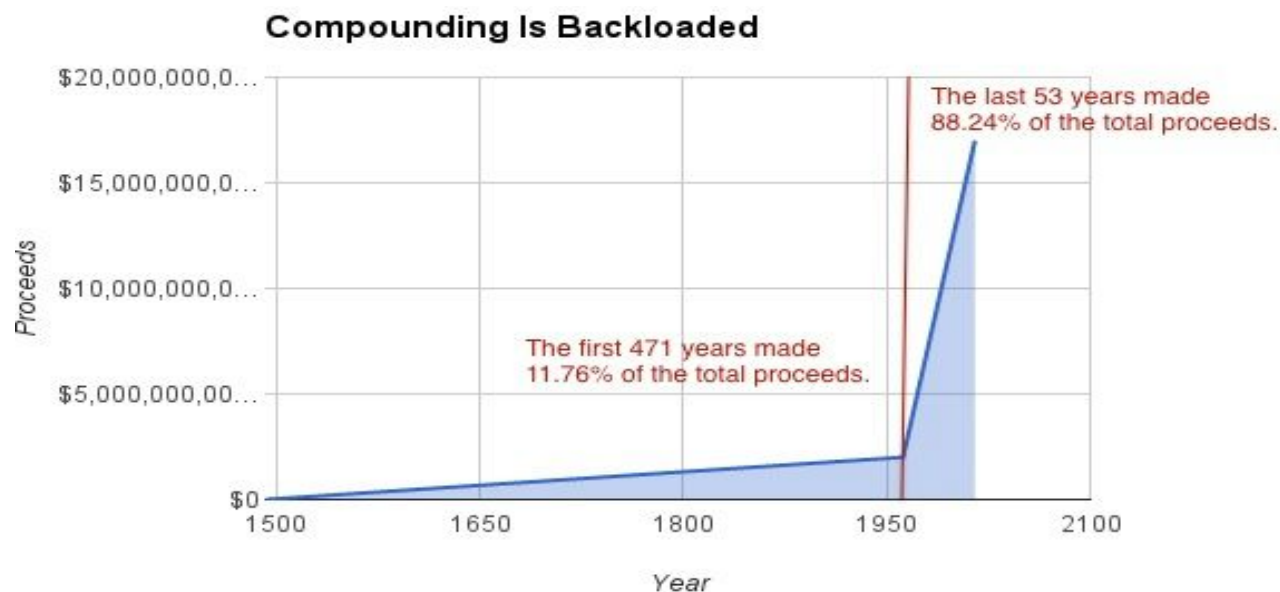
## Albert Einstein Understood It All

When most of the humans were struggling to make ends meet a German born theoretical physicist figured out the power of compound interest. His name is Albert Einstein a genius who discovered the mind bending formula $E = MC^2$. And he called compound interest as the **8th wonder of the world**. I can't vouch if Einstein made such a statement.



"Compound interest is the 8th wonder of the world."

- Albert Einstein
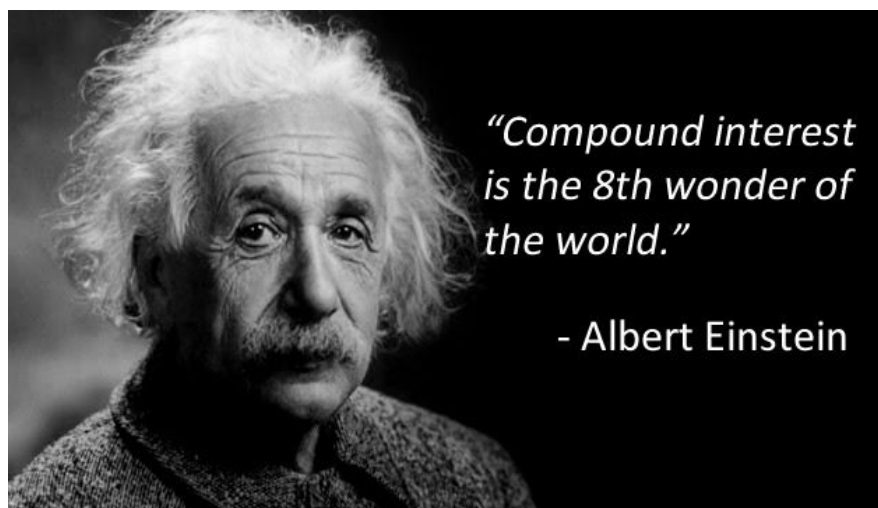
At this point I have convinced you enough about the power of compounding. It's time to put our knowledge into action by applying the principles of compounding in our daily life.

## Don't Lose Capital

Warren Buffett gave two rules for successful investing. They are **(1)** Don't lose money **(2)** Never forget Rule no 1. Why did he talk about not losing money instead of telling us to compound our capital at very high rates? This is because compounding works against us if we lose capital. As they say - To finish first you must first finish.

The key in investing is to stay in the game for a very long time without losing a lot of capital. This is what our models [Evolution, Warren Buffett, Moore's Law] did. They played the game for a very long time without losing much. This is very important in investing as a single big mistake could knock you out of the game. The chart given below illustrates this point well.
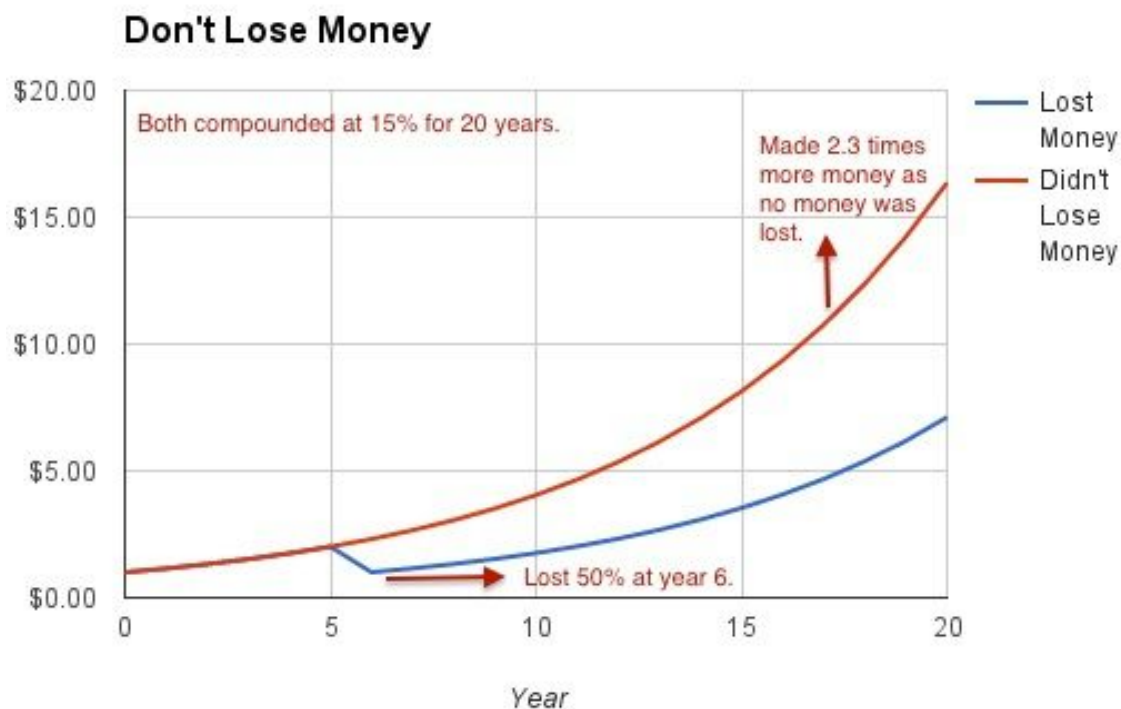


## Take the road less traveled - Think Long Term

I met a lot of smart value investors in India. And one of them is Vinay Parikh, who is the co-founder of Jeetay Investments. He told me that life is probabilistic and to lead a rational life one should do things that stack up odds in their favor. And avoid everything that works against them. What he told resonated with me and it reminded me of an interview given by Andrew Ng.

**Do you have any helpful habits or routines?**

*I wear blue shirts every day, I don't know if you know that. [laughter] Yes. One of the biggest levers on your own life is your ability to form useful habits.*

*When I talk to researchers, when I talk to people wanting to engage in entrepreneurship, **I tell them that if you read research papers consistently, if you seriously study half a dozen papers a week and you do that for two years, after those two years you will have learned a lot. This is a fantastic investment in your own long term development.***

*But that sort of investment, if you spend a whole Saturday studying rather than watching TV, there's no one there to pat you on the back or tell you you did a good job. Chances are what you learned studying all Saturday won't make you that much better at your job the following Monday. There are very few, almost no short-term rewards for these things. But it's a fantastic long-term investment. This is really how you become a great researcher, you have to read a lot.*

*People that count on willpower to do these things, it almost never works because willpower peters out. Instead I think people that are into creating habits — you know, studying every week, working hard every week — those are the most important. Those are the people most likely to succeed. - Andrew Ng*

Reread the lines marked in bold. Reflect on it for sometime. Is there a connection between what Vinay and Andrew said? Do you see compounding at play here? If yes which of the three models [Evolution, Warren Buffett, Moore's Law] does it map to? Think for a moment before reading further.

Compounding is at play in both cases. Let's assume that you develop several good habits like reading, thinking, exercising, healthy eating, etc. And these habits collectively confer you an advantage of 0.0001 percent. Let's assume that in your lifetime you engage in 150,000 activities. Your lifetime advantage adds up to $3.2 \, million = 1 * (1 + 0.0001)^{150000}$. Amazing isn't it. The model this example relates to is Evolution.

*Think of a manager's life as a long series of connected activities, such as assertions, questions, paraphrases, and the like – as meaningful speech acts, to be precise. If a manager participates in, say, 10 meetings a week and commits 10 such speech acts per meeting, then in a 50-week year she will engage in 5,000 such serially correlated activities, and in a 30-year managerial career, 150,000 of them.*

***Now, if she possesses or develops some characteristic that makes her even 1 per cent of 1 per cent (0.0001) more effective at bringing about constructive effects by what she says and how she thinks, then over course of her career that advantage will compound to a multiplier of 3.2 × 10$^6$ – that is, her overall effectiveness will go up by a factor of 3 million!*** *A 1 per cent effectiveness improvement on a per interaction*

*basis will compound to an unimaginably high $1.6 \times 10^{48}$ advantage – provided, of course, that such advantages compound. - [Diaminds](#)*

Someone asked Charlie Munger the secrets of getting rich. The response he gave is so simple but yet mind blowing.

*Spend each day trying to be a little wiser than you were when you woke up. Discharge your duties faithfully and well. Step by step you get ahead, but not necessarily in fast spurts. But you build discipline by preparing for fast spurts. Slug it out one inch at a time, day by day. At the end of the day – if you live long enough – most people get what they deserve.* ***Spend less than you make; always be saving something. Put it into a tax-deferred account. Over time, it will begin to amount to something. This is such a no-brainer.*** *- Charlie Munger*
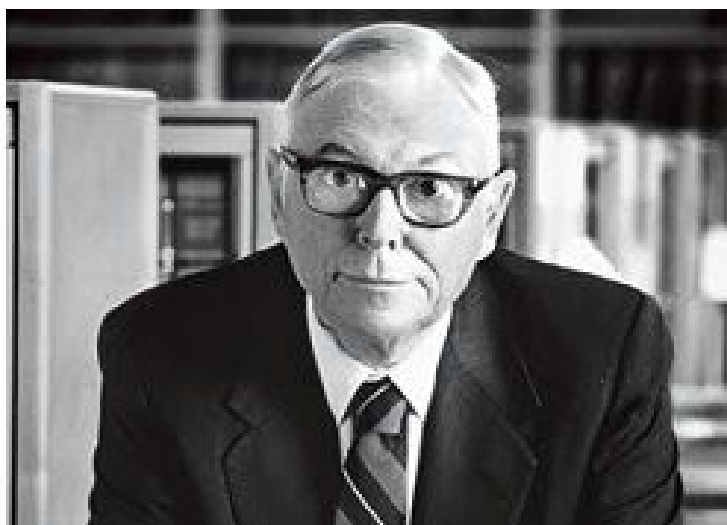


If you follow Munger's no-brainer advice by **(1)** saving money **(2)** start investing in a tax deferred account like 401k **(3)** buy a low cost index fund - works in both US and India **(4)** focus on the job at hand **(5)** go to bed a little wiser every night than you were in the morning. Then you can't avoid becoming rich.

The chart given below illustrates that someone contributing $17,500 to his 401k account every year will earn $3.2 million pretax at the age of 60. I have assumed 401k contribution growing at 1% every year. If you want to be a passive investor, this is all there is to know about investing.

## Compounded at 6%

$200,000.00

$150,000.00

$100,000.00

$50,000.00

$0.00

If you sum all the amounts then you would end up with $3.2 million pretax at the age of 60.

Compounded at 6%

20    30    40    50    60

Age
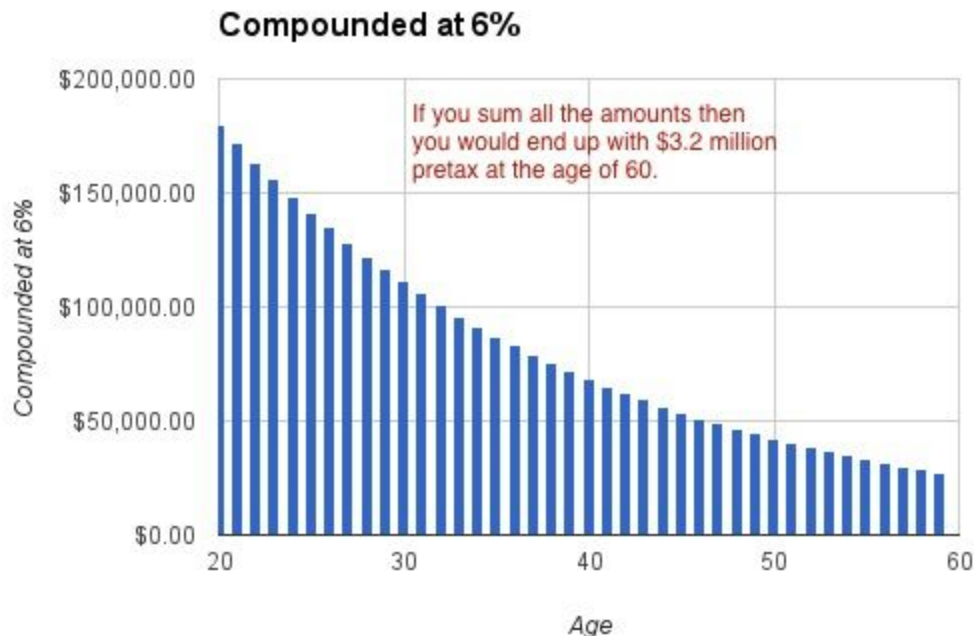
**The key takeaway from Vinay, Andrew, and Munger is to develop good habits early in life and think long term.**

## Few Items To Read And Watch

1. If civilization can progress only with an advanced method of invention, you can progress only when you learn the method of learning. Read the book A Mind For Numbers and take the free Coursera course Learning How To Learn.
2. We're often told that talent is innate. But that's not true. With deliberate practice you can improve your performance at almost anything. Read the book The Little Book of Talent.
3. If you want to become a worldly-wise person then you should read Charlie Munger's A Lesson on Elementary Worldly Wisdom.
4. How can I find time to read? Read this excellent writeup by Shane Parrish.

## Language Of Business

Calculus is the mathematical study of change. During the past three hundred years, calculus has been applied to mechanics, to the motion of the planets, to electricity and magnetism, to biology, to economics, and to countless other areas. The first article of calculus was published by Leibniz in the year 1684. This article was a mere 6 pages long containing two fundamental ideas.

Leibniz and Newton would be astounded to learn that today's introductory calculus textbook is 1,300 pages long. The calculus textbook introduces two fundamental ideas in the first 6 pages, and the remaining 1,294 pages consist of examples, variations, and applications — all arising from following the consequences of just two fundamental ideas.

> *Students might be amazed that their teachers know all 1,300 pages of that enormous tome filled with cryptic symbols. **But their teachers don't really know 1,300 independent pages of isolated facts— the teachers see the material differently. They know the meaning of the basic ideas, and they know how one idea leads to another.** Students who duplicate that perspective grasp the ideas of any subject better than those students who view each new week as an entirely new intellectual mountain to climb. As you are learning a topic, ask yourself what previous knowledge and what strategy of extending previous ideas make the new idea clear, intuitive, and a natural extension. - [The 5 Elements of Effective Thinking](#)*

Today's introductory financial statement analysis textbook is 600 pages long. Luca Pacioli, father of accounting, would be amazed to see that these 600 pages are built on top of the basic framework of double-entry bookkeeping which was invented by him 500 years ago. A student who dabbles with financial statements without understanding double-entry bookkeeping is participating in an asskicking contest with one leg.

In this lecture you will master the building blocks of accounting by watching Sherlock Holmes and Dr. Watson venture into a real estate business. Using these building blocks, we will create four key financial statements — Income Statement, Statement of Retained Earnings, Balance Sheet, and Cash Flow Statement. Finally I will tie these financial statements using two key ratios - Return on Equity (ROE) and Return On Invested Capital (ROIC).

Before we get started, I want to tell you why you should learn accounting, the language of business. As Charlie Munger tells, if you want to follow something or persuade someone you should tell them why. What if the persuasion comes from an authority figure like Warren Buffett? Most likely you will comply.

> *One thing I would recommend is to take all the accounting courses that you can find. Accounting is the language of business and there is nothing like getting it early and sort*

*of getting it in your system.* **Whenever you get a chance to take an accounting course jump on it. It will make it so much easier for years and years to come in reading financial statements.** *To get comfortable with it because it's a language of its own. Getting comfortable in a foreign language in effect takes little experience and study early on. And it pays off big later on. -* *Buffett's advice to a 17 year old student*

## Holmes and Watson buy a rental property

It was 31-Dec-2009 and Dr. Watson, friend and assistant of Sherlock Holmes, was reading a newspaper. After reading the paper he told Holmes, "Real estate prices across America is on a free fall. Good that we didn't buy one during its peak. And we should never buy a property in our lifetime. Who knows prices can go down to zero."

Holmes smiled and replied, "Anything is possible in life. But a rational person thinks in terms of probabilities and not possibilities. The right time to buy an asset class is when everybody is running away from it. That's when the price goes way below its intrinsic value. Fear is the foe of the faddist, But the friend of the fundamentalist."

Holmes immediately called his friend, a real estate broker in Fort Worth, Texas, and enquired about properties for sale. His friend replied, "There is a 2500 sq ft single family home available for $100,000 in an excellent neighborhood of Fort Worth, Texas. And it would fetch a monthly rent of $1,500.". Holmes immediately responded, "Watson and I would buy it tomorrow."

Readers who don't live in the US should use Google Maps to find out the exact location of Fort Worth, Texas. It's 1755 miles away from Sunnyvale, the place where I live.

After hanging up the phone Holmes explains to Watson on why he decided to buy the property. He gives three reasons that influenced his decision. They are

**(1)** We are buying the property for $40 per sq ft [$100,000 / 2500 sq ft]. If a builder wants to construct a new property then it would cost him $80 per sq ft. We are getting an opportunity to buy the asset way below its **replacement cost**. That's a steal and it's akin to buying $1 for 50 cents. This protects us on the downside and Benjamin Graham would bless this transaction as it has a decent **margin of safety**.

**(2)** The property will fetch an annual rent of $18,000 [$1,500 * 12] giving us a starting yield of 18% [$18,000 / $100,000] on our purchase price. Mortgage rates are at all time low and we can fund the purchase by taking a 30 year loan at a fixed rate of 3.41%. Over the long run if the interest rate **mean reverts** then it will go up. But we are protected as our interest rate is fixed for 30 years.

**(3)** Currently there is a disequilibrium of **supply and demand** with a lot of unsold inventory of homes. Since the house prices are selling way below the replacement cost, no sane builder will construct new homes. Over time this will result in reducing the unsold inventory and housing starts, the beginning of construction of a new house, will be considerably less than the number of new households being formed. This in turn will create excess demand and push house prices above the replacement cost. This will create **incentives** for both buyers and builders to get into action. When this happens we would make money, not just on rental yield, but also on the closing of price-value gap.

If you carefully studied the explanation given by Holmes then you should have noticed the words marked in bold [**replacement cost, margin of safety, mean reverts, supply and demand, incentives**]. Why did I mark them in bold? If you want to get smart in life then you should learn how great thinkers think. They think in terms of mental models and the words marked in bold are some of the models used by great thinkers.

> *A large part of the difference between the experienced decision maker and the novice in these situations is not any particular intangible like "judgment" or "intuition". If one could open the lid, so to speak, and see what was in the head of the experienced decision maker, one would find that he had at his disposal **repertoires of possible actions**; that he had checklists of things to think about before he acted; and that he had mechanisms in his mind to evoke these, and bring these to his conscious attention when the situations for decisions arose. - Herbert Simon*

## Golden Rule Of Accounting

On 01-Jan-2010 Holmes and Watson sets up a company called Holmes-Watson Co. They each own 50% share in it. They purchased the rental property in company's name by putting a

downpayment of $10,000. For the remaining $90,000 they take a 30 year loan from a local bank at a fixed rate of 3.41%.

Holmes tells Watson that, "Human brain gets confabulated with everyday experiences and to protect ourselves from it we need to record all the business transactions in a notebook. We need a language to record these transactions. And I'm sure someone smarter than us would have faced the same problem and he would have invented a language. I believe in the discipline of mastering the best that other people have ever figured out. I don't believe in just sitting down and trying to dream it all up yourself. Nobody's that smart."

Upon investigating Holmes figures out that Luca Pacioli invented the framework of double-entry bookkeeping 500 years back. And he learns that for every entity in a transaction you need to create a separate account. In the first transaction there are 3 entities involved — Cash of $100,000 which is funded by Downpayment of $10,000 and a Bank loan of $90,000.

Watson asks Holmes, "What do you mean by an account?". To which Holmes replies - "Think about it as a separate notebook. The best way to learn about an account is to view a blank account without any clutter. What do you see Watson?".

| Cash (A) | |
| --- | --- |
| | |
| | |
| | |
| | |

Few things which Watson sees from the empty Cash account are

**(1)** The title of the account is written at the top. We are looking at the cash account and hence it's titled Cash. The suffix next to the title (A) stands for Asset. An asset is something which the company owns. Since the cash of $100,000 belongs to the company its classified as an asset.

**(2)** The account looks like symbol T. Hence it's also called as a T-account. There are two sides to an account - **left side which is known as a debit entry and the right side known as a credit entry**. There is a word in English language called Connotation which means - *An idea or feeling that a word invokes in addition to its literal or primary meaning*. The moment we hear about debit and credit we visualize our bank account and associate debit as bad and credit as good. For now unlearn this connotation and just keep in mind that debit refer to the left hand side and credit refers to the right hand side of a T-account.

**(3)** The empty T-accounts for the other two entities are given below. The loan from the bank of $90,000 is represented by the T-account titled Mortgage Payable. The suffix (L) stands for liability which is something the company owes to others. In this case it owes $90,000 to the bank. The down payment made by Holmes and Watson is represented by the T-account titled Contributed Capital. The suffix (SE) stands for shareholder's equity which is something that remains in the company after paying all its liabilities. In this case the left over is $10,000 [$100,000 - $90,000]. This left over is what belongs to the shareholders — Holmes and Watson.

| Contributed Capital (SE) | | | Mortgage Payable (L) | |
|---|---|---|---|---|
| | | | | |
| | | | | |
| | | | | |
| | | | | |

From the above three points we can clearly see the golden rule of accounting $Assets = Liabilities + Shareholder's Equity.$ This equation is called as **Accounting Identity**. This cannot be broken under any circumstances. Let's leave Holmes and Watson to focus on the real estate business. And I will provide the narrative for all the business transactions.

## First Journal Entry

There are two things that can happen to any account. It can go up or down in value. But accounting doesn't allow the use of negative numbers. Why is that? I don't know the exact reason for that. My hypothesis is that even today many of us aren't comfortable dealing with negative numbers. Accounting was invented 500 years ago and absence of negative numbers shouldn't surprise us.

> *Still, many of us haven't quite made peace with negative numbers. As my colleague Andy Ruina has pointed out, people have concocted all sorts of funny little mental strategies to sidestep the dreaded negative sign. On mutual fund statements, losses (negative numbers) are printed in red or nestled in parentheses with nary a negative sign to be found. The history books tell us that Julius Caesar was born in 100 B.C., not –100. The subterranean levels in a parking garage often have designations like B1 and B2. Temperatures are one of the few exceptions: folks do say, especially here in Ithaca, New York, that it's –5 degrees outside, though even then, many prefer to say 5 below zero. There's something about that negative sign that just looks so unpleasant, so ...negative.*
> *- The Joy Of x*

Without negative numbers how do you decrease the value of an account? This is going to be done using the concept of debit (left side entry) and credit (right side entry). Let's relook at the accounting identity equation $Assets = Liabilities + Shareholder's\ Equity$. **The left hand side of the equation contains asset account. They go up in value by debit (left) entry and goes down in value by credit (right) entry. The right hand side of the equation contains liabilities and shareholder's equity account. They go up in value by credit (right) entry and goes down in value by debit (left) entry**. Reread and reflect on the lines marked in bold.

T-account is like a lock and you can't make entries into it directly. For opening a lock you need a key. Similarly for entering values into T-account you need to do journal entries which acts as the key. Before making a journal entry you need to ask three questions. They are **(1)** which T-account gets affected **(2)** do they go up or down in value **(3)** should it be a debit or credit entry. For the first transaction the answer for these questions are given below.

| Sno | T-Account | Entity Type | Up/Down | Debit/Credit |
|---|---|---|---|---|
| | | | | |
| 1 | Cash | Asset | Up | Debit Entry |
| 2 | Contributed Capital | Shareholder's Equity | Up | Credit Entry |
| 3 | Mortgage Payable | Liabilities | Up | Credit Entry |

The journal entry for the first transaction is given below. Every journal entry must have at least one debit and one credit entry. This is the reason why we call accounting is built on the framework of double-entry bookkeeping. According to Charlie Munger, double-entry bookkeeping was a hell of an invention. The sum(debits) must be equal to sum(credits). In this case they are equal to $100,000. Why should they be equal? If they're not equal then the golden rule of accounting $Assets = Liabilities + Shareholder's\ Equity$ will be broken. Reflect on it before proceeding further.

(1)    1-Jan-10    Dr. Cash (+A)        $100,000
                      Cr. Contributed Capital (+SE)    $10,000
                      Cr. Mortgage Payable (+L)        $90,000

Always debit entries should precede the credit entries. And credit entries should be slightly indented to the right. Why is that? This is to maintain consistency which results in standardization. This makes life easier for accountants to read journal entries made by other accountants. The prefix (1) signifies that it's the first journal entry. And 1-Jan-10 captures the date on which this transaction occurred. Finally [(+A), (+SE), (+L)] tells that the value of these T-accounts went up. A stands for Asset, SE stands for Shareholder's Equity, and L stands for Liability.

The affected T-accounts after the first journal entry is given below. At this point most of the information in the T-account should be clear to you. The column Ref# refers to the journal entry that modified the T-account.

| Ref # | Cash (A) | | Ref # | | Ref # | Contributed Capital (SE) | Ref # |
|---|---|---|---|---|---|---|---|
| (1) | $100,000 | | | | | $10,000 | (1) |
| | | | | | | | |
| | | | | | | | |
| | | | | | Ref # | Mortgage Payable (L) | Ref # |
| | | | | | | | |
| | | | | | | $90,000 | (1) |
| | | | | | | | |

Before proceeding further make sure that you understand everything about the first transaction. Rest of the lecture will not be clear without understanding this. All the Journal entries, T-accounts, Trial Balance, Four key financial statements can be found in .xlsx and .pdf format here and here. While reading this lecture notes refer to either one of them for better understanding.

## Next Three Journal Entries

On 01-Jan-2010 cash of $100,000 is used to purchase the rental property. The rental property consists of land which costs $10,000 and building which costs $90,000. Three entities are involved in this transaction. And their details are given below.

| Sno | T-Account | Entity Type | Up/Down | Debit/Credit |
|---|---|---|---|---|
| 1 | Land | Asset | Up | Debit Entry |
| 2 | Building | Asset | Up | Debit Entry |
| 3 | Cash | Asset | Down | Credit Entry |

At this point the journal entry should be self explanatory. Here is a small tip for doing journal entries. If a transaction involves cash account then do the entry for cash first. This is because it's easy to identify if cash is coming in or going out. If the cash is coming in then you debit (left) it. If not you credit (right) it. It's like solving a jigsaw puzzle. Once the cash piece is put in proper place then the other pieces goes to the right location by using cash as a reference point.

(2)   1-Jan-10   Dr. Land (+A)        $10,000
                  Dr. Building (+A)   $90,000
                        Cr. Cash (-A)              $100,000

The affected T-accounts after the second journal entry is given below. After this transaction the company has $0 in its bank account. How did I find that out? Take a look at the Cash T-account. Sum all the amounts on the debit (left) side. This comes to $100,000. Then Sum all the amounts on the credit (right) side. This comes to $100,000. Calculate $[Sum(Debit) - Sum(Credit)]$. You will get $0 [$100,000 - $100,000].

| Ref # | Cash (A) | | Ref # | | Ref # | Building (A) | | Ref # |
|---|---|---|---|---|---|---|---|---|
| (1) | $100,000 | | | | (2) | $90,000 | | |
| | | $100,000 | (2) | | | | | |

| Ref # | Land (A) | Ref # |
|---|---|---|
| (2) | $10,000 | |

Holmes's real estate broker friend agreed to market the rental property for attracting new tenants. For that he charged Holmes-Watson Co. $600 for an entire year. As we saw in the previous transaction the company doesn't have any cash left in its bank account. How is it going to pay $600? The broker was kind enough to do the marketing and collect cash sometime in future. There are two entities involved in this transaction. And they are given below.

| Sno | T-Account | Entity Type | Up/Down | Debit/Credit |
|---|---|---|---|---|
| 1 | Prepaid Marketing Fees | Asset | Up | Debit Entry |
| 2 | Marketing Fees Payable | Liability | Up | Credit Entry |

The broker has agreed to provide the service for one year. Since we have one year to elapse $600 can't be booked as an expense immediately. Instead it will be kept in the asset account and slowly expensed as time passes. Also the company didn't have cash to pay the broker. So $600 is recorded as Marketing Fees Payable which is a liability account. I am not sure if the accounting rule allows such a weird transaction to be created. As an example this transaction appears ok to me.

(3)    1-Jan-10    Dr. Prepaid Marketing Fees (+A)        $600
                            Cr. Marketing Fees Payable (+L)    $600

The affected T-accounts after the third journal entry is given below.

| Ref# | Prepaid Marketing Fees (A) | Ref# | | Ref# | Marketing Fees Payable (L) | Ref# |
|------|----------------------------|------|--|------|----------------------------|------|
| (3) | $600 | | | | $600 | (3) |

The broker's superior marketing skills enabled him to find a tenant on the same day. The tenant agreed to pay $1,500 as monthly rent. On top of that the tenant will pay $9,000, six months rent, as security deposit. The journal entry for the security deposit involves two entities. And they are given below.

| Sno | T-Account | Entity Type | Up/Down | Debit/Credit |
|-----|-----------|-------------|---------|--------------|
| 1 | Cash | Asset | Up | Debit Entry |
| 2 | Security Deposit | Liability | Up | Credit Entry |

The journal entries for the fourth transaction is given below. Since the security deposit should be paid back to the tenant when he vacates the house it's kept in the liability account. Remember liability is something that the company owes to others. In this case it owes money to the tenant.

(4)    1-Jan-10    Dr. Cash (+A)        $9,000
                            Cr. Security Deposit (+L)    $9,000

The affected T-accounts after the fourth journal entry is given below. After the fourth transaction the company has $9,000 cash in its bank account. By doing $Sum(Debit) - Sum(Credit)$ we can find out the cash balance. This comes to $9,000 [($109,000 - $100,000)].

| Ref # | Cash (A) | | Ref # | | Ref# | Security Deposit (L) | Ref# |
|-------|----------|--|-------|--|------|----------------------|------|
| (1) | $100,000 | | | | | $9,000 | (4) |
| | | $100,000 | (2) | | | | |
| (4) | $9,000 | | | | | | |

## Revenue Recognition - Fifth Journal Entry

On 05-Jan-2010 the tenant pays the monthly rent of $1,500 to the broker. But the broker, who is also the property manager, only paid $1,000 to Holmes-Watson Co. The broker promised Holmes-Watson Co. that the remaining $500 will be paid next month. At this point you need to ask couple of questions. They are **(1)** Can we book $1,500 as revenue immediately **(2)** How should we handle $500 which is still with the broker.

**Revenue gets recognized only when goods are transferred or services rendered. This is one of the most important concept in accounting. Lots of financial shenanigans is made possible by violating this principle.** In this case Holmes-Watson Co. is providing a service to the tenant. The tenant has paid the rent for the entire month on 05-Jan-2010. But the service gets fully rendered only on 31-Jan-2010. Until then Holmes-Watson Co. cannot book the revenue. And $1,500 will be kept as Deferred Rent which is a liability account. Why is this a liability? This is because the company needs to render service to the tenant.

For the accounting identity to balance the asset side should go also up by $1,500. We know that the company received $1,000 from the broker and this will make the cash account to go up by $1,000. And we know that the broker owes $500. This will be recorded as Accounts Receivable on the asset side. Three entities are involved in this transaction. And they are given below.

| Sno | T-Account | Entity Type | Up/Down | Debit/Credit |
|------|-----------|-------------|---------|--------------|
| 1 | Cash | Asset | Up | Debit Entry |
| 2 | Accounts Receivable | Asset | Up | Debit Entry |
| 3 | Deferred Rent | Liability | Up | Credit Entry |

The journal entries for this transaction is given below.

```
(5)   5-Jan-10    Dr. Cash (+A)                   $1,000
                  Dr. Accounts Receivable (+A)    $500
                      Cr. Deferred Rent (+L)         $1,500
```

The affected T-accounts after the fifth journal entry is given below. After the fifth transaction the company has $10,000 cash in its bank account. By doing $Sum(Debit) - Sum(Credit)$ we can find out the cash balance. This comes to $10,000 [($110,000 - $100,000)].

| Ref # | Cash (A) | | Ref # | | Ref# | Deferred Rent (L) | | Ref# |
|---|---|---|---|---|---|---|---|---|
| (1) | $100,000 | | | | | | $1,500 | (5) |
| | | $100,000 | (2) | | | | | |
| (4) | $9,000 | | | | | | | |
| (5) | $1,000 | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | Accounts Receivable (A) | | | | | | | |
| (5) | $500 | | | | | | | |

## How To Handle Revenue And Expenses - Sixth Journal Entry

On 05-Jan-2010 the broker charges $100 to Holmes-Watson Co. for managing their property. The broker arrived at $100 by charging 6.66% as property management expense on the monthly rent of $1,500. There are two entities involved in this transaction — Cash and Property management expense. We know that cash belongs to the asset account and this transaction will reduce it by $100. Which account does property management expense belong to? In order to answer this question we need to expand the accounting identity equation.

| | | |
|---|---|---|
| Assets | = Liabilities + Shareholder's Equity | **A** |
| Shareholder's Equity | = Contributed Capital + Retained Earnings | **B** |
| Retained Earnings | = Prior Retained Earnings + New Retained Earnings | **C** |
| New Retained Earnings | = Revenue - Expenses | **D** |

**Substituting equation D -> C -> B -> A we get**

Assets = [ Liabilities + Contributed Capital + Prior Retained Earnings + Revenue - Expenses]

**Accounting doesn't allow -ve sign. Take Expenses to the left hand side.**

Assets + Expenses = [ Liabilities + Contributed Capital + Prior Retained Earnings + Revenue ]                    **E**

Equation **E** is the holy grail of accounting. Using this equation you should be able to handle any complex accounting transactions. There are some new terms in this equation which needs some explanation.

The real estate property earns income (rent) and also incurs several expenses including property management expense. If the income exceeds all the expenses then the property will earn a profit. If not it will incur a loss. This profit or loss gets added to retained earnings (read it what the company keeps to itself) account which in turn gets added to shareholder's equity account.

From the above paragraph we can clearly see the emergence of two new accounts — Revenue and Expenses. These two accounts either increase or decrease retained earnings account which in turn increase or decrease the shareholders equity account. The next question is how do we increase or decrease the value of Revenue and Expense accounts? Before reading further try to answer this question on your own. I explained this in detail when we did the first journal entry.

The position of these accounts in equation **E** gives the answer. Expenses are on the left hand side of the equation. So they go up by debit (left) and go down by credit (right) entry. Revenue is on the right hand side of the equation. So they go up by credit (right) and go down by debit (left) entry.

The image given below is called as **Super T-account** and it summarizes how Asset, Liabilities, Contributed Capital, Retained Earnings, Revenue, and Expenses go up and down in value. Spend a lot time to understand this very deeply.

We are ready to do the sixth journal entry. There are two entities involved in this transaction. And they are given below.

| Sno | | T-Account | Entity Type | Up/Down | Debit/Credit |
|---|---|---|---|---|---|
| | 1 | Property Management Expense | Expense | Up | Debit Entry |
| | 2 | Cash | Asset | Down | Credit Entry |

The journal entry for the sixth transaction is given below. Most of the items should be self explanatory. The only item that needs explaining is the suffix (+E, -SE). E stands for expense account and this transaction increases it. Expense account is a proxy for shareholders equity account. When expense account goes up in value then shareholder's equity goes down in value by the same amount.

(6)     5-Jan-10     Dr. Property Management (+E, -SE)     $100
                              Cr. Cash (-A)                                        $100

The affected T-accounts after the sixth journal entry is given below. After the sixth transaction the company has $9,900 cash in its bank account. By doing $Sum(Debit) - Sum(Credit)$ we can find out the cash balance. This comes to $9,900 [($110,000 - $100,100)]. Why am I specifying the cash balance every time cash account is updated? Cash to a company is like oxygen to humans. As Buffett tells — When either is abundant, its presence goes unnoticed. When either is missing, that's all that is noticed. Even a short absence of credit can bring a company to its knees. This is why everyone tells **cash is king**.

| Ref # | Cash (A) | | Ref # | | Ref # | Property Management (E, -SE) | Ref # |
|---|---|---|---|---|---|---|---|
| (1) | $100,000 | | | | (6) | $100 | |
| | | $100,000 | (2) | | | | |
| (4) | $9,000 | | | | | | |
| (5) | $1,000 | | | | | | |
| | | $100 | (6) | | | | |

## Final Four Journal Entries

On 10-Jan-2010 air conditioner in the property didn't work properly. Fixing it costed $50 and the repairman was promised that he will be paid $50 in couple of weeks. This transaction involves two entities. And they are given below.

| Sno | T-Account | Entity Type | Up/Down | Debit/Credit |
|---|---|---|---|---|
| | | | | |
| 1 | Repair Expense | Expense | Up | Debit Entry |
| 2 | Repair Expense Payable | Liability | Up | Credit Entry |

The journal entry and affected T-accounts for this transaction is given below.

(7)    10-Jan-10    Dr. Repair Expense (+E, -SE)    $50
                          Cr. Repair Expense Payable (+L)        $50

| Ref # | Repair Expense (E, -SE) | Ref # | | Ref # | Repair Expense Payable (L) | Ref # |
|---|---|---|---|---|---|---|
| | | | | | | |
| (7) | $50 | | | | $50 | (7) |
| | | | | | | |
| | | | | | | |

On 20-Jan-10 the repairman was paid $50 as promised. This transaction involves two entities. And they are given below.

| Sno | T-Account | Entity Type | Up/Down | Debit/Credit |
|---|---|---|---|---|
| | | | | |
| 1 | Repair Expense Payable | Liability | Down | Debit Entry |
| 2 | Cash | Asset | Down | Credit Entry |

The journal entry for this transaction is given below.

(8)    20-Jan-10    Dr. Repair Expense Payable (-L)   $50
                          Cr. Cash (-A)                            $50

The affected T-accounts after the eighth journal entry is given below. By paying $50 to the repairman the company no longer owes him anything. Hence this liability was brought down to zero. After this transaction the company has $9,850 cash in its bank account.

| Ref # | Cash (A) | | Ref # | | Ref # | Repair Expense Payable (L) | | Ref # |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | |
| (1) | $100,000 | | | | | | $50 | (7) |
| | | $100,000 | (2) | | (8) | $50 | | |
| (4) | $9,000 | | | | | | | |
| (5) | $1,000 | | | | | | | |
| | | $100 | (6) | | | | | |
| | | $50 | (8) | | | | | |
| | | | | | | | | |
| | | | | | | | | |

On 22-Jan-10 Holmes-Watson Co. pays $600 in cash to the broker towards marketing fees. This liability was incurred by the company in journal entry (3). This transaction involves two entities. And they are given below.

| Sno | T-Account | Entity Type | Up/Down | Debit/Credit |
|---|---|---|---|---|
| | | | | |
| 1 | Marketing Fees Payable | Liability | Down | Debit Entry |
| 2 | Cash | Asset | Down | Credit Entry |

The journal entry and affected T-accounts for this transaction is given below. By paying the broker $600 for marketing fees the company doesn't owe him anything. And the Marketing Fees Payable liability account is brought down to $0. After this transaction the company has $9,250 cash in its bank account.

(9)    22-Jan-10    Dr. Marketing Fees Payable (-L) $600
                          Cr. Cash (-A)                      $600

| Ref # | Cash (A) | | Ref # | | Ref # | Marketing Fees Payable (L) | | Ref # |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | |
| (1) | $100,000 | | | | | | $600 | (3) |
| | | $100,000 | (2) | | (9) | $600 | | |
| (4) | $9,000 | | | | | | | |
| (5) | $1,000 | | | | | | | |
| | | $100 | (6) | | | | | |
| | | $50 | (8) | | | | | |
| | | $600 | (9) | | | | | |
| | | | | | | | | |
| | | | | | | | | |

On 31-Jan-10 Holmes-Watson Co. paid $400 in cash towards interest expense. It incurred this expense on its 30-year mortgage loan for the amount of $90,000 at 3.41% interest per annum. If you are wondering how I arrived at $400 as interest expense then use the excel function $PMT((0.0341/12),\ 360,\ \$90,000)$.

The mortgage payment contains interest expense and some portion of it goes towards the repayment of the principal. During the initial years majority of the payment goes towards servicing the interest. To simplify the journal entries, I have accounted the entire payment towards interest expense. This transaction involves two entities. And they are given below.

| Sno | T-Account | Entity Type | Up/Down | Debit/Credit |
|---|---|---|---|---|
| | | | | |
| 1 | Interest Expense | Expense | Up | Debit Entry |
| 2 | Cash | Asset | Down | Credit Entry |

The journal entry and affected T-accounts for this transaction is given below. After this transaction the company has $8,850 cash in its bank account.

(10)   31-Jan-10   Dr. Interest Expense (+E, -SE)  $400
                              Cr. Cash (-A)                              $400

| Ref # | Cash (A) | | Ref # | | | Interest Expense (E, -SE) | |
|---|---|---|---|---|---|---|---|
| | | | | | | | |
| (1) | $100,000 | | | (10) | | $400 | |
| | | $100,000 | (2) | | | | |
| (4) | $9,000 | | | | | | |
| (5) | $1,000 | | | | | | |
| | | $100 | (6) | | | | |
| | | $50 | (8) | | | | |
| | | $600 | (9) | | | | |
| | | $400 | (10) | | | | |
| | | | | | | | |
| | | | | | | | |

We are done with all the journal entries involving external entities like broker, tenant, bank, repairman, etc. Before proceeding further we need to check the correctness of what we did so far. This will be done by creating a trial balance.

## Unadjusted Trial Balance

The trial balance is a listing of all the T-accounts and their balances. We will create the trial balance in three steps. The steps are **(1)** for each T-account that was created we need to calculate the debit or credit balance **(2)** create a new table with a separate row for each T-account and post the debit or credit balance created in the previous step **(3)** ensure that the $sum(debits) = sum(credits)$. If it matches then our work is correct and we can move on to the next step. If it doesn't match then we need to find and fix the error until they match.

Let me do step (1) for couple of T-accounts so that you know how to do it for other T-accounts. Take a look at the T-accounts given below. Focus on Cash T-account. By calculating $Sum(Debit) - Sum(Credit)$ we get $8,850 [$110,000 - $101,150] which is posted at the end of the debit (left) side of the T-account. For Mortgage Payable the $Sum(Debit) - Sum(Credit)$ comes to $90,000 which is posted at the end of of the credit (right) side of the T-account.

| Ref # | Cash (A) | | Ref # | | Ref # | Mortgage Payable (L) | | Ref # |
|---|---|---|---|---|---|---|---|---|
| (1) | $100,000 | | | | | | $90,000 | (1) |
| | | $100,000 | (2) | | | | | |
| (4) | $9,000 | | | | | | | |
| (5) | $1,000 | | | | | | $90,000 | |
| | | $100 | (6) | | | | | |
| | | $50 | (8) | | | | | |
| | | $600 | (9) | | | | | |
| | | $400 | (10) | | | | | |
| | | | | | | | | |
| | **$8,850** | | | | | | | |

There are 14 T-accounts in total and we need to calculate the debit or credit balance for each one of them. Don't worry I already did this for you. And the table I mentioned in step (2) is given below. This table is called as **unadjusted trial balance**. Why is it called as unadjusted? We will find that out in the next section when we do adjusting entries.

The sum of debit and credit column add up to $110,500. So we are good to proceed to the next step. The sum of debits matching the sum of credits is not a coincidence. For every single journal entry we ensured that sum(debits) matched the sum(credits). All we are doing here is adding them all up and they have to match if the journal entries were posted correctly.

*The trial balance does two things. **First, it shows that total debits equal total credits. It is not possible to prepare a set of financial statements that are correct if you do not start with a trial balance that balances.** One reason the trial balance may not balance is that you forgot to list an account. You might have also listed a balance in the wrong column or entered the wrong amount. What do you do if the debits do not equal the credits? Since the trial balance is a listing of every account and its balance, it offers lots of opportunity for a mistake in writing down a number. - Accounting Demystified*

| | Unadjusted Balances | |
| --- | --- | --- |
| | Debit | Credit |
| | | |
| Cash | $8,850 | |
| Accounts Receivable | $500 | |
| Prepaid Marketing Fees | $600 | |
| Building | $90,000 | |
| Land | $10,000 | |
| Deferred Rent | | $1,500 |
| Marketing Fees Payable | | $0 |
| Repair Expense Payable | | $0 |
| Security Deposit | | $9,000 |
| Mortgage Payable | | $90,000 |
| Contributed Capital | | $10,000 |
| Property Management | $100 | |
| Repair Expense | $50 | |
| Interest Expense | $400 | |
| | | |
| | $110,500 | $110,500 |

## Adjusting Entries

It's 31-Jan-2010 and a month has passed since the creation of Holmes-Watson Co. We are almost ready to prepare the financial statements of the company. We need to make adjusting entries before preparing the financial statements. What are adjusting entries?

**Adjusting entries are journal entries made at the end of the accounting period to allocate revenue and expenses to the period in which they actually are applicable.** They are internal transactions without involving any external entities like broker, tenant, bank, repairman, etc. Adjusting entries will not affect Cash T-account. Let's do several adjusting entries so that the concept becomes clear to you.

If you look at the Building T-account, refer to journal entry (2), you will notice that it has a debit balance of $90,000. Will $90,000 stay in the asset account forever? Of course not. It goes to the expense account over time. The next question that one should ask is why does $90,000 move from asset to expense account?

In order to answer this question we need to learn about another key principle of accounting. And it's called as matching principle. **The matching principle states that expenses should be recorded during the period in which they are incurred, regardless of when the transfer of cash occurs.**

The building is responsible for generating a monthly revenue of $1,500 for not just a single month but for several future months. The matching principle of accounting states that we need to match the cost of the building to the revenue it generates. That is where the concept of **depreciation** comes in — taking the cost of an asset and spreading it over the years that will benefit from having the asset. There are two ways to calculate depreciation — straight-line and declining-balance.

In this lecture we will be using straight-line depreciation as it's easy to understand. You take the cost of the asset, in this case the building costs $90,000, and divide it by the asset's useful life. I have estimated the building useful life to be 30 years. This results in a monthly depreciation expense of $250 [ $90,000 / (30 * 12) ]. How did I arrive at the building useful life to be 30 years? I made a crude approximation.

> For example, everyone can see that you have to more or less just guess at the useful life of a jet airplane or anything like that. **Just because you express the depreciation rate in neat numbers doesn't make it anything you really know.** - [Charlie Munger](Charlie Munger)

The first adjusting entry affects two entities. The obvious one is Depreciation Expense account which will go up. Can you guess the other entity? If you answered that Building account has to go down then it's incorrect. If we directly reduce the value of the building account then we will lose track of its original value. Accounting doesn't allow that. In order to deal with this situation accounting provided us with a concept called as **Contra Account**. The dictionary meaning for the word Contra is — *against; opposite; contrasting*.

We will create another T-account called as Accumulated Depreciation account. This will be a contra asset account with a credit balance instead of the debit balance found in the Building T-account. Hence it has the name **contra asset account**. The affected entities for this transaction are given below.

| Sno | T-Account | Entity Type | Up/Down | Debit/Credit |
|-----|-----------|-------------|---------|--------------|
| | | | | |
| 1 | Depreciation Expense | Expense | Up | Debit Entry |
| 2 | Accumulated Depreciation | Contra Asset | Up | Credit Entry |

The journal entry for this transaction is given below. Most of the items should be self explanatory. Couple of things that you should notice are **(1)** Accumulated Depreciation is a contra asset account which goes up by a credit entry **(2)** XA stands for contra asset account and the + sign indicates that its value went up. And -A indicates that this transaction reduces the value of building asset account by $250.

(11)   31-Jan-10    Dr. Depreciation Expense (+E, -SE)    $250
                         Cr. Accumulated Depreciation (+XA, -A)          $250

The affected T-accounts for this transaction are given below.

| Ref# | Accumulated Depreciation (XA, -A) | Ref# | | Ref# | Depreciation Expense (E, -SE) | Ref# |
|------|-----------------------------------|------|---|------|-------------------------------|------|
| | | | | | | |
| | | $250 | (11) | (11) | $250 | |
| | | | | | | |
| | | | | | | |

When we prepare the balance sheet in the next few pages you will notice that we will calculate the net building value by making use of both Building and Accumulated Depreciation T-accounts. It will be calculated as given below. The concept of contra account is used for both assets and liabilities. Make sure that you understand this concept thoroughly.

```
Building                      $90,000
Accumulated Depreciation        $250 (-)
                              ----------
Net Building                  $89,750
                              ----------
```

Take a look at the super T-account updated with contra asset account.

Remember in journal entry (5) we didn't record the revenue as the service was not fully rendered to the tenant. But today is 31-Jan-2010 and the tenant stayed in the house for an entire month. Holmes-Watson Co. has rendered the service to the tenant and they are eligible to record the revenue. The affected entities for this transaction are given below.

| Sno | T-Account | Entity Type | Up/Down | Debit/Credit |
| --- | --- | --- | --- | --- |
| | | | | |
| 1 | Deferred Rent | Liability | Down | Debit Entry |
| 2 | Rental Income | Revenue | Up | Credit Entry |

The journal entry and affected T-accounts for this transaction are given below. After this transaction the value of deferred rent goes down to $0.

(12)   31-Jan-10   Dr. Deferred Rent (-L)      $1,500
                         Cr. Rental Income (+R, +SE)   $1,500

| Ref# | Income (R, +SE) | | Ref# | | Ref# | Deferred Rent (L) | | Ref# |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| | | | | | | | | |
| | | $1,500 | (12) | | | | $1,500 | (5) |
| | | | | | (12) | $1,500 | | |
| | | | | | | | | |
| | | | | | | | | |

If you refer to journal entry (5) you will notice that we received $1,000 in cash and the broker owes the company $500. Why did we record the entire rental income of $1,500 instead of recording only $1,000 that the company received as cash? **This is because accounting uses another key concept called as accrual which is a method that records revenues and expenses when they are incurred, regardless of when cash is exchanged.**

Holmes-Watson Co. insured their property and the insurance costs $1,200 for one year. They need to pay this amount before the end of the year. This translates to a monthly insurance expense of $100 [$1,200 / 12]. Even though no cash has changed hands the company should record this an expense due to the concept of accrual accounting. The affected entities for this transaction are given below.

| Sno | T-Account | Entity Type | Up/Down | Debit/Credit |
|---|---|---|---|---|
| | | | | |
| 1 Home Insurance Expense | Expense | Up | Debit Entry |
| 2 Home Insurance Payable | Liability | Up | Credit Entry |

The journal entries and affected T-accounts for this transaction are given below.

(13)   31-Jan-10    Dr. Home Insurance Expense (+E, -SE)        $100
                        Cr. Home Insurance Payable (+L)            $100

| Ref# | Home Insurance Expense (E, -SE) | Ref# | | Ref# | Home Insurance Payable (L) | Ref# |
|---|---|---|---|---|---|---|
| | | | | | | |
| (13) | $100 | | | | $100 | (13) |
| | | | | | | |
| | | | | | | |

The company owes property taxes to the tax authorities. The property tax rate is 3.9% on the total purchase price of $100,000. This comes to $3,900 [$100,000 * 0.039] per annum and this should be paid before the end of the year. This translates to an income tax expense of $325 [$3,900 / 12] per month. Even though no cash has changed hands the company should record this expense due to the concept of accrual accounting. The affected entities for this transaction are given below.

| Sno | T-Account | Entity Type | Up/Down | Debit/Credit |
|---|---|---|---|---|
| | | | | |
| 1 Income Tax Expense | Expense | Up | Debit Entry |
| 2 Income Tax Payable | Liability | Up | Credit Entry |

The journal entries and affected T-accounts for this transaction are given below.

(14)   31-Jan-10    Dr. Income Tax Expense (+E, -SE)     $325
                              Cr. Income Tax Payable (+L)        $325

| Ref# | Income Tax Expense (E, -SE) | Ref# | | Ref# | Income Tax Payable (L) | Ref# |
|---|---|---|---|---|---|---|
| | | | | | | |
| (14) | $325 | | | | $325 | (14) |
| | | | | | | |
| | | | | | | |

We have one more adjustment entry to do. Remember in journal entry (9) we paid $600 towards marketing fees for the entire year. Since one month is already over we need to book $50 as monthly marketing expense. The affected entities for this transaction are given below.

| Sno | T-Account | Entity Type | Up/Down | Debit/Credit |
|---|---|---|---|---|
| | | | | |
| 1 | Marketing Fees Expense | Expense | Up | Debit Entry |
| 2 | Prepaid Marketing Fees | Asset | Down | Credit Entry |

The journal entries and affected T-accounts for this transaction are given below. This transaction will also reduce the prepaid Prepaid Marketing Fees asset account by $50.

(15)   31-Jan-10    Dr. Marketing Fees Expense (+E, -SE) $50
                              Cr. Prepaid Marketing Fees (-A)     $50

| | Prepaid Marketing Fees (A) | | | Ref# | Marketing Fees Expense (E, -SE) | Ref# |
|---|---|---|---|---|---|---|
| (3) | $600 | | | | | |
| | | $50 | (15) | (15) | $50 | |
| | | | | | | |
| | | | | | | |

At this point we are done with all the adjusting entries. Now we need to do adjusted trial balance and after that we can prepare our first financial statement - Income Statement.

## Adjusted Trial Balance -> Income Statement

A trial balance with adjusting entries is called as adjusted trial balance. For each T-account that got affected by the adjusting entries you need to compute the debit or credit balance. If you don't know how to do this then refer to step (1) of Unadjusted Trial Balance. After that you need to post these adjustments to trial balance under a new column named Adjustments. Take a look at the image given below which illustrates this.

| | Unadjusted Balances | | Adjustments | | Adjusted Balances | |
|---|---|---|---|---|---|---|
| | Debit | Credit | Debit | Credit | Debit | Credit |
| Cash | $8,850 | | | | $8,850 | |
| Accounts Receivable | $500 | | | | $500 | |
| Prepaid Marketing Fees | $600 | | | $50 | $550 | |
| Building | $90,000 | | | | $90,000 | |
| Accumulated Depreciation | | | | $250 | | $250 |
| Land | $10,000 | | | | $10,000 | |
| Deferred Rent | | $1,500 | $1,500 | | | $0 |
| Home Insurance Payable | | | | $100 | | $100 |
| Income Tax Payable | | | | $325 | | $325 |
| Security Deposit | | $9,000 | | | | $9,000 |
| Mortgage Payable | | $90,000 | | | | $90,000 |
| Contributed Capital | | $10,000 | | | | $10,000 |
| Rental Income | | | | $1,500 | | $1,500 |
| Property Management | $100 | | Contents inside the red rectangle directly | | $100 | |
| Repair Expense | $50 | | goes to the Income Statement. | | $50 | |
| Interest Expense | $400 | | | | $400 | |
| Depreciation Expense | | | $250 | | $250 | |
| Home Insurance Expense | | | $100 | | $100 | |
| Income Tax Expense | | | $325 | | $325 | |
| Marketing Fees Expense | | | $50 | | $50 | |
| | $110,500 | $110,500 | $2,225.00 | $2,225.00 | $111,175.00 | $111,175.00 |

If the above image is not big enough then you can click here or here to download it in the .xlsx or .pdf format. Combining [Unadjusted Balances + Adjustments] we get Adjusted Trial Balance. Creating an Income Statement is a piece of cake. All you need to do is copy and paste the contents inside the red rectangle and you get the income statement for the period 01-Jan-2010 to 31-Jan-2010.

| Holmes-Watson Co. | |
|---|---|
| **Income Statement For Period Ending 31-Jan-2010** | |
| | |
| Rental Income | $1,500 |
| Expenses | $1,275 |
| Property Management | $100 |
| Repair Expense | $50 |
| Interest Expense | $400 |
| Depreciation Expense | $250 |
| Home Insurance Expense | $100 |
| Income Tax Expense | $325 |
| Marketing Fees Expense | $50 |
| **Net Income** | $225 |

Leibniz took 6 pages to explain the fundamental concepts of Calculus. But I took 25 pages to create the Income Statement. The process was painful. But it's definitely worth it.

The Income Statement is concerned with how much money the company brought in and how much it spent in order to bring that money in. In case of Holmes-Watson Co. it bought in $1,500 and for bringing in that money it spent $1,275. And it made a profit, also called as net income, of $225. The Income Statement covers a period of time. The period could be an year, quarter, month, or any period of time that the company feels is appropriate. In case of Holmes-Watson Co. the time period is for one month from 01-Jan-2010 to 31-Jan-2010.

## Closing Entries

Accounts can be classified into two types — **temporary and permanent**. Income and Expense accounts are called as temporary accounts. Why is that? Income and Expense accounts cover a period of time. After a period is over we need to reset their values. This is why they're called as temporary accounts. Why should we reset their values? By resetting these accounts to zero we can reuse them for the next period. If we don't reset them then we will be commingling current and past transactions.

Before resetting their values we need to move it to some other place. Where should we move it to? We need to move it to Retained Earnings account. We need to do closing journal entries to move the values. Given below is the journal entry and T-account for resetting and moving the value from Income T-account to Retained Earnings T-account. After this transaction Retained Earnings account went up by $1,500 and Income account went down to $0.

C1          Dr. Rental Income (-R, -SE)    $1,500
              Cr. Retained Earnings (+SE)      $1,500

| Ref# | Retained Earnings (SE) | | Ref# | | Ref# | Income (R, +SE) | | Ref# |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | |
| | | $1,500 | C1 | | | | $1,500 | (12) |
| | | | | | C1 | $1,500 | | |
| | | | | | | After closing entry, Income account is brought down to $0. And it's ready to be reused for the next period. | | |
| | | | | | | | $0 | |

The journal entries for resetting all the expense accounts is given below.

C2          Dr. Retained Earnings (-SE)    $1,275
              Cr. Property Management (-E, +SE)      $100
              Cr. Repair Expense (-E, +SE)      $50
              Cr. Interest Expense (-E, +SE)      $400
              Cr. Depreciation Expense (-E, +SE)      $250
              Cr. Home Insurance Expense (-E, +SE)      $100
              Cr. Income Tax Expense (-E, +SE)      $325
              Cr. Marketing Fees Expense (-E, +SE)      $50

After this transaction the Retained Earnings T-account will have $225. And all the expense T-account will go down to zero. The image given below shows the Retained Earnings and Property Management expense T-account going down by $1,275 and $100. To see all other expense T-accounts going down to zero click here or here to download them in the .xlsx or .pdf format.

| Ref# | Retained Earnings (SE) | | Ref# | | Ref# | Property Management (E, -SE) | | Ref# |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | |
| | | $1,500 | C1 | | (6) | $100 | | |
| C2 | $1,275 | | | | | | $100 | C2 |
| | | | Difference of $1,500 and $1,275 is posted as a credit entry. | | | Expense account reset to zero by a closing entry C2. | | |
| | | $225 | | | | | $0 | |

There is one more temporary account which I haven't discussed. It is called as dividend account. You can read about it on your own. Asset, Liability, and Shareholder's Equity are permanent accounts as their balances carry over from year to year.

All the debit or credit balance, of T-accounts that got affected by the closing entries, gets posted to the trial balance under the heading Closing Entries. This in turn is used to do a final posting under the heading Post Closing Balance. This is illustrated in the image given below.

| | Closing Entries | | | Post Closing Balance | | |
|---|---|---|---|---|---|---|
| | Debit | Credit | | Debit | Credit | |
| | | | | | | |
| Cash | | | | $8,850 | | |
| Accounts Receivable | | | | $500 | | |
| Prepaid Marketing Fees | All these items goes to the balance sheet. | | | $550 | | |
| Building | | | | $90,000 | | |
| Accumulated Depreciation | | | | | $250 | |
| Land | | | | $10,000 | | |
| Home Insurance Payable | | | | | $100 | |
| Income Tax Payable | | | | | $325 | |
| Security Deposit | | | | | $9,000 | |
| Mortgage Payable | Goes to the statement of retained earnings. | | | | $90,000 | |
| Contributed Capital | | | | | $10,000 | |
| Retained Earnings | | $225 | | | $225 | |
| Rental Income | $1,500 | | | | | Closing entries zero out income and expense account. Retained earnings account go up by $225. |
| Property Management | | $100 | | | | |
| Repair Expense | | $50 | | | | |
| Interest Expense | | $400 | | | | |
| Depreciation Expense | | $250 | | | | |
| Home Insurance Expense | | $100 | | | | |
| Income Tax Expense | | $325 | | | | |
| Marketing Fees Expense | | $50 | | | | |
| | $1,500 | $1,500 | | $109,900 | $109,900 | |

## Statement Of Retained Earnings & Balance Sheet

From the image given above pull out the value for Retained Earnings under the column Post Closing Balance. You will find this value to be $225. Using this value I have created a Statement Of Retained Earnings which is shown below.

| Holmes-Watson Co. | |
|---|---|
| **Retained Earnings For Period Ending 31-Jan-2010** | |
| | |
| Beginning balance, 01-Jan-2010 | $0 |
| Net Income (+) | $225 |
| Dividends (-) | $0 |
| Ending balance, 31-Jan-2010 | $225 |

This statement is prepared for a period, and the period should be the same as that of the Income Statement. In this case the period is for one month from 01-Jan-2010 to 31-Jan-2010. This statement shows how much profit did the company keep to itself after distributing dividends to its shareholders. In this case it retained everything as it paid $0 in dividends.

Preparing a balance sheet is a piece of cake. From the Post Closing Trial Balance pull out all the rows from Cash to Retained Earnings. And you get the Balance Sheet.

| Balance Sheet As On 31-Jan-2010 | |
|---|---|
| | |
| **Assets** | $109,650 |
| Cash | $8,850 |
| Accounts Receivable | $500 |
| Prepaid Marketing Fees | $550 |
| Net Building | $89,750 |
| Building | $90,000 |
| Accumulated Depreciation | $250 |
| Land | $10,000 |
| | |
| **Liabilities** | $99,425 |
| Home Insurance Payable | $100 |
| Income Tax Payable | $325 |
| Security Deposit | $9,000 |
| Mortgage Payable | $90,000 |
| | |
| **Shareholders Equity** | $10,225 |
| Contributed Capital | $10,000 |
| Retained Earnings | $225 |
| | |
| **Liabilities + Shareholders Equity** | $109,650 |

The Balance Sheet is prepared **"as on"** a particular day, and the accounts reflect the balances that existed at the close of business on that day. The Balance Sheet is prepared on the last day that the Income Statement covers. In our case the Income Statement is for the period ending 31-Jan-2010. So the Balance Sheet would be as on 31-Jan-2010.

Balance sheet contains three major groups. They are **(1)** what the company owns; assets. In this case the assets add up to $109,650 **(2)** what the company owes to others; liabilities. In this case the liabilities add up to $99,425 **(3)** what is left over; shareholder's equity. This goes to the shareholders — Holmes and Watson. In this case the left over is $10,225.

A quick way to check the correctness of the created balance sheet is to see if the Accounting Identity equation is satisfied. As shown below it does get satisfied.

Assets     = Liabilities + Shareholder's Equity
$109,650 = $99,425  + $10,225
$109,650 = $109,650

## Cash Flow Statement

The fourth and the final financial statement that we need to prepare is the Cash Flow Statement. Preparing it isn't easy as preparing the other financial statements. This is because we can't use the trial balance to prepare it. Instead we need to go through every journal entry that affected the Cash T-account.

Cash flow statement is divided into three sections. They are **(1)** Cash flows from operations **(2)** Cash flows from investing **(3)** Cash flows from financing.

**Cash flows from operations** - This section shows how much money the company generated from its core business, as opposed to peripheral activities such as investing or borrowing. If the company is losing money in its core operations then its cash flows from operations will be negative. Otherwise it will be positive. The core operations of Holmes-Watson Co. generated positive cash flows.

**Cash flows from investing** - This section shows how much money the company spent on investments that are needed to keep the business running. For acquiring the rental property Holmes-Watson Co. spent $100,000. And this belongs in investing section.

**Cash flows from financing** - This section shows how much cash did the company raise from its shareholders and debtholders. In Holmes-Watson Co. $10,000 was raised from its shareholders and $90,000 was raised from the bank.

There are two ways to prepare a cash flow statement — Direct and Indirect Method. I don't know if any company uses the direct method. So I am going to focus only on the Indirect method. In the Indirect method you start with Net Income shown in the Income Statement. To that add all non-cash expenses. Then add all cash inflows and subtract all cash outflows that are not captured in the income statement.

For example security deposit of $9,000 from the tenant is a cash inflow that is not captured in the income statement. So I have added it. Marketing fees expense of $50 is captured in the Income statement. But the remaining $550 is a cash outflow which is not captured in the Income statement. So I subtracted it.

Given below is the cash flow statement prepared using the Indirect method. Make sure that you understand every line in it. Cash flow statement, like Income statement, is prepared for a period. In our case the period is for one month from 01-Jan-2010 to 31-Jan-2010.

| Holmes-Watson Co. | |
|---|---|
| **Cash Flow Statement For Period Ending 31-Jan-2010** | |
| Net Income | $225 |
| Depreciation Expense (+) | $250 |
| Income Tax Expense (+) | $325 |
| Home Insurance Expense (+) | $100 |
| Marketing Fees Expense (-) | $550 |
| Accounts Receivable (-) | $500 |
| Security Deposit (+) | $9,000 |
| | |
| **Cash Flow From Operations** | **$8,850** |
| | |
| Land | $10,000 |
| Building | $90,000 |
| | |
| **Cash Flow From Investing** | **$100,000** |
| | |
| Contributed Capital | $10,000 |
| Mortgage Payable | $90,000 |
| | |
| **Cash Flow From Financing** | **$100,000** |
| Starting Cash | $0 |
| Ending Cash | $8,850 |
| Change in Cash | $8,850 |

Annotations on the statement:
- Start with Net Income. Add all non-cash expenses. Then Add cash inflows and subtract cash outflows that are not captured in the income statement.
- Change in Cash of $8,850 is the cash that is available with the company. And it will be shown in the balance sheet.

A quick way to check the correctness of the created cash flow statement is to add the cash flows from three groups and make sure that they match the cash position shown in the balance sheet. As shown below it does match.

Change in cash position = Cash flows from [Operations - Investing + Financing]
Change in cash position = $8,850 - $100,000 + $100,000
Change in cash position = $8,850

Change in balance sheet cash = Cash on 31-Jan-2010 - Cash on 31-Dec-2009
Change in balance sheet cash = $8,850 - $0
Change in balance sheet cash = $8,850

At first glance, cash flow statement looks very similar to an income statement. You may wonder why do we need a cash flow statement. This question is beautifully answered in Morningstar tutorials.

> The difference lies in a complex concept called accrual accounting. **Accrual accounting requires companies to record revenues and expenses when transactions occur, not when cash is exchanged.** While that explanation seems simple enough, it's a big mess in practice, and the statement of cash flows helps investors sort it out.
>
> The statement of cash flows is very important to investors because it shows how much actual cash a company has generated. The income statement, on the other hand, often includes non-cash revenues or expenses, which the statement of cash flows excludes.
>
> One of the most important traits you should seek in a potential investment is the firm's ability to generate cash. Many companies have shown profits on the income statement but stumbled later because of insufficient cash flows. A good look at the statement of cash flows for those companies may have warned investors that rocky times were ahead. - _Morningstar.com_

## Everything is Connected

Few days back I was reading about Pauli exclusion principle. I would urge you to watch this excellent video in which physicist Brian Cox, using a piece of diamond and Pauli exclusion principle, shows us why everything is connected to everything else.

> This shift of the configuration of the electrons inside the diamond has consequences, because the sum total of all the electrons of the universe must respect Pauli. Therefore, every electron around every atom in the universe must be shifting as I heat the diamond up, to make sure that none of them end up in the same energy level. **When I heat this**

> *diamond up, all the electrons in the universe instantly but imperceptibly change their energy levels. So everything is connected to everything else.* - *Brainpickings*

I am not a physicist to validate the truth in Brian Cox's statement. But I know enough to tell you that all four financial statements that we created are deeply connected. I came up with five connections and they are shown below by annotating them with A - E. If the image is not clearly visible then you can download it from here.

| Holmes-Watson Co. Income Statement For Period Ending 31-Jan-2010 | | | | Holmes-Watson Co. Balance Sheet As On 31-Jan-2010 | | | | Holmes-Watson Co. Cash Flow Statement For Period Ending 31-Jan-2010 | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Rental Income | $1,500 | E | | Assets | $109,650 | | | Net Income | | $225 |
| Expenses | $1,275 | | | Cash | $8,850 | B | | Depreciation Expense (+) | | $250 |
| Property Management | $100 | | | Accounts Receivable | $500 | E | | Income Tax Expense (+) | | $325 |
| Repair Expense | $50 | | | Prepaid Marketing Fees | $550 | | | Home Insurance Expense (+) | | $100 |
| Interest Expense | $400 | | | Net Building | $89,750 | | | Marketing Fees Expense (-) | | $550 |
| Depreciation Expense | $250 | C | | Building | $90,000 | | | Accounts Receivable (-) | E | $500 |
| Home Insurance Expense | $100 | | | Accumulated Depreciation | $250 | C | | Security Deposit (+) | | $9,000 |
| Income Tax Expense | $325 | D | | Land | $10,000 | | | | | |
| Marketing Fees Expense | $50 | | | | | | | Cash Flow From Operations | | $8,850 |
| Net Income | $225 | A | | Liabilities | $99,425 | | | | | |
| | | | | Home Insurance Payable | $100 | | | Land | | $10,000 |
| Holmes-Watson Co. Retained Earnings For Period Ending 31-Jan-2010 | | | | Income Tax Payable | $325 | D | | Building | | $90,000 |
| | | | | Security Deposit | $9,000 | | | | | |
| Beginning balance, 01-Jan-2010 | $0 | | | Mortgage Payable | $90,000 | | | Cash Flow From Investing | | $100,000 |
| Net Income (+) | $225 | A | | Shareholders Equity | $10,225 | | | Contributed Capital | | $10,000 |
| Dividends (-) | $0 | | | Contributed Capital | $10,000 | | | Mortgage Payable | | $90,000 |
| Ending balance, 31-Jan-2010 | $225 | | | Retained Earnings | $225 | A | | | | |
| | | | | | | | | Cash Flow From Financing | | $100,000 |
| | | | | Liabilities + Shareholders Equity | $109,650 | | | | | |
| | | | | | | | | Starting Cash | | $0 |
| | | | | | | | | Ending Cash | | $8,850 |
| | | | | | | | | Change in Cash | B | $8,850 |

As an exercise I want you to reason these annotations. One of the best ways to learn financial statements very deeply is by discovering connections between them. Apart from five connections that I have shown, see if you can come up with more connections. Believe me there are many more.

## Tying it all with ROE and ROIC

It's party time. Sitting inside a bar, Holmes and Watson were celebrating their real estate success with a bottle of beer. Watson tells Holmes, "I'm happy that we made a decent start. But net income of $225 is not a lot and I don't see a reason to celebrate."

To which Holmes replied, "Looking at $225 in isolation will lead you to form incorrect conclusions. In life everything is relative and you need to compare net income with how much

we invested. We made $225 for one month. All else being equal we would make $2,700 [ $225 * 12 ] per year. And we contributed $10,000 to begin with. Our return on investment comes to 27 percent [ $2,700 / $10,000 ]."

To which Watson replied, "Now I see a reason to celebrate!".

To which Holmes replied, "Not so fast. In life everything is relative. To find out if 27 percent is high or low we need to compare it with 10-year US Treasury which is **our next best investment opportunity.** And the current 10-year treasury yield is less than 4%. So our real estate returns are very high and we have a reason to celebrate."
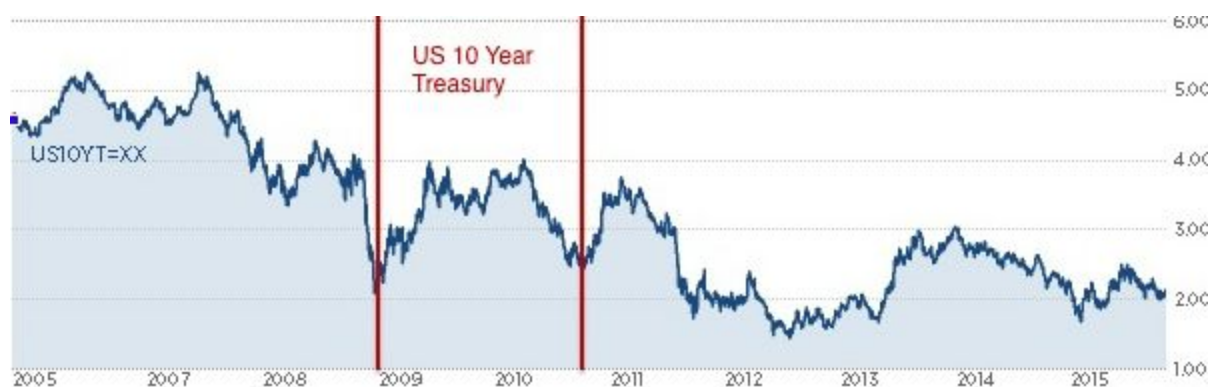


The concept which Holmes explained to Watson is called as **Return On Equity (ROE)**. The formula is given below. I have expanded the formula to show the constituents that makes up ROE. This expanded version is called as **Dupont Analysis**.

ROE = (*Net Income / Shareholder's Equity*)

ROE = (*Net Income / Assets*) * (*Assets / Shareholder's Equity*)

ROE = (*Net Income / Sales*) * (*Sales / Assets*) * (*Assets / Shareholder's Equity*)

ROE = *Profitability * Efficiency * Leverage*        **[ Dupont Analysis ]**

ROE gets affected by three levers. They are **(1)** Profitability which tells for every dollar of sale made by the company how much profits did it retain **(2)** Efficiency which tells for every dollar invested in assets how much sale did the company make **(3)** Leverage which tells for every dollar of shareholder's equity how much assets did the company control.

In the case of Holmes-Watson Co. which levers were responsible for generating 27 percent ROE? From the calculation given below we can see that it achieved these returns by retaining 15 cents of profit for every dollar of sale. And it made 16 cents in sales for every dollar invested in assets. Finally it controlled $10.96 worth of assets for every dollar of shareholder's equity. **The main lever which magnified ROE is leverage.**

ROE = ($2,700 / $18,000) ∗ ($18,000 / $109,650) ∗ ($109,650 / $10,000) [normalized for 1 year]
ROE = 0.15 ∗ 0.164 ∗ 10.96
ROE = 27%

After seeing the power of leverage, Watson told Holmes, "Let's take a lot of leverage and buy 1,000 properties. And we can become super rich!". To which Holmes replied, "Leverage magnifies your return both up and down. You should read about the story of Long Term Capital Management. The firm was run by a bunch of ethical super smart guys with very high IQ. The company went belly up because their excess leverage misfired in the opposite direction."

> *If you take John Meriwether, Eric Rosenfeld, Larry Hilibrand, Greg Hawkins, Victor Haghani and the Nobel prize winner Myron Scholes. If you take the 16 of them, they probably have the highest average IQ of any 16 people working together in one business in the country,including Microsoft or whoever you want to name–so incredible is the amount of intellect in that room. Now if you combine that with the fact that those 16 have had extensive experience in the field in which they operate. I mean, this is not a bunch of guys who made their money selling men's clothing and all of the sudden went to the security business or anything. They had, in aggregate, probably 350 or 400 years of experience doing exactly what they were doing. And then you throw in the third factor: that most of them had virtually all of their very substantial net worth in the business. They have their own money tied up, hundreds of hundred of millions of dollars of their own money tied up, a super high intellect, they were working in a field they knew, and they went broke. And that to me is absolutely fascinating. If I write a book, it's going to be called "Why do smart people do dumb things?"*
>
> ***To make the money they didn't have and they didn't need, they risked what they did have and did need–that's foolish, that's just plain foolish. If you risk something that is important to you for something that is unimportant to you, it just does not make any sense. I don't care whether the odds are 100 to 1 that you succeed, or 1,000 to 1 that you succeed.*** *If you hand me a gun with a thousand chambers or a million chambers, and there is a bullet in one chamber and you said 'put it to your temple and pull it' , I'm not going to pull it. You can name any sum you want. It doesn't do anything for me on the upside, and I think the downsize is fairly clear. I'm not interested in that kind of a game, and yet people do it financially without thinking about it very much. It's like Henry Kauffman said the other day– the people going broke in these situations are just two types: the ones who know nothing, and the ones who know everything. - Warren Buffett On LTCM*

After realizing the dangers of leverage, Watson asked Holmes, "From this venture can we conclude that real estate is a great business?". To which Holmes replied, "**It all depends on the capital structure**. In the current form it's a great business to be in."

Reread the line marked in bold. What does Holmes mean by capital structure? In order to understand his statement we need to learn about **Return On Invested Capital (ROIC)**. Let me explain this in detail. Take a look at the diagram given below.
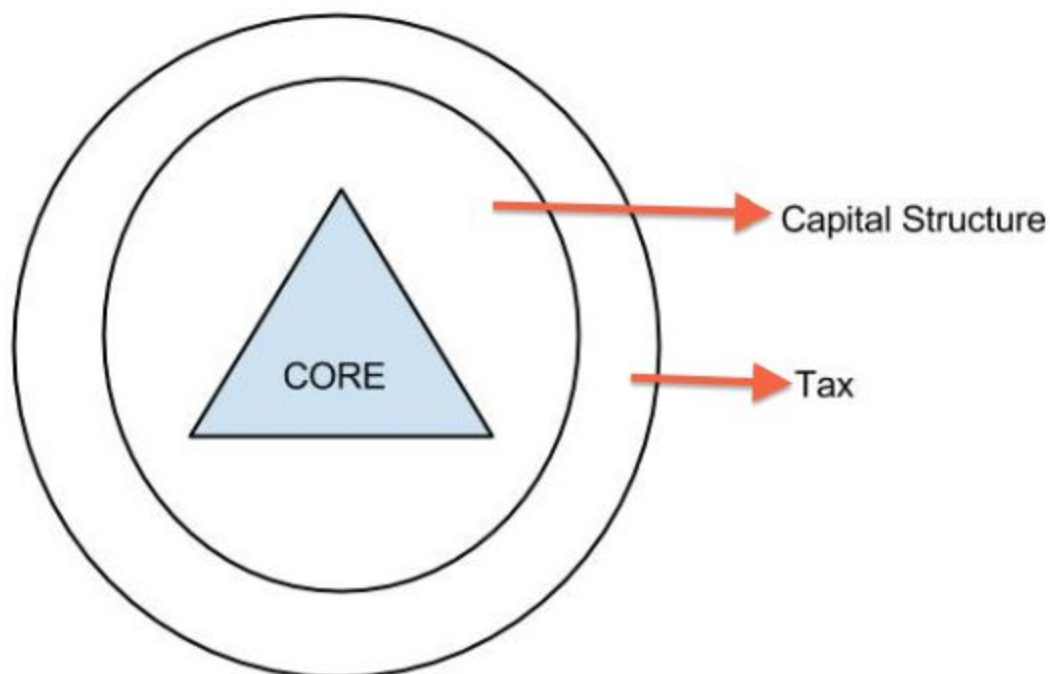


Every business has a core which is represented by the triangle at the center. It is then surrounded by its capital structure which tells how a company is financed. It is then surrounded by the tax structure which tells how much tax the business pays to the government authorities. The capital structure of Holmes-Watson Co. consists of shareholder's contributing $10,225, debtholders contributing $90,000, and the remaining $9,425 is funded by other liabilities.

In order to understand how a business is performing we need to calculate the return generated by the core business. ROIC is the metric which measures this. It is calculated by using the formula *Operating Earnings / Invested Capital*.

The table given below shows the calculation for Operating Earnings. We want to measure the returns generated by the core business. So I removed the interest and property tax expenses from the calculations. Also I normalized Operating Earnings for one year. After normalizing, operating earnings comes to $11,400.

| Holmes-Watson Co. | |
|---|---|
| Operating Earnings | |
| | |
| Rental Income | $1,500 |
| Expenses | $550 |
|   Property Management | $100 |
|   Repair Expense | $50 |
|   Depreciation Expense | $250 |
|   Home Insurance Expense | $100 |
|   Marketing Fees Expense | $50 |
| Operating Earnings | $950 |
| Normalized for one year | $11,400 |

The table given below shows how I arrived at the value for Invested Capital. Start with the total assets invested in the business. From that subtract all liabilities that doesn't have any interest expense. The total capital invested in the business comes to $100,225.

| Holmes-Watson Co. | |
|---|---|
| Invested Capital | |
| | |
| Total Assets | $109,650 |
| Less | $9,425 |
|   Security Deposit | $9,000 |
|   Home Insurance Payable | $100 |
|   Income Tax Payable | $325 |
| Invested Capital | $100,225 |

So the ROIC of the core business is 11.37% [ $11,400 / $100,225]. Not bad compared to 10-year US Treasury yield. But pale compared to ROE. Now we know what Holmes meant. If Holmes-Watson Co. didn't take any debt their returns would have been average. This is what Holmes meant when he said, "**It all depends on the capital structure.**"

## Did Holmes and Watson Invest or Speculate?

Now it's time to ask you a question. Would you consider the action of Holmes and Watson an investment or speculation? Before reading further think about it for some time. In lecture one, I introduced you to Benjamin Graham. Do you remember what he wrote about investment?

> *An investment operation is one which, upon **thorough analysis, promises safety of principal and an adequate return**. Operations not meeting these requirements are speculative. - Benjamin Graham*

The lines marked in bold contains three key terms - [ **thorough analysis, promises safety of principal, adequate return** ]. Holmes spoke to his broker friend and clearly understood the situation before purchasing the property. So we can safely assume that he did a thorough analysis. By buying the asset way below its replacement cost, [purchased at $40 per sq ft when the replacement cost was $80], he satisfied the second criteria; safety of principal.

Did they get an adequate return? In order to answer this question we need to know what was their rate of return? A first level thinker would look at ROE and answer yes, as 27 percent is more than adequate. But a second level thinker sees more than 27 percent. How's that possible? Think about it before reading further.

Let's assume that Holmes-Watson Co. holds the property for 30 years. Who pays the monthly mortgage for the property? The tenant. After 30 years the property is debt free. At that time let's assume that the price-value gap closes and construction cost per sq ft goes up to $80. This is an ultra conservative assumption as I haven't factored in inflation for 30 years.

The cost of the property would be $200,000. Subtracting their initial investment of $10,000, Holmes-Watson Co. made $190,000 on their initial $10,000 investment. This translates to a compounded growth rate of 10.31 percent. The calculation given below shows how I arrived at 10.31 percent.

$$FV = PV * (1 + R)^n$$
$$(1 + R)^n = (FV / PV)$$
$$(1 + R) = (FV / PV)^{(1/n)}$$
$$R = (FV / PV)^{(1/n)} - 1$$
$$R = (\$190,000 / \$10,000)^{(1/30)} - 1$$
$$R = (19)^{(1/30)} - 1$$
$$R = 10.31 \; percent$$

So their total return would be 37.31% which satisfies the final criteria of adequate return. From this we can conclude that Holmes-Watson Co. made an investment and they didn't speculate.

## Few Items To Read And Watch

Knowledge without application is worthless. **In the next week lecture notes, using our newly acquired accounting knowledge, we will tease apart the financial statements of Alphabet**

**Inc., holding company of Google.** Until then I want you to read and watch few items given below.

1. To understand the framework of double-entry bookkeeping read the book Accounting Made Simple and Accounting Demystified.
2. Take the free Coursera course Introduction to Financial Accounting. I have taken the unabridged version of this course. Without it I couldn't have written this lecture notes. **I highly recommend it**. Some of my Indian friends quibble that it teaches US GAAP accounting and they're only interested in analyzing Indian companies. My answer to them is that it doesn't matter. After all the language of accounting is 500 years old. This course teaches you that language for free.
3. Read the book How to Read a Financial Report. I love this book for its simplicity and the connections it shows between financial statements.
4. Under an hour William Ackman teaches you everything you need know about finance and investing.

# Analyzing the financial statements of Alphabet Inc.

If you want to learn new concepts very deeply, then you need to relate it with something you already know very well. Using the knowledge acquired in the previous lecture, let's analyze the financial statements of Alphabet Inc., the holding company of Google.

We will be studying the financial statements of Alphabet by asking four important questions. They are **(1)** Who funds the company? **(2)** What does the company own? **(3)** Using what it owns did the company generate profits? **(4)** What did it do with the generated profits?

The first and the second question can be answered by reading the balance sheet. The third question can be answered by reading the income statement. The last question can be answered by reading the cash flow statement. The next question is from where do we get these financial statements?

All public companies in the US are mandated to submit their financial performance report to the Securities and Exchange Commission (SEC) every year (10-K) and every quarter (10-Q). Both 10-K and 10-Q contains the three key financial statements. You can download it directly from the SEC or the company's website.

We will get the answers for the above four questions by studying Alphabet's 10-K report for the year 2014. I already extracted the three key financial statements from the 10-K report. You can download it from here.

## Who Funds The Company?

In order to find out who funds the company, we need to read the liabilities and shareholder's equity section of the balance sheet. I extracted this section from the balance sheet and it's given below. Here are few things that we can see.

The total funds provided by the shareholders and non shareholders adds up to $131.13 billion. The company owes $26.63 billion to the non shareholders. And the remaining $104.50 billion belongs to the shareholders. In case of Holmes-Watson Co. the shareholders owned $10,225 and the remaining $99,425 belonged to others.

The financial position of Alphabet is much better than Holmes-Watson Co. Why is that? In case of Alphabet, shareholders owns 80% [ $104.50 billion / $131.13 billion ] of the company. Whereas shareholders in Holmes-Watson Co. only owns 9% [ $10,225 / $109,650] of the company. The probability of Holmes-Watson becoming insolvent is much higher than Alphabet.

| Liabilities and Stockholders' Equity (In millions) | 2013 | 2014 |
|---|---|---|
| **Current liabilities:** | | |
| Accounts payable | $ 2,453 | $ 1,715 |
| Short-term debt | 3,009 | 2,009 |
| Accrued compensation and benefits | 2,502 | 3,069 |
| Accrued expenses and other current liabilities | 3,755 | 4,434 |
| Accrued revenue share | 1,729 | 1,952 |
| Securities lending payable | 1,374 | 2,778 |
| Deferred revenue | 1,062 | 752 |
| Income taxes payable, net | 24 | 96 |
| Total current liabilities | 15,908 | 16,805 |
| Long-term debt | 2,236 | 3,228 |
| Deferred revenue, non-current | 139 | 104 |
| Income taxes payable, non-current | 2,638 | 3,407 |
| Deferred income taxes, net, non-current | 1,947 | 1,971 |
| Other long-term liabilities | 743 | 1,118 |
| Commitments and contingencies    A    Total Liabilities | | $ 26,633 |
| **Stockholders' equity:** | | |
| Convertible preferred stock, $0.001 par value per share, 100,000 shares authorized; no shares issued and outstanding | 0 | 0 |
| Class A and Class B common stock, and Class C capital stock and additional paid-in capital, $0.001 par value per share: 15,000,000 shares authorized (Class A 9,000,000, Class B 3,000,000, Class C 3,000,000); 671,664 (Class A 279,325, Class B 56,507, Class C 335,832) and par value of $672 (Class A $279, Class B $57, Class C $336) and 680,172 (Class A 286,560, Class B 53,213, Class C 340,399) and par value of $680 (Class A $287, Class B $53, Class C $340) shares issued and outstanding | 25,922 | 28,767 |
| Accumulated other comprehensive income | 125 | 27 |
| Retained earnings | 61,262 | 75,706 |
| Total stockholders' equity    B | 87,309 | 104,500 |
| Total liabilities and stockholders' equity    A + B | $ 110,920 | $ 131,133 |

We learnt in lecture two that $Shareholder's\ Equity\ =\ Contributed\ Capital\ +\ Retained\ Earnings$ . In case of Holmes-Watson Co. the total shareholder's equity came to $10,225 with owners contributing $10,000 and the balance coming from the retained earnings of $225. In case of Alphabet the math is a little complicated.

This complexity arises because of two reasons **(1)** Compensating employees by issuing new stocks affects contributed capital **(2)** Accumulated other comprehensive income (AOCI) is an advanced accounting concept which affects shareholder's equity.

As this is an introductory course, I'm going to simplify this complexity by **(1)** not differentiating the effects on contributed capital caused by stock compensation **(2)** adding $27 million of AOCI to retained earnings. After this simplification Alphabet's total shareholder's equity comes to $104.50 billion with owners contributing $28.76 billion and the balance coming from the retained earnings of $75.70 billion.

If you look at the Shareholder's equity section closely then you would have noticed few weird looking lines. Do they mean anything?

> Class A and Class B common stock, and Class C capital stock and additional paid-in capital, $0.001 par value per share: **15,000,000 shares authorized** (Class A 9,000,000, Class B 3,000,000, Class C 3,000,000); 671,664 (Class A 279,325, Class B 56,507, Class C 335,832) and par value of $672 (Class A $279, Class B $57, Class C $336) and 680,172 (**Class A 286,560, Class B 53,213, Class C 340,399**) and par value of $680 (Class A $287, Class B $53, Class C $340) shares issued and outstanding. [share counts are reflected in thousands]

They tell us that Alphabet has three classes of common shares — A, B, and C. Class A can cast one-vote-per-share and class B can cast ten-votes-per-share. Class C doesn't have any voting power. Most of the class B shares are owned by the insiders, Larry, Sergey, and Eric. This gives them complete power to decide the board of directors. The company is authorized to issue up to 15 billion shares and as of 31-Dec-2014 it had 680.16 million shares outstanding. I would urge you to read the article the-many-classes-of-google-stock.

Take a look at the liabilities section. Why are some liabilities grouped under current liabilities? Those liabilities that are coming due within one year are called as **current liabilities**. This adds up to $16.80 billion. Few examples of current liabilities are accounts payable and short-term debt. Liabilities that are not due within one year are called as **non-current liabilities**. This adds up to $9.83 [ $26.63 - $16.80 ] billion. Few examples of non-current liabilities are long-term debt and non-current portion of deferred revenue.

In case of Holmes-Watson Co. it had a debt (bank loan) of $90,000. How much debt does Alphabet have? From the liabilities section we can see that its debt is divided into two parts — short-term debt of $2.0 billion and long-term debt of $3.23 billion. So the total debt adds up to $5.23 billion. Is this a lot of debt? In order to answer this question we need to calculate the **debt-to-equity** ratio. This comes to 0.05 [ $5.23 billion / $104.50 billion ]. This is very low compared to Holmes-Watson Co. debt-to-equity ratio of 8.8 [ $90,000 / $10,225 ]. **Lower the debt-to-equity ratio better the financial position of the company**. Reread and reflect on the above line marked in bold.

When is Alphabet's debt due? And how much interest does it pay on its debt? The liabilities section in the balance sheet doesn't contain the answer. For finding the answer you need to read the **notes to financial statements**. Also referred to as footnotes. It provides additional information pertaining to a company's operations and financial position and are considered to be an integral part of the financial statements. Investing without reading the footnotes is akin to you playing soccer blindfolded when other players are keeping their eyes wide open.

Open the 10-K report and search for "Note 3. Debt". By reading the footnotes we can see that Alphabet's short-term debt consists of commercial paper worth $2.0 billion. The weighted average interest rate on this debt comes to 0.1%. This loan is due within one year.

From the table given below we can see that Alphabet's long-term debt adds up to $3.23 billion. The due dates on these debts fall between the year 2016 to 2024. And the interest rates on them range from 2.125 to 3.375 percent.

| Long-term debt: | (In millions) | 2013 | 2014 |
|---|---|---|---|
| 2.125% Notes due on May 19, 2016 | | 1,000 | 1,000 |
| 3.625% Notes due on May 19, 2021 | | 1,000 | 1,000 |
| 3.375% Notes due on February 25, 2024 | | 0 | 1,000 |
| Unamortized discount for the Notes above | | (10) | (8) |
| Subtotal | | 1,990 | 2,992 |
| Capital lease obligation | | 246 | 236 |
| Total | | $ 2,236 | $ 3,228 |

## What does the company own?

The accounting identity equation $Assets = Liabilities + Shareholder's Equity$ must always be in balance. This means that $131.13 billion supplied by the entities on the right hand side of the equation must match the assets on the left hand side. In order to find out what Alphabet owns we need to read the assets section of the balance sheet. I extracted this section from the balance sheet and it's given below. Here are few things that we can see.

The company has total assets worth $131.13 billion and this clearly satisfies the accounting identity equation. Why are some assets grouped under current assets? Those assets that are expected to be converted to cash within a year are called as **current assets**. This adds up to $80.68 billion. Few examples of current assets are cash and marketable securities. Assets that are not expected to be converted to cash within a year are called as **non-current assets**. This adds up to $50.45 [ $131.13 - $80.68 ] billion. Few examples of non-current assets are property-and-equipment and goodwill.

In the previous section we saw that Alphabet had current liabilities of $16.8 billion. This will be due within one year. To find out if it can pay its current liabilities we need to calculate its **working capital**. It is defined as the difference between current assets and current liabilities. Alphabet has a huge working capital surplus of $63.88 [ $80.68 - $16.8 ] billion. And it needn't worry about servicing its current liabilities.

| (In millions) | As of December 31, 2013 | As of December 31, 2014 |
|---|---|---|
| **Assets** | | |
| Current assets: | | |
| Cash and cash equivalents | $ 18,898 | $ 18,347 |
| Marketable securities | 39,819 | 46,048 |
| Total cash, cash equivalents, and marketable securities (including securities loaned of $5,059 and $4,058) | 58,717 | 64,395 |
| Accounts receivable, net of allowance of $631 and $225 | 8,882 | 9,383 |
| Receivable under reverse repurchase agreements | 100 | 875 |
| Deferred income taxes, net | 1,526 | 1,322 |
| Income taxes receivable, net | 408 | 1,298 |
| Prepaid revenue share, expenses and other assets | 3,253 | 3,412 |
| Total current assets | 72,886 | 80,685 |
| Prepaid revenue share, expenses and other assets, non-current | 1,976 | 3,280 |
| Non-marketable equity investments | 1,976 | 3,079 |
| Property and equipment, net | 16,524 | 23,883 |
| Intangible assets, net | 6,066 | 4,607 |
| Goodwill | 11,492 | 15,599 |
| Total assets | $ 110,920 | $ 131,133 |

In the previous section we saw that Alphabet had total debt of $5.23 billion. And I told that its debt-to-equity ratio is very low and we needn't worry about its debt. One of the key points that you need to remember is **equity-is-not-cash**. Debt can only be serviced by cash.

> *Leverage, of course, can be lethal to businesses as well. Companies with large debts often assume that these obligations can be refinanced as they mature. That assumption is usually valid.* ***Occasionally, though, either because of company-specific problems or a worldwide shortage of credit, maturities must actually be met by payment. For that, only cash will do the job****. - Warren Buffett*

Alphabet has cash and marketable securities adding up to $64.39 billion. With this much amount it can buy [ Linkedin + Twitter ] and still be left with a change of $15 billion. So it needn't worry about its debt of $5.23 billion. Now you see why they say **cash is king**.

Cash and marketable securities accounts for 49% [ $ 64.39 billion / $131.13 billion] of the total assets. Whenever any item on the balance sheet accounts for more than 10% of the total, then you need to read the footnotes. Also, I would recommend reading the footnotes when there is a big jump in an item compared to the previous year.

Open the 10-K report and search for "Note 2. Financial Instruments". By reading the footnotes we can see that majority of its investments are in money market funds, government bonds, and municipal securities. They are super safe instruments. Alphabet invested $63.93 billion and after

adding the net unrealized gains of $460 million we get $64.39 billion. The last two items — Agency residential mortgage-backed securities and Asset-backed securities accounts for $11.71 billion. I don't know enough to talk about the safety of these instruments. They remind me of 2008-09 financial crisis.

|  | As of December 31, 2014 | | | | | |
|  | Adjusted Cost | Gross Unrealized Gains | Gross Unrealized Losses | Fair Value | Cash and Cash Equivalents | Marketable Securities |
| --- | --- | --- | --- | --- | --- | --- |
| Cash | $ 9,863 | $ 0 | $ 0 | $ 9,863 | $ 9,863 | $ 0 |
| Level 1: |  |  |  |  |  |  |
| Money market and other funds | 2,532 | 0 | 0 | 2,532 | 2,532 | 0 |
| U.S. government notes | 15,320 | 37 | (4) | 15,353 | 1,128 | 14,225 |
| Marketable equity securities | 988 | 428 | (64) | 1,352 | 0 | 1,352 |
|  | 18,840 | 465 | (68) | 19,237 | 3,660 | 15,577 |
| Level 2: |  |  |  |  |  |  |
| Time deposits[1] | 2,409 | 0 | 0 | 2,409 | 2,309 | 100 |
| Money market and other funds[2] | 1,762 | 0 | 0 | 1,762 | 1,762 | 0 |
| Fixed-income bond funds[3] | 385 | 0 | (38) | 347 | 0 | 347 |
| U.S. government agencies | 2,327 | 8 | (1) | 2,334 | 750 | 1,584 |
| Foreign government bonds | 1,828 | 22 | (10) | 1,840 | 0 | 1,840 |
| Municipal securities | 3,370 | 33 | (6) | 3,397 | 3 | 3,394 |
| Corporate debt securities | 11,499 | 114 | (122) | 11,491 | 0 | 11,491 |
| Agency residential mortgage-backed securities | 8,196 | 109 | (42) | 8,263 | 0 | 8,263 |
| Asset-backed securities | 3,456 | 1 | (5) | 3,452 | 0 | 3,452 |
|  | 35,232 | 287 | (224) | 35,295 | 4,824 | 30,471 |
| Total | $ 63,935 | $ 752 | $ (292) | $ 64,395 | $ 18,347 | $ 46,048 |

*(red annotations:)* It has $11.71 billion invested in ABS. Reminds me of 2008 financial crisis. — Alphabet had an unrealized gain of $460 million.

Take a look at the accounts receivable asset item. What does the term net of allowance means? And what does the amounts $631 million and $225 million signify?

| (in millions) | 2013 | 2014 |
| --- | --- | --- |
| Accounts receivable, net of allowance of $631 and $225 | $8,882 | $9,383 |

In case of Holmes-Watson Co. the broker promised us to pay $500 and we booked that as accounts receivable. If you don't remember, then go to lecture notes two and refer to journal entry (5). In that example we assumed that the broker will payback $500 without fail. But in real life this doesn't happen. Some customers go bankrupt and they wouldn't be able to payback the receivables.

There are couple of ways companies manage their accounts receivables. They are **(1)** Direct write off method **(2)** Allowance method. In the first method as and when customer defaults you record the expense in the income statement and reduce the accounts receivable in the balance

sheet. But the major drawback with this method is that **it violates matching principle of accounting i.e expenses are not matched with respective sales as the time period of the default could be way out in the future**. So in practice I don't think any company follows it.

All companies follow the allowance method. In this method you bucket the accounts receivables based on its age. You will create several buckets — 0-30 days, 31 - 90 days, 91 - 180 days, 181 days and above. Then for each bucket the company estimates a percentage of it to go bad. This will be recorded as an expense in the income statement and accounts receivable will be reduced by the expense amount. This reduced accounts receivable is called as **net accounts receivable**.

The percentage estimation is done based on historical transactions. And this is left to the judgment of the management. At some point the customer account is no longer collectible and you write off the allowance and reduce the gross accounts receivable. **This method obeys matching principle of accounting even though they are subject to the judgments of the management.** The calculations given below shows how net accounts receivable is calculated for the year 2014.

```
Gross accounts receivable        - $9,608 million
Allowance for doubtful accounts -    225 million
                                 ----------------
Net accounts receivable          - $9,383 million
                                 ----------------
```

A curious reader would have noticed the similarities between the above calculations and the one we did for Holmes-Watson Co to handle depreciation. If you don't remember, then go to lecture notes two and refer to journal entry (11). Both of them use the concept of **contra assets**. Before reading further spend some time thinking about the similarities between the two.

Alphabet has $23.88 billion in net property and equipment. In order to find out the components of this item we need to open the 10-K report and search for "Note 4. Balance Sheet Components".  By reading the footnotes we can see that Alphabet has accumulated depreciation and amortization of $8.86 billion. Adjusting for this we can arrive at the net property and equipment worth $23.88 [ $32.74 - $8.86] billion.

A curious reader should ask what is the difference between **depreciation and amortization**? Tangible (perceptible by touch) assets like buildings, vehicles, computers, etc. are depreciated over the useful life of the asset. Whereas intangible (unable to be touched) assets like computer software, trademarks, patents, etc. are amortized over the useful life of the asset.

| | As of December 31, 2013 | As of December 31, 2014 |
|---|---|---|
| Information technology assets | $ 9,094 | $ 10,918 |
| Land and buildings | 7,488 | 13,326 |
| Construction in progress | 5,602 | 6,555 |
| Leasehold improvements | 1,576 | 1,868 |
| Furniture and fixtures | 77 | 79 |
| Total | 23,837 | 32,746 |
| Less: accumulated depreciation and amortization | 7,313 | 8,863 |
| Property and equipment, net | $ 16,524 | $ 23,883 |

*Alphabet has gross property-and-equipment worth $32.74 billion. After adjusting for accumulated depreciation of $8.86 billion we get net property-and-equipment worth $23.88 billion.*

Alphabet has $15.60 billion in goodwill asset item. What does this mean? In order to answer this question let's assume that there are two software companies A and B. The balance sheet of both A and B are given below.

| | A | B |
|---|---|---|
| | | |
| **Assets** | $100 | $50 |
| **Liabilities** | $10 | $20 |
| **Equity** | $90 | $30 |

A agrees to acquire B by paying $100. This means that A is paying $100 for B which is only worth $30 after the deduction of liabilities. The excess amount of $70 is kept in A's balance sheet as an asset item called as goodwill.

> *When a business is purchased, accounting principles require that the purchase price first be assigned to the fair value of the identifiable assets that are acquired. Frequently the sum of the fair values put on the assets (after the deduction of liabilities) is less than the total purchase price of the business. In that case, the difference is assigned to an asset account entitled "excess of cost over equity in net assets acquired". To avoid constant repetition of this mouthful, we will substitute "Goodwill". - Warren Buffett*

Over the years Alphabet has been acquiring a lot companies by paying more than its book value. And this is typical in the software industry. This has resulted in Alphabet having a goodwill of $15.60 billion. Open the 10-K report and search for "Note 7. Goodwill and Other Intangible Assets". By reading the note we can see that in the year 2014 goodwill account went up by $4.1 billion.

| | | |
|---|---|---|
| Balance as of December 31, 2013 | $ | 11,492 |
| Goodwill acquired | | 4,208 |
| Goodwill disposed | | (43) |
| Goodwill adjustment | | (58) |
| Balance as of December 31, 2014 | $ | 15,599 |

**I haven't discussed about few asset and liability items presented in Alphabet's balance sheet. Take them as your homework assignment and find out the details.** Refer to lecture notes two for items like deferred revenue, accounts payable, and income taxes payable. For items that are not covered here or in the lecture notes two, you need to ask your friend, Google. Don't worry if you don't understand some of the items. Focus on what you understand instead of worrying about what you don't understand.

## Reformulating The Balance Sheet

In case of Holmes-Watson Co. we calculated invested capital ($100,225) by starting with total assets ($109,650) and from that we subtracted all liabilities ($9,425) that don't have any interest expense. If you don't remember, then refer to section "Tying it all with ROE and ROIC" in lecture notes two. We can do the same thing for Alphabet.

There are a couple of challenges with the above approach. They are **(1)** Balance sheet of Alphabet contains too many items **(2)** Not all items in the balance sheet are needed to run its core business operations (search engine). For example, the balance sheet of Alphabet contains cash and marketable securities, adding up to $64.39 billion. Does it need all of them for running its core operations. Of course not.

To solve the above two problems we need to reformulate (read it as rearrange) the items on Alphabet's balance sheet. Given below is the standard view of a balance sheet.

> *Operating assets are those employed in the business, like receivables, inventory, and plant. Operating liabilities are liabilities incurred in the course of business, like accounts payable, deferred revenues, and accrued expenses. Financial liabilities are the debt from raising cash to finance the business, like bonds payable and bank loans, whereas financial assets are (interest-bearing) debt in which the firm invests to hold "excess cash" not required for business operations (like cash equivalents and short-term debt investments).* **In fancier terms, operating assets and liabilities arise from trading in product and input markets (with customers and suppliers), whereas financial assets and liabilities arise from trading in debt markets to raise cash for the business and to store cash from the business.** *- Accounting For Value*

| Standard Balance Sheet | |
|---|---|
| **Assets** | **Liabilities and Equity** |
| Financial assets | Financial liabilities |
| Operating assets | Operating liabilities |
| | Shareholder's equity |
| Total assets | Total liabilities and equity |

Given below is the reformulated view of a balance sheet. In the reformulated balance sheet operating assets and operating liabilities are kept separately from financing assets and financing liabilities. Net operating assets (NOA) are a business's operating assets minus its operating liabilities. NOA is also referred as Invested capital. So don't get confused if you see me interchanging NOA <-> Invested capital. Net financing assets (NFA) are a business's financing assets minus its financing liabilities.

| Reformulated Balance Sheet | |
|---|---|
| **Operating** | **Financing** |
| Operating assets | Financial assets |
| Operating liabilities | Financial liabilities |
| | Shareholder's equity |
| Net operating assets | Net financial assets + Shareholder's Equity |

The reformulated balance sheet of Alphabet is given below. From this we can see that Alphabet has NOA of $48.36 billion and NFA of $56.13 billion. It doesn't need its NFA to run its core business operations. It might need it for future acquisitions. For now it has parked its NFA in super safe instruments like money market funds, government bonds, and municipal securities. As a shareholder we need to find out how much profits are generated by its NOA and how much is generated by its NFA. We will do this in the next section.

| Alphabet's Reformulated Balance Sheet as of 31-Dec-2014 | | | |
| --- | --- | --- | --- |
| (in millions) | | | |
| | | | |
| **Operating Assets (A)** | $65,863 | **Financing Assets (C)** | $65,270 |
| Accounts receivable | $9,383 | Cash | $18,347 |
| Deferred income taxes, net | $1,322 | Marketable securities | $46,048 |
| Income tax receivable, net | $1,298 | Receivable under reverse purchase agreements | $875 |
| Prepaid revenue share, expenses and other assets | $6,692 | | |
| Non-marketable equity investments | $3,079 | **Financing Liabilities (D)** | $9,133 |
| Property and equipment, net | $23,883 | Debt | $5,237 |
| Intangible assets, net | $4,607 | Securities lending payable | $2,778 |
| Goodwill | $15,599 | Other long-term liabilities | $1,118 |
| | | | |
| **Operating Liabilities (B)** | $17,500 | **Net Financing Assets (C - D)** | $56,137 |
| Accounts payable | $1,715 | | |
| Accured compensation and benefits | $3,069 | **Shareholder's Equity** | $104,500 |
| Accured expenses and other current liabilities | $4,434 | | |
| Accured revenue share | $1,952 | Shareholder's Equity = Net Operating Assets + Net Financing Assets | |
| Deferred revenue | $856 | | |
| Income taxes payable, net | $3,503 | | |
| Deferred income taxes, net non-current | $1,971 | | |
| | | | |
| **Net Operating Assets (A - B)** | $48,363 | | |

I learnt about the idea of reformulating the balance sheet from Stephen Penman, who is the author of the fantastic book, Financial Statement Analysis and Security Valuation. In this book he gives rules on how to classify assets and liabilities as operating and financing. These rules are given below.

The Reformulated Balance Sheet

| Assets | Liabilities and Stockholders' Equity |
| --- | --- |
| Financial assets: | Financial liabilities: |
| Cash equivalents | Short-term borrowings |
| Short-term investments | Current maturities of long-term debt |
| Short-term notes receivable (?) | Short-term notes payable (?) |
| Long-term debt investments | Long-term borrowing (bank loans, bonds payable, notes payable) |
| | Lease obligations |
| | Preferred stock ( Preferred is classified as financial liability) |
| Operating assets: | Operating liabilities: |
| All else | All else |
| | Minority (noncontrolling) interest |
| | Common equity |

## Using what it owns did the company generate profits?

In order to find out the profits generated by NOA and NFA we need to read the income statement of Alphabet. Given below is the income statement of Alphabet. Let's focus only on the year 2014.

| (In millions) | Year Ended December 31, | | |
|---|---|---|---|
| | 2012 | 2013 | 2014 |
| Revenues | $ 46,039 | $ 55,519 | $ 66,001 |
| Costs and expenses: | | | |
| Cost of revenues [1] | 17,176 | 21,993 | 25,691 |
| Research and development [1] | 6,083 | 7,137 | 9,832 |
| Sales and marketing [1] | 5,465 | 6,554 | 8,131 |
| General and administrative [1] | 3,481 | 4,432 | 5,851 |
| Total costs and expenses | 32,205 | 40,116 | 49,505 |
| Income from operations | 13,834 | 15,403 | 16,496 |
| Interest and other income, net | 635 | 496 | 763 |
| Income from continuing operations before income taxes | 14,469 | 15,899 | 17,259 |
| Provision for income taxes | 2,916 | 2,552 | 3,331 |
| Net income from continuing operations | $ 11,553 | $ 13,347 | $ 13,928 |
| Net income (loss) from discontinued operations | (816) | (427) | 516 |
| Net income | $ 10,737 | $ 12,920 | $ 14,444 |

In 2014 Alphabet generated revenue of $66 billion. As we learnt in the previous lecture revenue is not same as cash due to the nature of accrual accounting. A company can recognize revenue when the services or products have been provided or delivered irrespective of cash changing hands. Management have misused revenue recognition to their advantage and transferred wealth from minority shareholders to their bank accounts.

As a minority shareholder I would do a couple of things to safeguard myself. The first thing I would do is to read the footnotes to understand how the company recognizes revenue. Open the 10-K report and search for "Note 1. Google Inc. and Summary of Significant Accounting Policies". Do you agree with Alphabet's revenue recognition policy given below? I do agree with their policy. It took less than five minutes to read the policy. But most of the retail investors never do this. And they don't even know such a thing exists.

> We recognize as revenues the fees charged to advertisers each time a user clicks on one of the ads that appears next to the search results or content on Google websites or our Google Network Members' websites. For those advertisers using our cost-per-impression pricing, we recognize as revenues the fees charged to advertisers each time their ads are displayed on Google websites or our Google Network Members'

*websites. We report our Google AdSense revenues on a gross basis principally because we are the primary obligor to our advertisers.*

*For hardware product sales, where we sell directly to end customers or through distribution channels, revenue recognition generally occurs when products have been shipped, risk of loss has transferred to the customer, objective evidence exists that customer acceptance provisions have been met, no significant obligations remain and allowances for discounts, price protection, returns and customer incentives can be reasonably and reliably estimated. Recorded revenues are reduced by these allowances. Where these allowances cannot be reasonably and reliably estimated, we recognize revenue at the time the product sells through the distribution channel to the end customer.*

The next thing I would do is to check how many days of sales are yet to be collected from the customers. In 2014 Alphabet generated revenue of $181 million [ $66 billion / 365 days] every day. At the end of 2014 it had 52 days [ $9,383 million / $181 million] of sales outstanding as accounts receivable. In the previous year it had 58 days of sales outstanding. From this we can conclude that Alphabet is doing a good job in converting its sales to cash.

We will dig into the details of other items in the income statement when we study it from the vantage points of [Business, People, and Price] in the future lectures. For now let's focus on finding out the profits generated by NOA and NFA. Take a look at the calculations given below.

|                                                            | **2014**            |
|------------------------------------------------------------|---------------------|
| Income from operations                                     | $16,496 million     |
| Interest and other income, net                             | 763 million  (+)    |
|                                                            | -----------------   |
| Income from continuing operations before income taxes      | 17,259 million      |
|                                                            | -----------------   |
| Provision for income taxes                                 | 3,331 million (-)   |
|                                                            | -----------------   |
| Net Income from continuing operations                      | 13,928 million      |
|                                                            | -----------------   |

From the above calculations, I need to find out the after tax profits for core and non-core operations. We can't get the values directly as income tax expense is combined for both core and non-core operations. So we need to separate the income tax expense. In the US statutory tax rate is 35%. Applying this to interest-and-other-income of $763 million we get an income tax expense of $267 million. And the balance $3,064 million [ $3,331million - $267 million] will be applied to income from operations.

|                                | **2014** |
|--------------------------------|----------|
| Income from operations         | $16,496 million |
| Provision for income taxes     | 3,064 million  (-) |
|                                | ---------------- |
| Core Operations after tax income | 13,432 million |
|                                | ---------------- |

|                                | |
|--------------------------------|---|
| Interest and other income, net | $763 million |
| Provision for income taxes     | 267 million (-) |
|                                | -------------- |
| Non-Core after tax income      | 496 million |
|                                | -------------- |

By using NOA of $48.36 billion Alphabet made after tax profits of $13.43 billion. So its return on net operating assets (RNOA), which is same as ROIC, comes to 28 percent [ $13.43 billion / $48.36 billion]. As shown below RNOA gets affected by two levers. In case of Alphabet both of them are responsible for generating 28 percent.

$RNOA = $ *After tax core operating income / Net Operating Assets*

$RNOA = $ (*After tax core operating income / Revenue*) $*$ (*Revenue / Net Operating Assets*)

$RNOA = Profitability * Efficiency$

$RNOA = $ ($13.43 *billion* / $66 *billion*) $*$ ($66 *billion* / $48.36 *billion*)

$RNOA = 20.34\% * 1.36$

$RNOA = 28 \, percent$

In case of Holmes-Watson Co. I calculated ROIC using pre-tax operating income. But in case of Alphabet I used after-tax operating income. Why is that? Taxes are real expenses incurred by the company. When I study a business to value it, then I use after-tax operating income. But when I compare two businesses then I use pre-tax operating income. This is because their effective tax rates could differ. For apple-apple comparisons I need to use pre-tax operating income.

By using NFA of $56.13 billion Alphabet made after tax profits of $496 million. So its return on net financial assets comes to around 0.9 percent. These miniscule returns shouldn't be surprising as the short term US Treasury rates are hovering below 0.5 percent.

Let's calculate Alphabet's ROE. This comes to around 13.33 percent [ $13.93 billion / $104.50]. Alphabet's ROE of 13.33 percent is only half of its RNOA of 28 percent. Why is that? We know that *Shareholder's Equity = Net Operating Assets + Net Financial Assets*.

Around 54 percent of shareholder's equity is sitting in NFA which is yielding only 0.9 percent. And the remaining 46 percent is sitting in NOA which is yielding 28 percent. This is the reason why ROE comes to 13.33 percent. Now you see why shareholders welcomed Alphabet's recent announcement of share buybacks. You can read about the announcement here.
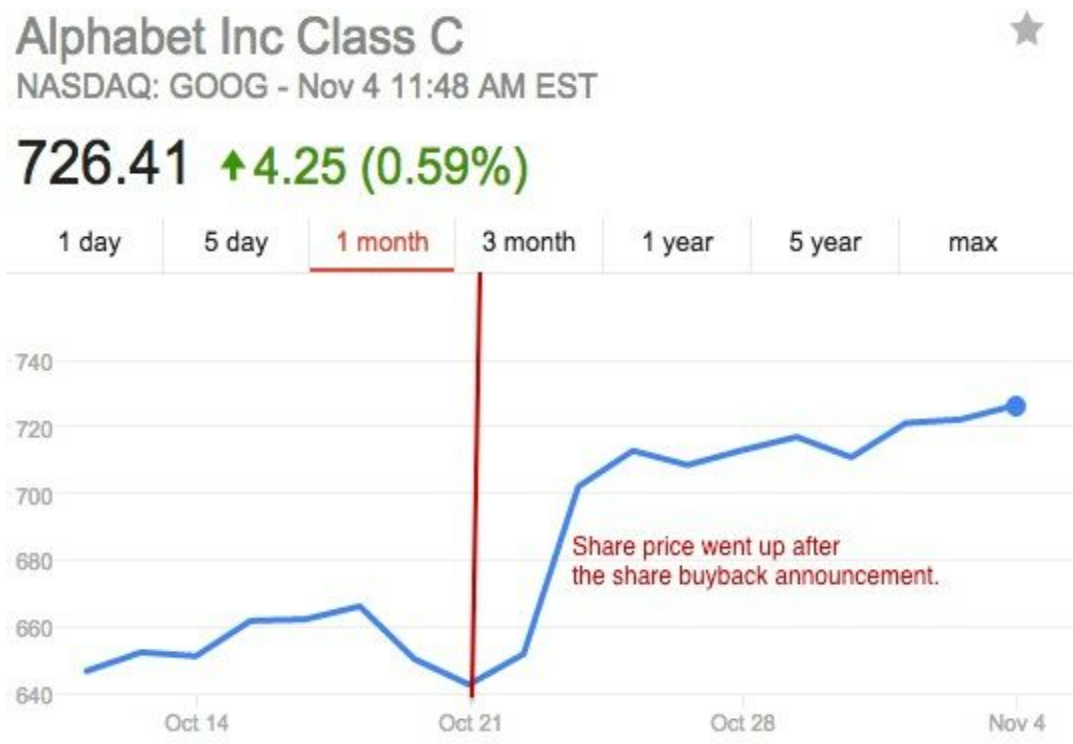


**Here is another homework assignment. In case of Holmes-Watson Co. its ROE was 27% compared to its pre-tax ROIC of 11.37 percent. This is exactly opposite to what we saw in the case of Alphabet. Why is that?**

## What did it do with the generated profits?

Income Statement uses accrual accounting. To study what Alphabet did with its profits we need to reconcile profits and cash flows. This is already done for us in the operating activity section of the cash flow statement. Take a look at the net cash provided by operating activities. Alphabet's operating activity generated cash flows of $22.37 billion. But its net income is only $14.44 billion. Why is there a huge difference of $7.93 billion?

Depreciation, Amortization, and Stock-based compensation are responsible for this huge difference. These items don't involve cash so they are added back here. Even though these items don't involve cash they are real expenses. And this is why we treated them as expenses in the income statement. **All else being equal, if operating cash flows are greater than net income, then it's a positive sign. If not you need to dig deeper.**

| (in millions) | Year Ended December 31, | | |
|---|---|---|---|
| | 2012 | 2013 | 2014 |
| **Operating activities** | | | |
| Net income | $ 10,737 | $ 12,920 | $ 14,444 |
| Adjustments: | | | |
| Depreciation expense and loss on disposal of property and equipment | 1,988 | 2,781 | 3,523 |
| Amortization and impairment of intangible and other assets | 974 | 1,158 | 1,456 |
| Stock-based compensation expense | 2,692 | 3,343 | 4,279 |
| Excess tax benefits from stock-based award activities | (188) | (481) | (648) |
| Deferred income taxes | (266) | (437) | (104) |
| Gain on divestiture of businesses | (188) | (700) | (740) |
| Gain on equity interest | 0 | 0 | (126) |
| Gain on sale of non-marketable equity investments | 0 | 0 | (159) |
| Other | (28) | 106 | 87 |
| Changes in assets and liabilities, net of effects of acquisitions: | | | |
| Accounts receivable | (787) | (1,307) | (1,641) |
| Income taxes, net | 1,492 | 401 | 283 |
| Prepaid revenue share, expenses and other assets | (532) | (930) | 459 |
| Accounts payable | (499) | 605 | 436 |
| Accrued expenses and other liabilities | 762 | 713 | 757 |
| Accrued revenue share | 299 | 254 | 245 |
| Deferred revenue | 163 | 233 | (175) |
| **Net cash provided by operating activities** | 16,619 | 18,659 | 22,376 |

Take a look at the net cash used in investing activities. Alphabet spent $21.05 billion in investing activities. It brought property-and-equipment for $10.95 billion and acquired other companies by paying $4.88 billion. It acquired net marketable securities worth $4.99 billion.

| Investing activities (in millions) | 2012 | 2013 | 2014 |
|---|---|---|---|
| Purchases of property and equipment | (3,273) | (7,358) | (10,959) |
| Purchases of marketable securities | (33,410) | (45,444) | (56,310) |
| Maturities and sales of marketable securities | 35,180 | 38,314 | 51,315 |
| Investments in non-marketable equity investments | (696) | (569) | (1,227) |
| Cash collateral related to securities lending | (334) | (299) | 1,403 |
| Investments in reverse repurchase agreements | 45 | 600 | (775) |
| Proceeds from divestiture of businesses | 0 | 2,525 | 386 |
| Acquisitions, net of cash acquired, and purchases of intangibles and other assets | (10,568) | (1,448) | (4,888) |
| **Net cash used in investing activities** | (13,056) | (13,679) | (21,055) |

Take a look at the net cash used in financing activities. Alphabet spent $1.43 billion in financing activities. It repaid debt worth of $11.64 billion and issued new debt worth of $11.62 billion.

| Financing activities | (in millions) | 2012 | 2013 | 2014 |
|---|---|---|---|---|
| Net payments related to stock-based award activities | | (287) | (781) | (2,069) |
| Excess tax benefits from stock-based award activities | | 188 | 481 | 648 |
| Proceeds from issuance of debt, net of costs | | 16,109 | 10,768 | 11,625 |
| Repayments of debt | | (14,781) | (11,325) | (11,643) |
| **Net cash provided by (used in) financing activities** | | 1,229 | (857) | (1,439) |

The cash flows from all three sections, along with currency exchange rate effects are summarized below. In 2014 Alphabet had a cash outflow of $551 million. And this is reflected in the balance sheet.

Cash flow from operations - $22,376 million
Cash flow from investing  -  21,055 million  (-)
Cash flow from financing  -   1,439 million  (-)
Exchange rate effects     -     433 million (-)
                            ------------------
Change in cash position   -    ($551) million
                            ------------------

| | | As of December 31, 2013 | As of December 31, 2014 |
|---|---|---|---|
| **Assets** | | | |
| Current assets: | | $18,347 - $18,898 => Cash outflow of $551 million. | |
| Cash and cash equivalents | | $    18,898 | $    18,347 |

## What about Statement Of Retained Earnings?

In case of Holmes-Watson Co. we prepared another financial statement called as Statement of Retained Earnings. Do we not have this for Alphabet? Yes we do and it is called as Statement of Stockholder's Equity. Take a look at the statement given below. What do you see?

| | Class A and Class B Common Stock, Class C Capital Stock and Additional Paid-In Capital | | Accumulated Other Comprehensive Income | Retained Earnings | Total Stockholders' Equity |
|---|---|---|---|---|---|
| | Shares | Amount | | | |
| Balance at December 31, 2013 | 671,664 | 25,922 | 125 | 61,262 | 87,309 |
| Common and capital stock issued | 8,508 | 465 | 0 | 0 | 465 |
| Stock-based compensation expense | | 4,279 | 0 | 0 | 4,279 |
| Stock-based compensation tax benefits | | 625 | 0 | 0 Net Income gets added to shareholder's equity. | 625 |
| Tax withholding related to vesting of restricted stock units | | (2,524) Stock compensation and AOCI affects shareholder's equity. | 0 | 0 | (2,524) |
| Net income | | 0 | 0 | 14,444 | 14,444 |
| Other comprehensive income | | 0 | (98) | 0 | (98) |
| Balance at December 31, 2014 | 680,172 | $    28,767 | $    27 | $    75,706 | $    104,500 |

As I wrote on page 2, stock compensation and AOCI affects shareholder's equity. Since these are advanced accounting concepts, let's not worry about it. Just know that there are entities other than net income which can affect shareholder's equity.

From the income statement, net income of $14.44 billion is added to shareholder's equity. For the entire year shareholder's equity went up from $87.30 billion to $104.50 billion. And the balance sheet reflects this change.

## Studying Financial Statements For Multiple Years

So far we have been studying the financial statements of Alphabet for the year 2014. But that's not enough. If you need to have a good understanding about a company then you need to study its financials for at least 10 years. Why is it necessary to study the financial statements for multiple years? Let me answer this question with an example. Take a look at the data provided for company A and B for the year 2000. Which is a better company?

| (in millions) | A | B |
|---|---|---|
| Sales | $2,761 | $4,375 |
| Operating cash flows | -$130 | $80 |
| Long-term debt | $2,127 | $666 |
| Shareholder's equity | -$967 | $777 |

It doesn't take a genius to tell company B is better than A based on one year data. Now take a look at the data for the year 2014. Which is a better company?

| (in millions) | A | B |
|---|---|---|
| Sales | $88,988 | $6,381 |
| Operating cash flows | $6,842 | $319 |
| Long-term debt | $8,265 | $0 |
| Shareholder's equity | $10,741 | $658 |

Now you would change your mind and tell that company A (Amazon) is better than B (Barnes & Noble). In 15 years Amazon compounded its sales at 26 percent. Whereas Barnes & Noble compounded its sales at 3 percent. The key point I am trying to convey is that in order to have a good understanding about a company one needs to study its financials for multiple years.
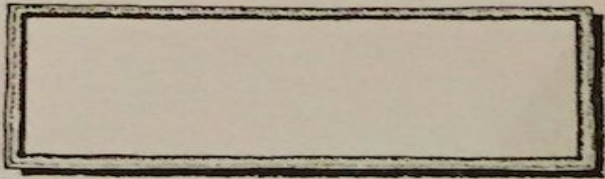
**Here is another homework assignment.** Using Alphabet's financial statements for the year 2010, 2011, 2012, and 2013 complete the table given below. After completing the table you will notice that both RNOA and ROE will be going down over the years. Find out the reason for that.

| Alphabet | 2010 | 2011 | 2012 | 2013 | 2014 |
|---|---|---|---|---|---|
| RNOA | | | | | 27.66% |
| Profitability | | | | | 20.34% |
| Efficiency | | | | | 1.36 |
| RNFA | | | | | 0.90% |
| ROE | | | | | 13.33% |
| Cash flow from operations | | | | | $22,376 |
| Purchases of property and equipment | | | | | $10,959 |
| Acquisitions | | | | | $4,888 |

## Few Tips For Studying Financial Statements

An inexperienced reader of financial statements will spend a lot of time slicing and dicing the numbers. Yet he fails to see the forest through the trees. Like the Iowa farmer, he saw the steel and the wheels, but he didn't see the consequences.



See the Big Picture

Source: Creative Whack Pack

**7** In 1866 an Iowa farmer watched the construction of the transcontinental railroad near his fields. After seeing the track laid and a locomotive steam through, he thought, "So that's what railroading is all about: tracks and trains." What didn't he see? That he could get his products to more markets more quickly, and that once there they would have to compete against products from many more places. That people could travel from coast to coast in less than a week. That more ideas would be shared, and that different people would meet and get married. He saw the steel and the wheels, but he didn't see the consequences. **What are the larger implications of your idea? How does it fit into the Big Picture?**

Here are few things that one can do to see the big picture.

**Common-Size Analysis -** It is simply a standardization of line items to eliminate the effect of size. Income statement items are stated as a percent of net sales and balance sheet items are stated as a percent of total assets or total liabilities-and-shareholder's-equity. Given below is the common-size analysis of the Alphabet's income statement for the past five years.

| Common size | 2010 | 2011 | 2012 | 2013 | 2014 | |
|---|---|---|---|---|---|---|
| | | | | | | Why did the gross profit margin go down? |
| Revenue | 100.00% | 100.00% | 100.00% | 100.00% | 100.00% | |
| Cost of revenue | 35.53% | 34.79% | 41.12% | 43.22% | 38.93% | |
| Gross profit | 64.47% | 65.21% | 58.88% | 56.78% | 61.07% | |
| Operating expenses | 29.07% | 34.23% | 33.44% | 33.43% | 36.08% | Find out why operating expens are going up? |
| Research and development | 12.83% | 13.62% | 13.54% | 13.29% | 14.90% | |
| Sales, General and administrative | 16.24% | 19.29% | 19.91% | 20.14% | 21.18% | |
| Other operating expenses | 0.00% | 1.32% | 0.00% | 0.00% | 0.00% | The company is provisioning less for income taxes. Find out why? |
| Operating income | 35.40% | 30.98% | 25.43% | 23.34% | 24.99% | |
| Interest Expense | 0.00% | 0.15% | 0.17% | 0.14% | 0.15% | |
| Other income (expense) | 1.42% | 1.69% | 1.42% | 1.02% | 1.31% | |
| Income before taxes | 36.82% | 32.52% | 26.68% | 24.23% | 26.15% | |
| Provision for income taxes | 7.81% | 6.83% | 5.18% | 3.81% | 5.05% | Net income margin is going down. Find out why? |
| Net income from continuing operations | 29.01% | 25.69% | 21.50% | 20.42% | 21.10% | |
| Net income from discontinuing ops | 0.00% | 0.00% | -0.10% | 1.18% | 0.78% | |
| Net income | 29.01% | 25.69% | 21.40% | 21.60% | 21.88% | |

As illustrated above, I look for big trends that stand out. I annotated them with questions for which I will find out the answer later. A lot of investors use financial statements only to get answers to questions like ROE, ROIC, etc. **But according to me the real power in analyzing financial statements comes from asking better questions.**

**Trend Analysis -** It expresses financial statement items as an index relative to a base year. It gives a picture of how financial statement items have changed over time. Given below is the trend analysis of the Alphabet's balance sheet for the last five years. It uses 2010 as the base year. Once again we see can see the power of asking better questions.

| Trend Analysis | 2010 | 2011 | 2012 | 2013 | 2014 | |
|---|---|---|---|---|---|---|
| Assets | 100 | 125 | 162 | 192 | 227 | |
| Current assets | 100 | 127 | 145 | 175 | 194 | |
| Cash and cash equivalents | 100 | 73 | 108 | 139 | 135 | Why is inventory |
| Short-term investments | 100 | 162 | 156 | 187 | 216 | item present only |
| Receivables | 100 | 128 | 185 | 209 | 221 | in the year 2012 and 2013. |
| Inventories | 0 | 0 | 100 | 84 | 0 | |
| Deferred income taxes | 100 | 83 | 442 | 589 | 510 | Why did property, |
| Prepaid expenses | 100 | 132 | 161 | 213 | 257 | plant and equipment double in the last |
| Other current assets | 100 | 99 | 93 | 68 | 290 | two years. |
| Non-current assets | 100 | 122 | 205 | 233 | 310 | |
| Net property, plant and equipment | 100 | 124 | 153 | 213 | 308 | Why did intangibles |
| Equity and other investments | 100 | 151 | 281 | 378 | 589 | go up by seven |
| Goodwill | 100 | 117 | 168 | 184 | 249 | times in 2012? |
| Intangible assets | 100 | 151 | 716 | 581 | 441 | |
| Deferred income taxes | 100 | 0 | 0 | 0 | 0 | |
| Other long-term assets | 100 | 113 | 455 | 447 | 742 | |

**Skip-Few-Years-And-Read -** In this method you look at the financial statement items in five year increments. The human brain works on a contrast scale and it is not good in identifying changes when it comes in small pieces (contrast effect). But it is very good at spotting trends over longer periods of time. I learnt this method from Prof. Sanjay Bakshi. By looking at Revenue and Net Income of Alphabet in five year increments you can't help but stare in awe.

| (in millions) | 2002 | 2006 | 2010 | 2014 |
|---|---|---|---|---|
| Revenue | $439 | $10,604 | $29,321 | $66,001 |
| Net Income | $99 | $3,077 | $8,505 | $14,444 |

## What lies beyond the numbers

A lot of investors assume that if they know how to calculate ROE and ROIC they can pick stocks like Warren Buffet. But that's far from true. If that had been true, then I can buy a laptop for $300 and run a python script which will do the stock picking for me. In a recent presentation titled "Moats-versus-Boats", Chetan Parikh told that - "**What lies beyond the numbers is more interesting than the numbers themselves.**" The financial statement analysis that we did so far carry about 15-20 percent of the total freight. The remaining 80-85 percent will come from studying Alphabet from the vantage point of [Business, People, and Price].

## Few Items To Read

1. Read the book The Five Rules for Successful Stock Investing. Pat Dorsey does a fantastic job of teasing apart financial statements of real companies in such a way that anyone without prior investing knowledge can understand.
2. Read the letter Warren Buffett wrote in 1983 on Goodwill and its Amortization: The Rules and The Realities.
3. Read the letter Warren Buffett wrote in 2007 on Businesses – The Great, the Good and the Gruesome. In this letter, Buffett talks about the kinds of business which turns him on. I have read this letter at least two dozen times. Print out the letter read, reread and reflect.

# The Great, the Good and the Gruesome

In his 2007 letter to shareholders, Warren Buffett talks about the kinds of businesses that turn him on. He also discusses about those that he wishes to avoid. I have reproduced his writing here as it is. Before reading what he wrote spend a couple of minutes watching the excellent video in which he talks about the traits of good businesses.



**Businesses – The Great, the Good and the Gruesome**

Let's take a look at what kind of businesses turn us on. And while we're at it, let's also discuss what we wish to avoid.

Charlie and I look for companies that have a) a business we understand; b) favorable long-term economics; c) able and trustworthy management; and d) a sensible price tag. We like to buy the whole business or, if management is our partner, at least 80%. When control-type purchases of quality aren't available, though, we are also happy to simply buy small portions of great businesses by way of stock- market purchases. It's better to have a part interest in the Hope Diamond than to own all of a rhinestone.

A truly great business must have an enduring "moat" that protects excellent returns on invested capital. The dynamics of capitalism guarantee that competitors will repeatedly assault any business

"castle" that is earning high returns. Therefore a formidable barrier such as a company's being the low- cost producer (GEICO, Costco) or possessing a powerful world-wide brand (Coca-Cola, Gillette, American Express) is essential for sustained success. Business history is filled with "Roman Candles," companies whose moats proved illusory and were soon crossed.

Our criterion of "enduring" causes us to rule out companies in industries prone to rapid and continuous change. Though capitalism's "creative destruction" is highly beneficial for society, it precludes investment certainty. A moat that must be continuously rebuilt will eventually be no moat at all.

Additionally, this criterion eliminates the business whose success *depends* on having a great manager. Of course, a terrific CEO is a huge asset for any enterprise, and at Berkshire we have an abundance of these managers. Their abilities have created billions of dollars of value that would never have materialized if typical CEOs had been running their businesses.

But if a business *requires* a superstar to produce great results, the business itself cannot be deemed great. A medical partnership led by your area's premier brain surgeon may enjoy outsized and growing earnings, but that tells little about its future. The partnership's moat will go when the surgeon goes. You can count, though, on the moat of the Mayo Clinic to endure, even though you can't name its CEO.

Long-term competitive advantage in a stable industry is what we seek in a business. If that comes with rapid organic growth, great. But even without organic growth, such a business is rewarding. We will simply take the lush earnings of the business and use them to buy similar businesses elsewhere. There's no rule that you have to invest money where you've earned it. Indeed, it's often a mistake to do so: Truly great businesses, earning huge returns on tangible assets, *can't* for any extended period reinvest a large portion of their earnings internally at high rates of return.

Let's look at the prototype of a dream business, our own See's Candy. The boxed-chocolates industry in which it operates is unexciting: Per-capita consumption in the U.S. is extremely low and doesn't grow. Many once-important brands have disappeared, and only three companies have earned more than token profits over the last forty years. Indeed, I believe that See's, though it obtains the bulk of its revenues from only a few states, accounts for nearly half of the entire industry's earnings.

At See's, annual sales were 16 million pounds of candy when Blue Chip Stamps purchased the company in 1972. (Charlie and I controlled Blue Chip at the time and later merged it into Berkshire.) Last year See's sold 31 million pounds, a growth rate of only 2% annually. Yet its durable competitive advantage, built by the See's family over a 50-year period, and strengthened subsequently by Chuck Huggins and Brad Kinstler, has produced extraordinary results for Berkshire.

We bought See's for $25 million when its sales were $30 million and pre-tax earnings were less than $5 million. The capital then required to conduct the business was $8 million. (Modest seasonal debt was also needed for a few months each year.) Consequently, the company was earning 60% pre-tax

on invested capital. Two factors helped to minimize the funds required for operations. First, the product was sold for cash, and that eliminated accounts receivable. Second, the production and distribution cycle was short, which minimized inventories.

Last year See's sales were $383 million, and pre-tax profits were $82 million. The capital now required to run the business is $40 million. This means we have had to reinvest only $32 million since 1972 to handle the modest physical growth – and somewhat immodest financial growth – of the business. In the meantime pre-tax earnings have totaled $1.35 billion. *All of that*, except for the $32 million, has been sent to Berkshire (or, in the early years, to Blue Chip). After paying corporate taxes on the profits, we have used the rest to buy other attractive businesses. Just as Adam and Eve kick-started an activity that led to six billion humans, See's has given birth to multiple new streams of cash for us. (The biblical command to "be fruitful and multiply" is one we take seriously at Berkshire.)

There aren't many See's in Corporate America. Typically, companies that increase their earnings from $5 million to $82 million require, say, $400 million or so of capital investment to finance their growth. That's because growing businesses have both working capital needs that increase in proportion to sales growth and significant requirements for fixed asset investments.

A company that needs large increases in capital to engender its growth may well prove to be a satisfactory investment. There is, to follow through on our example, nothing shabby about earning $82 million pre-tax on $400 million of net tangible assets. But that equation for the owner is vastly different from the See's situation. It's far better to have an ever-increasing stream of earnings with virtually no major capital requirements. Ask Microsoft or Google.

One example of good, but far from sensational, business economics is our own FlightSafety. This company delivers benefits to its customers that are the equal of those delivered by any business that I know of. It also possesses a durable competitive advantage: Going to any other flight-training provider than the best is like taking the low bid on a surgical procedure.

Nevertheless, this business requires a significant reinvestment of earnings if it is to grow. When we purchased FlightSafety in 1996, its pre-tax operating earnings were $111 million, and its net investment in fixed assets was $570 million. Since our purchase, depreciation charges have totaled $923 million. But capital expenditures have totaled $1.635 billion, most of that for simulators to match the new airplane models that are constantly being introduced. (A simulator can cost us more than $12 million, and we have 273 of them.) Our fixed assets, after depreciation, now amount to $1.079 billion. Pre-tax operating earnings in 2007 were $270 million, a gain of $159 million since 1996. That gain gave us a good, but far from See's-like, return on our incremental investment of $509 million.

Consequently, if measured only by economic returns, FlightSafety is an excellent but not extraordinary business. Its put-up-more-to-earn-more experience is that faced by most corporations. For example, our large investment in regulated utilities falls squarely in this category. We will earn

considerably more money in this business ten years from now, but we will invest many billions to make it.

Now let's move to the gruesome. The worst sort of business is one that grows rapidly, requires significant capital to engender the growth, and then earns little or no money. Think airlines. Here a *durable* competitive advantage has proven elusive ever since the days of the Wright Brothers. Indeed, if a farsighted capitalist had been present at Kitty Hawk, he would have done his successors a huge favor by shooting Orville down.

The airline industry's demand for capital ever since that first flight has been insatiable. Investors have poured money into a bottomless pit, attracted by growth when they should have been repelled by it. And I, to my shame, participated in this foolishness when I had Berkshire buy U.S. Air preferred stock in 1989. As the ink was drying on our check, the company went into a tailspin, and before long our preferred dividend was no longer being paid. But we then got very lucky. In one of the recurrent, but always misguided, bursts of optimism for airlines, we were actually able to sell our shares in 1998 for a hefty gain. In the decade following our sale, the company went bankrupt. Twice.

To sum up, think of three types of "savings accounts." The great one pays an extraordinarily high interest rate that will rise as the years pass. The good one pays an attractive rate of interest that will be earned also on deposits that are added. Finally, the gruesome account both pays an inadequate interest rate and requires you to keep adding money at those disappointing returns.

## Is Alphabet a Great Business?

If Buffett looks at the financial data of Alphabet, which is given below, would he classify it as a great, good, or a gruesome business? If you have read carefully what he wrote, then you would have noticed that he classified Alphabet (Google) as a great business.

| (in billions) | Alphabet Inc. | | |
|---|---|---|---|
| | 2006 | 2010 | 2014 |
| | | | |
| Invested capital | $5.86 | $15.92 | $48.36 |
| Sales | $10.60 | $29.32 | $66 |
| Pre-tax operating income | $3.55 | $10.38 | $16.50 |
| Cash flow from operations | $3.58 | $11.08 | $22.38 |
| Purchases of property and equipment | $1.90 | $4.02 | $10.96 |
| Acquisitions | $0.40 | $1.07 | $4.50 |
| Goodwill | $1.55 | $6.26 | $15.60 |
| | | | |
| Pre-tax ROIC or RNOA | 60.58% | 65.20% | 34.12% |
| Profitability | 33.49% | 35.40% | 25.00% |
| Efficiency | 1.81 | 1.84 | 1.36 |

Why did he classify it as a great business? In the year 2006 and 2010, Alphabet generated pre-tax returns of 60 and 65 percent on its invested capital. These are fantastic returns. And this is the reason why he classified it as a great business.

Looking at the financial data, a curious reader would ask a couple of questions **(1)** Why did ROIC in 2014 halved compared to 2010? **(2)** According to Buffett a great business can increase its stream of earnings with virtually no major capital requirements. But Alphabet's invested capital in 2014 went up 3 times compared to 2010. Why is that?

In order to answer the above questions, let us focus on the components of ROIC — Profitability and Efficiency. Alphabet's profitability went down from 35 percent in 2010 to 25 percent in 2014. This happened because it increased its headcount from 24,000 to 53,600 in five years. Alphabet makes 90% of its revenue from advertising business. Does it need all 53,600 employees to be working in the advertising business? Of course not. Then why did it hire so many people?

Many of them are hired to work on several "**moonshot**" projects, including self-driving cars and flying balloons through the stratosphere to get internet access to everyone. These projects don't bring in any revenue today. This resulted in reducing the profit margins. Is this decrease temporary or permanent in nature? Headcount expenses are fixed in nature. This means that an increase in sales shouldn't proportionally increase this expense. So in my view the shrinkage of profit margins is temporary in nature.

Alphabet's efficiency went down from 1.81 in 2006 to 1.36 in 2014. Why did this happen? One of the components of invested capital is goodwill. It went up from $1.55 billion in 2006 to $15.60 billion in 2014. This resulted in decreasing its ROIC. If you don't remember what goodwill is then read the previous lecture notes. Over the years Alphabet has been acquiring a lot companies by

paying more than its book value. This excess is kept as a goodwill of $15.60 billion on its balance sheet.

Goodwill is an intangible item and its presence in the balance sheet doesn't affect the operating profit in anyways. Let's imagine that we set the value of the goodwill account to zero. Would Alphabet's operating profits go down because of that? Of course not. If we remove goodwill and calculate Alphabet's ROIC then it will come to 50 percent [ $16.50\ billion$ / $32.76\ billion$ ] .

The above explanation is conveyed beautifully in its price chart which is given below. As soon as the new CFO, Ruth Porat, told that they will be prudent about these expenses the stock market showed its support by moving the stock price by over 30 percent.

Even though Buffett classified Alphabet as a great business he wouldn't invest in it. Why is that? **This is because he rules out companies in industries prone to rapid and continuous change. The technology industry is prone to rapid and continuous changes.** A cynical reader would ask then why did Buffett invest in IBM. I don't know the answer to that question.



## Turnarounds seldom turn - JCPenney

JCPenney is a 114-year-old department-store chain selling a wide selection of brand-name clothing, footwear and furnitures. Take a look at the financial data of the company which is given below. Would you classify JCPenney as a great, good, or a gruesome business? Before reading further I would urge you to think about it.

| (in millions) | JCPenney | | | | |
|---|---|---|---|---|---|
| | 2006 | 2008 | 2010 | 2012 | 2014 |
| | | | | | |
| Invested capital | $8,409.00 | $8,618.00 | $9,203.00 | $6,836.00 | $7,856.00 |
| Sales | $19,903.00 | $18,486.00 | $17,759.00 | $12,985.00 | $12,257.00 |
| Pre-tax operating income | $1,922.00 | $1,135.00 | $832.00 | -$1,310.00 | -$308.00 |
| Cash flow from operations | $1,255.00 | $1,155.00 | $592.00 | -$10.00 | $239.00 |
| Purchases of property and equipment | $772.00 | $969.00 | $499.00 | -$810.00 | $252.00 |
| | | | | | |
| Pre-tax ROIC or RNOA | 22.86% | 13.17% | 9.04% | -19.16% | -3.92% |
| Profitability | 9.66% | 6.14% | 4.68% | -10.09% | -2.51% |
| Efficiency | 2.37 | 2.15 | 1.93 | 1.90 | 1.56 |

It doesn't take a genius to tell that JCPenney's business is gruesome. Whenever you see sales going down along with negative operating profits and cash flows, then you can conclude that the business is having a lot of trouble. Before proceeding further, let's understand the nature of the industry in which JCPenney is operating in.

The company is operating in the retail industry and it's one of the toughest industry to be in. Even a genius like Warren Buffett has failed in the retailing business several times.

> *We failed other times in retailing. Retailing is a tough, tough business, partly because your competitors are always attempting and very frequently successfully attempting to copy anything you do that's working. And so the world keeps moving. It's hard to establish a permanent moat that your competitor can't cross. And you've seen the giants of retail, the Sears, the Montgomery Wards, the Woolworth's, the Grants, the Kresge's. I mean, over the years, a lot of giants have been toppled. - Warren Buffett*

From Buffett's statement, we can conclude that the **base rates** of operating profitably in the retail industry are very low. In order to understand what base rates are I would encourage you to read Prof. Sanjay Bakshi's fantastic write up on worldly-wisdom-in-an-equation.

Benjamin Graham told that — **In the short term, the stock market is a voting machine; in the long term, it's a weighing machine**. Applying Graham's wisdom one can learn a lot by looking at the stock price chart over the long term and relate the changes in the chart to what actually happened in the business. I learnt this technique from Charlie Munger. Take a look at the price chart for the last sixteen years given below. What do you see?
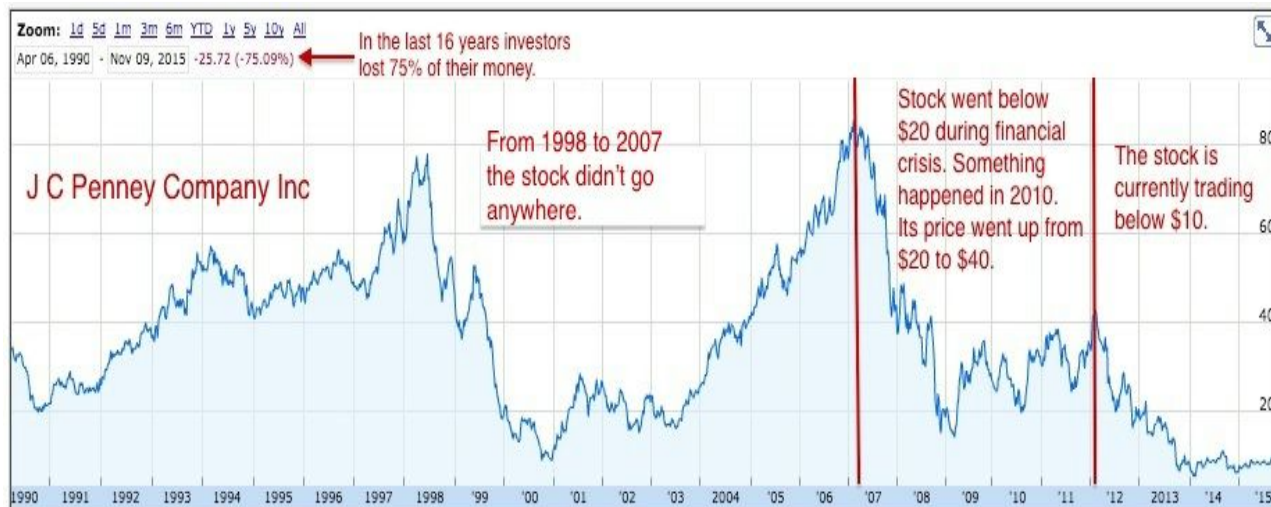
*If I were teaching business school I would have Value-Line-type figures that took me through the entire history of General Motors and **I would try to relate the changes in the graph and data to what happened in the business.** To some extent, they faced a really difficult problem—heavily unionized business, combined with great success, and very tough competitors that came up from Asia and elsewhere in Europe. That is a real problem which of course… to prevent wealth from killing people—your success turning into a disadvantage—is a big problem in business. - Charlie Munger*

In 1994 the company generated around $19 billion in sales. In 2006, after thirteen years, it rang up $19.90 billion in sales. In an inflationary world if the sales are flat for thirteen long years, then we can safely assume that the company isn't doing that well. The stock price didn't go anywhere from 1998 to 2007.

From 2006 to 2010 its ROIC went down from 23 percent to 9 percent. Both profitability and efficiency suffered. In 2010 activist investor Bill Ackman invested $900 million in JCPenney stock. Why did a smart guy like Bill Ackman invested in JCPenney stock even though its ROIC is going down? Remember what we learnt in the previous lecture notes — **What lies beyond the numbers is more interesting than the numbers themselves**. Whitney Tilson did a thorough analysis on why Bill Ackman invested in JCPenney. You can find his analysis here.

At that time when Bill Ackman was buying, the stock was selling for around $25 and he believed that it had an intrinsic value of $65. In order to unlock the value he gained a seat on the company's board and appointed Ron Johnson, the genius who created Apple retail stores and brought high-end designer wears to Target, as the CEO of JCPenney. If you have read worldly-wisdom-in-an-equation then you would notice that Bill Ackman was betting on the **likelihood ratio** $[\ Posterior\ odds\ =\ Prior\ odds\ *\ Likelihood\ ratio\ ]$ to play out in his favor even though the prior odds (base rates) were against him. Did it play out as he expected?

Ron made substantial changes to the stores look-and-feel, merchandise, and its pricing structure. He got rid of sales promotions and discount coupons in favor of everyday low prices. The stock market viewed Ron's strategy positively and pushed the stock price above $40. Did JCPenney's customers feel the same way?

> *We are making substantial changes in our merchandise and continue to edit and introduce more global brands into our merchandise assortment. We are reorganizing our department stores into separately curated unique specialty stores known as The Shops. The Shops will be organized around a pathway through our stores known as The Street^TM, a bold new interface for retail, which includes places to relax, refresh, engage and check out. The Street will surround The Square^TM, a dynamic seasonal space that will provide engaging experiences for our customers. Our pricing strategy is founded on providing merchandise at low everyday prices and delivering even more exciting value through sales, promotions and rewards. - 2012 Annual Report*

JCPenney's core customers have long been women aged 35-55 years with an annual household income between $35,000 and $100,000. They came into the stores because of the discount coupons. As soon as the coupons were discontinued they operated under deprival-super-reaction-syndrome and stopped coming to the stores. On top that the new changes were too trendy and expensive for them. Sales plummeted by over 25 percent. And Ron was promptly sacked in 2013. The stock price sank into the single digits. Bill Ackman sold the stock and incurred more than 50 percent loss.

Here are a few key lessons that we can learn from the JCPenney saga **(1)** Strategy that worked for Ron at Apple didn't work in JCPenney. This is because Apple customers loved its products and didn't mind paying up. Whereas customers at JCPenney came to the stores because of the discount coupons. **(2)** Investing is a game of probability and even smart investors like Bill Ackman will make "an unforced error". **(3)** As Buffett says, "When management with a reputation for brilliance tackles a business with a reputation for bad economics, it is the reputation of the business that remains intact." **(4)** Turnarounds seldom turn.

## The Relic of the 19th century - Union Pacific

Union Pacific operates North America's premier railroad franchise, covering 23 states in the western two-thirds of the United States. Its rail network includes 31,974 route miles. Take a look at the financial data of the company which is given below. Would you classify Union Pacific as a great, good, or a gruesome business? Before reading further I would urge you to think about it.

| (in billions) | Union Pacific | | |
|---|---|---|---|
| | 2006 | 2010 | 2014 |
| Invested capital | $23.32 | $28.82 | $34.73 |
| Sales | $15.58 | $16.97 | $23.99 |
| Pre-tax operating income | $2.88 | $4.98 | $8.75 |
| Cash flow from operations | $2.88 | $4.11 | $7.39 |
| Depreciation | $1.24 | $1.49 | $1.90 |
| Purchases of property and equipment | $2.24 | $2.48 | $4.35 |
| Net property cost | $32.87 | $38.25 | $46.27 |
| Total cost (+) | $43.45 | $51.91 | $63.21 |
| Accumulated depreciation (-) | $10.58 | $13.66 | $16.94 |
| Free cash flow | $0.64 | $1.63 | $3.04 |
| Pre-tax ROIC or RNOA | 12.35% | 17.28% | 25.19% |
| Profitability | 18.49% | 29.35% | 36.47% |
| Efficiency | 0.67 | 0.59 | 0.69 |
| Free cash flow / Invested capital | 2.74% | 5.66% | 8.75% |

If you focused too much on ROIC of 12.36 percent in the year 2006 then you would have concluded that Union Pacific is a gruesome business. On the other hand, if you gave too much weight to 2014's ROIC of 25.19 percent, then you would conclude it to be a great business. Both answers are incorrect and I would classify it as a good business. Why is that?

Let's focus on the components of ROIC — Profitability and Efficiency. By looking at the efficiency component we can conclude that its business is **asset intensive**. And efficiency remained reasonably stable with invested capital of $1 producing between 59 to 67 cents of sales.

The second component profitability doubled from 2006 to 2014 by going up from 18 to 36 percent. Something fundamental needs to change in the railroad industry for such dramatic jumps in profitability. What changed? And how did the stock market react to this change? One of the best ways to learn about a company and its industry is to look at the price chart over several years. Then relate the changes in the price chart to what actually happened in the business. What do you see from the price chart of Union Pacific?

From 2000 to 2006 Union Pacific stock price didn't go anywhere. This should not surprise anyone as its railroad assets were inefficient and earning a sub par ROIC of only 12.36 percent. On September 2008, a crowded commuter train crashed into the Union Pacific's freight train. The crash occurred in Los Angeles and it killed 25 and injured 135 people. The driver of the commuter train was sending and receiving text messages seconds before his train skipped a red light and collided head-on with a freight train. What followed after this incident?

> The following month Congress passed the Rail Safety Improvement Act of 2008, requiring the country's major railroads to fund, build and implement a new, safer "Positive Train Control" system by the end of 2015. **The law called for Union Pacific alone to refit an average of 2.5 locomotives and 10 miles of track per day for seven years, placing GPS devices on every locomotive.** - *Forbes*

After the passage of the Rail Safety Improvement Act of 2008, Union Pacific spent tons of money to improve the efficiency of its railroad assets. Moving freight over rail is more **cost efficient** than trucks. This is because rails can carry a ton about 500 miles on a single gallon of diesel fuel. For the same task a truck would consume four times as much fuel. After the financial crisis with diesel prices edging toward $4 a gallon it made more sense for businesses to use trains to carry their freight. This resulted in Union Pacific carrying more freight and this in turn increased its revenue.

From 2006 to 2010 its sales went up by 54 percent. Whereas its operating income went up by 204 percent. Union Pacific's business is asset intensive with fixed costs making up a large percentage of total costs. When the volume of sales increases its fixed costs will not go up proportionally with increase in sales and this will give rise to **economies of scale**. This concept is beautifully explained by Pat Dorsey.

*To understand scale advantages, it's important to remember the difference between fixed and variable costs. If you think about your local grocery store, its fixed costs are rent, utilities, and salaries for some base level of staffing. The variable costs would be the wholesale cost of the merchandise that the store needs to stock the shelves, and perhaps extra compensation costs for high-traffic times of the year like the holidays. A real-estate brokerage office, by contrast, would have almost exclusively variable costs. Aside from an office, a phone, a car, and a computer with a link to the database of homes for sale, an agent doesn't have many costs aside from commissions, which vary with real-estate sales: no sales, no commissions.*

***Very broadly speaking, the higher the level of fixed costs relative to variable costs, the more consolidated an industry tends to be, because the benefits of size are greater. It's no surprise that there are only a few national package-delivery companies, or automobile manufacturers, or microchip producers—but there are thousands of small real-estate agencies, consultancies, law offices, and accounting agencies.***

*A law firm with 1,000 lawyers has no cost advantage over a law firm with 10 lawyers. It may have a greater range of services it can offer, and it may get additional business from that angle, but it is not going to have a meaningful cost advantage over a smaller competitor. -* [*The Little Book That Builds Wealth*](#)

Union Pacific's cost structure is highly fixed in nature. Some of its fixed costs include depreciation, large portion of labor costs, and some portion of fuel costs. After covering the fixed costs the balance directly flows to the bottom line. This resulted in operating profits growing at a much faster pace than sales. The stock price chart above tells the entire story.

Then why did I classify Union Pacific as a good, but not a great business? In the year 2014 it reported a depreciation expense of $1.9 billion. But capital expenditure came to $4.35 billion. Why did it spend 2.3 times more on capital expenditure compared to depreciation? Railroad businesses demand massive reinvestments just to maintain the quality of their existing assets. Most of the reinvestments are not for generating new sales, but instead to maintain current sales. This is akin to running on a treadmill; **spend-more-to-stay-where-you-are**. Union Pacific's operating profits are overstated because its depreciation expense is understated.

Let's adjust for this overstatement of operating profits by looking at **free cash flow**. It is a measure of how much cash a business generates after accounting for capital expenditures such as buildings or equipment. From the above table you can see that in the year 2014 its free cash flow came to $3.04 billion. This translates to 8.75 percent on the invested capital of $34.73 billion.

Remember what Buffett told about the traits of a great business? A great business should have ever-increasing stream of earnings with virtually no major capital requirements. Union Pacific

fails this test and hence I classified it as a good business. Did somebody saw the effects of Rail Safety Improvement Act of 2008 and capitalized on it? Warren Buffett did by purchasing another railroad company called BNSF. **Spend ten minutes watching this amazing video in which he explains why he purchased BNSF. You will get your MBA in ten minutes.**



## Skate to where the puck is going to be, not where it's been - Crocs

Crocs designs, manufactures, and distributes casual footwear for men, women and children. The company went public in February 2006 and it raised $208 million, making the deal the biggest-ever footwear IPO in America. On the first day the stock price rose 48 percent above their initial listed price of $21. In less than two years the stock price went up 3 times from the original listed price. Those who brought the stock in the IPO felt like Albert Einstein.

Take a look at the financial data of the company which is given below. Would you classify Crocs as a great, good, or a gruesome business? Before reading further I would urge you to think about it.

| (in millions) | Crocs | | | |
| --- | --- | --- | --- | --- |
| | 2005 | 2007 | 2009 | 2014 |
| | | | | |
| Invested capital | $38.46 | $465.22 | $324.15 | $654 |
| Sales | $108.59 | $847.35 | $645.77 | $1,198.22 |
| Pre-tax operating income | $26.90 | $240.33 | -$51.18 | -$4.73 |
| Cash flow from operations | $10.60 | $8.93 | $61.10 | -$11.65 |
| Inventory days | 119 | 175 | 128 | 101 |
| | | | | |
| Pre-tax ROIC or RNOA | 69.94% | 51.66% | -15.79% | -0.72% |
|   Profitability | 24.77% | 28.36% | -7.93% | -0.39% |
|   Efficiency | 2.82 | 1.82 | 1.99 | 1.83 |

If you focused only on the years 2005 and 2007s ROIC of 70 percent and 52 percent, then you would incorrectly conclude that Crocs is a great business. This is what investors did by pushing up the stock price above $67. They focused on the current rosy conditions and didn't bother about the future prospects of the business. I would classify Crocs business as gruesome. Take a look at the price chart which is given below.



What the market forgot is that you don't make money because the company has a high ROIC today. You only make money when the company can maintain its high ROIC for a very long time into the future. **In the stock market, you make money by skating to where the puck is going to be, not where it's been.**

In the year 2007 Crocs had cash flow from operations of $8.93 million. This is miniscule compared with the operating income of $240.33 million. Why is there a huge difference? Take a look at the inventory days. It went up from 119 to 175 days. Crocs was building up huge

inventory thinking that its footwear will sell like hot cakes. But that didn't happen. Sales plummeted by over 25 percent in a couple of years. The stock price went down from the peak price of $67 to $1.16.

Crocs shoes, like tulip bulbs, were a hot fad which had exploded into success for a couple of years. Everyone wanted to have a pair of Crocs shoes. Sales and profits exploded for some time. Every fad fizzles out with time and this is what happened to Crocs. No one wanted its shoes anymore. Had investors looked at the base rates of shoe business, then they wouldn't have purchased the stock.

## Few Items To Read And Watch

1. If you want to develop good business sense, then you need to read Warren Buffett's letters to shareholders. You can read it for free here. If you prefer to read it on Kindle, then go here. It costs $2.99 which is less than a tall Mocha.
2. Want to become a millionaire? All you need to do is to invest a billion dollars in the airline industry. This is what Vijay Mallya did by investing in Kingfisher Airlines. Watch this video in which Buffett explains about the brutality of the airlines industry.
3. Watch this excellent video in which Buffett explains how he analysis businesses like Nebraska Furniture Mart, Coke, and Gillette.
4. Why some businesses are able to generate high ROIC for a decade or two? Pat Dorsey answers this question in his fantastic book The Little Book That Builds Wealth. If you don't have time to read the book then watch Pat Dorsey's presentation at Google. You can find the mind maps for this book here.
5. Read the financial statements of Amazon, Costco, and Walmart for the last ten years. And categorize them into great, good, or a gruesome business.

# Vantage Point: Alphabet's Business

The best way to eat an elephant is one bite at a time. We can apply the same logic for analyzing public companies like Alphabet. The next question is how do we break down our analysis? Buffett already answered that question for us in the previous lecture. This is what he wrote — "Charlie and I look for companies that have a) a business we understand; b) favorable long-term economics; c) able and trustworthy management; and d) a sensible price tag".

In the video given below watch from 6:00 to 7:08 minutes to see Charlie Munger talking about the same four points. Value investors refer to them as four filters of Buffett and Munger. In this lecture we will learn about the first filter. Instead of using the word filter I prefer using vantage point. Throughout the lecture notes I would be interchanging Alphabet <-> Google to mean the same thing. So don't get confused.



## Do not theorize before you have data

The moment we think about Google our associative brain automatically evokes positive thoughts about its superior products like Search Engine, Gmail, YouTube, Android, and Chrome. We get anchored to these positive thoughts and seek those evidences which supports it. And disregard everything else that contradicts it. Charlie Munger calls this as **first conclusion bias** — "Human mind is a lot like the human egg, and the human egg has a shut-off

device. When one sperm gets in, it shuts down so the next one can't get in. The human mind has a big tendency of the same sort".

If you want to be a rational investor then you cannot operate under the influence of first conclusion bias. Your duty is to gather facts, both positive and negative, about the company with an absolutely blank mind. You cannot conclude that Google is a great company before gathering positive and negative facts about it. In other words, do not theorize before you have data.

> *We approached the case with an absolutely blank mind, which is always an advantage. We had formed no theories. We were there simply to observe and to draw inferences from our observations. I have not all my facts yet, but I do not think there are any insuperable difficulties. Still, it is an error to argue in front of your data. You find yourself insensibly twisting them round to fit your theories.* **It is a capital mistake to theorize before one has data. Insensibly one begins to twist facts to suit theories, instead of theories to suit facts**. - *A Few Lessons from Sherlock Holmes*

The next question is from where do we gather facts about Alphabet's business? Every public company, including Alphabet will have an investor relations website. From there you can download the 10-K reports and founder's letters. Also, I like to read the quarterly conference call transcripts as it might contain some key facts about the business. You can download the transcripts from websites like SeekingAlpha. I zipped all the reports and you can download it from here.

## Don't blindly collect endless amounts of facts

The zip file that you downloaded contains 30 files. If you add all the pages in these files, it will be around 2000 pages. Should you read all 2000 pages? Of course not. From the latest 10-K report you need to read the sections — Business, Management Discussion and Analysis, and Consolidated Statement of Balance sheet, Income statement, and Cash flows. You need to read them by asking questions. Why is this important? Reading without asking questions is akin to trying to reach your destination without knowing where you're going.

> *We can't observe or collect facts without some kind of view - what to look for, how to look and how to interpret what we see. The professor and philosopher Karl Popper (1902 - 1994) often started his lectures by telling his audience:* **"Observe!" But we can't - we need to know "Observe what?" We can't observe without an idea of what we are looking for.** *But we should try to gather facts as open-minded and unbiased as possible.* - *A Few Lessons from Sherlock Holmes*

**Ask "Why?"**

2 Leonardo da Vinci: "I roamed the countryside searching for answers to things I did not understand. Why shells exist on the tops of mountains along with imprints of plants usually found in the sea. Why thunder lasts longer than that which causes it. How circles of water form around the spot which has been struck by a stone. And how a bird suspends itself in the air. Questions like these engaged my thought throughout my life." **What are you curious about? What probing questions can you ask? Where can you ask "Why?"**

## What questions to ask?

The world has seven billion people and someone smart must have written a book on what questions to ask while analyzing a business. Business Model Generation is that book which gives nine questions that we need to ask while reading Alphabet's 10-K report. They are given below.

**Customer Segments:** Customers comprise the heart of any business model. Without customers, no company can survive for long. You need to find out who are Alphabet's customers. Are they businesses or consumers? What is the demographics of the customers and how affluent are they?

**Value Propositions:** What value does Alphabet deliver to its customers? Which customer's problems does it solve? Which customer needs are being satisfied? What bundles of products and services does the company offer to each customer segment?

**Channels:** How does the customer know about Alphabet's products and services? How does the company deliver its product and services to customers? Is it online or offline? How does the customer contact the company post-purchase?

**Customer Relationships:** How does Alphabet establish relationship with each customer segment? Can a customer communicate with a real customer service representative to get help before and after purchase? Is it self-service and the customers are expected to do it all by themselves?
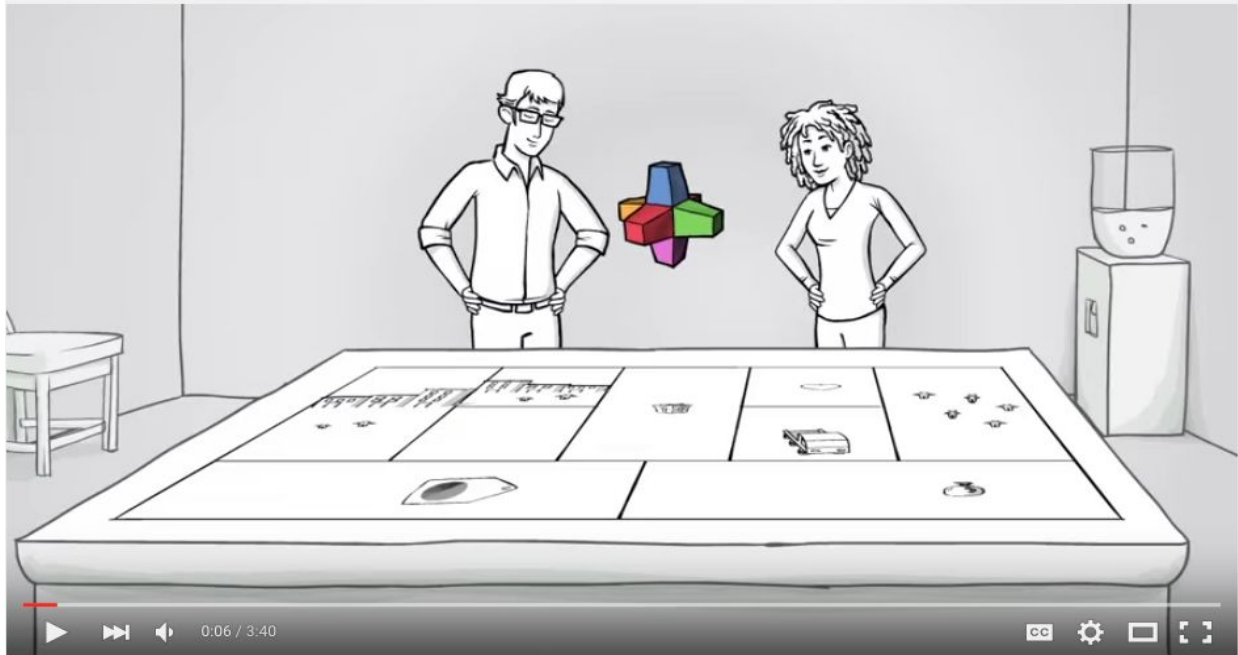


**Revenue Streams:** It represents the cash a company generates from each customer segment. If customers comprise the heart of a business model, revenue streams are its arteries. You should ask, For what value are customers really willing to pay? For what do they currently pay? How are they currently paying? How would they prefer to pay? How much does each revenue stream contribute to overall revenues? There are several ways of generating revenue and some of them are **(1)** By selling goods as Amazon does **(2)** Based on usage as Hilton does **(3)** Based on subscription as Netflix does **(4)** By Advertising as Google does **(5)** By transaction fee as Visa and Mastercard does **(6)** By renting as Enterprise and Hertz does.

**Key Resources:** What are the key resources that enable the company to create value, win customers, and generate revenue? The key resources could be **(1)** Physical assets such as manufacturing facilities, building, and distribution networks. Walmart relies heavily on physical assets **(2)** Intellectual resources such as brands, proprietary knowledge, patents and copyrights. Nike and Coke rely heavily on its brand **(3)** Human resources are crucial in knowledge intensive and creative industries. Technology companies like Alphabet and Facebook rely heavily on people **(4)** Banks and lending companies rely heavily on financial assets.

**Key Activities:** What are the key activities does Alphabet do to generate value? These activities can be categorized as **(1)** Production; Examples are companies like Ford and Toyota design and manufacture cars **(2)** Problem Solving; Examples are IBM and McKinsey solves problems for its customers **(3)** Platform and Networks; Examples are companies like Amazon and Apple.

**Key Partnerships:** A company cannot do everything on its own and it depends on key partnerships. Google depends on third parties to show ads on their website. So that it can earn some portion of the ad revenue. An insurance company may choose to rely on independent brokers to sell its policies rather than develop its own sales force. Find out who are the key partners of the company.

**Cost Structure:** It describes all the costs incurred by the company to operate the business. The cost structure of a company depends on the type of business. Enterprise companies like Salesforce need to spend a lot of money on salespeople. On the other hand Facebook doesn't need a lot of salespeople as its products are self served. This enables Facebook to command an operating profit margin of 40 percent.

Analyzing businesses is not at all a linear experience. The latest 10-K report might not contain answers to all the nine questions. In that case you need to **(1)** Read the previous years 10-K report's **(2)** Visit the company's website **(3)** Read the management interviews **(4)** Talk to Alphabet's employees, suppliers, customers, and competitors **(5)** Someone smart should have written a book about the company or the industry. Go and read that book. In case of Google, I urge you to read How-Google-Works. **Your goal is not to blindly collect endless amounts of facts. But to get answers to all the above questions.**

## Business

My favorite quote of George Bernard Shaw is — "The reasonable man adapts himself to the world; the unreasonable one persists in trying to adapt the world to himself. Therefore, all progress depends on the unreasonable man."

The unreasonable man encounters a situation that is less than ideal and asks **why**. He begins to come up with ideas for possible improvements and solutions – with such ideas usually surfacing in the form of **what If** possibilities. He takes one of those possibilities and tries to implement it or make it real; this mostly involves figuring out **how**. I learnt about the framework of **why-what if-how** from Warren Berger.

Marc Benioff, an executive at the tech company, Oracle once asked – "Why aren't all enterprise software applications built like Amazon and eBay?" – The result is Salesforce. As of today its market capitalization is $52 billion. Marc Benioff is one example of an unreasonable man.

Google's empire is built on **unreasonable engineers** who ask a lot of what-if questions. Some of the what-if questions which Googlers asked are **(1)** What if we could download and index the entire web? [Google Search] **(2)** What if we could develop a smarter email service with plenty of storage? [Gmail] **(3)** What if we could make a simpler, speedier, safer browser? [Chrome].

Google was founded in 1998 with a **mission to organize the world's information and make it universally accessible and useful**. It went public on August 2004 with a valuation of $27 billion. As I write this lecture notes, its valued at $505 billion. This translates to a CAGR of 30.51 percent every year for almost eleven years.
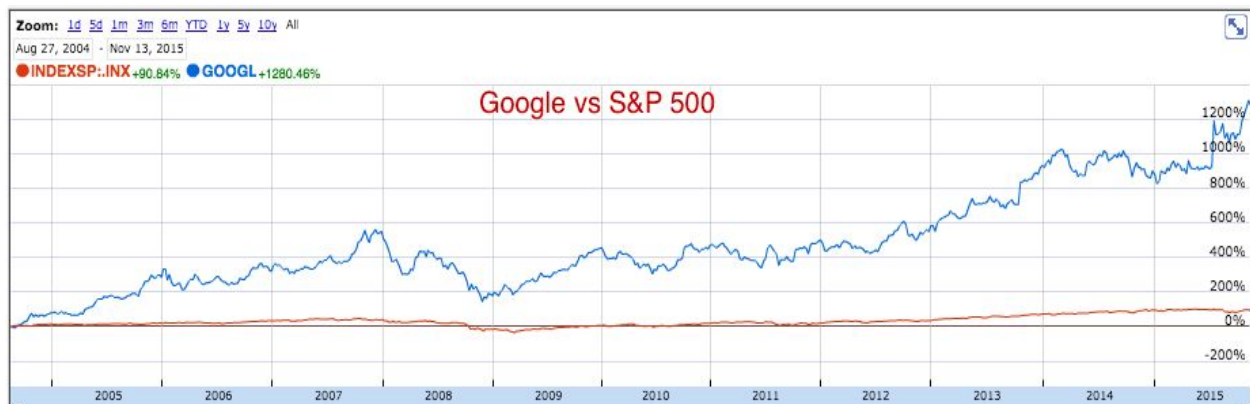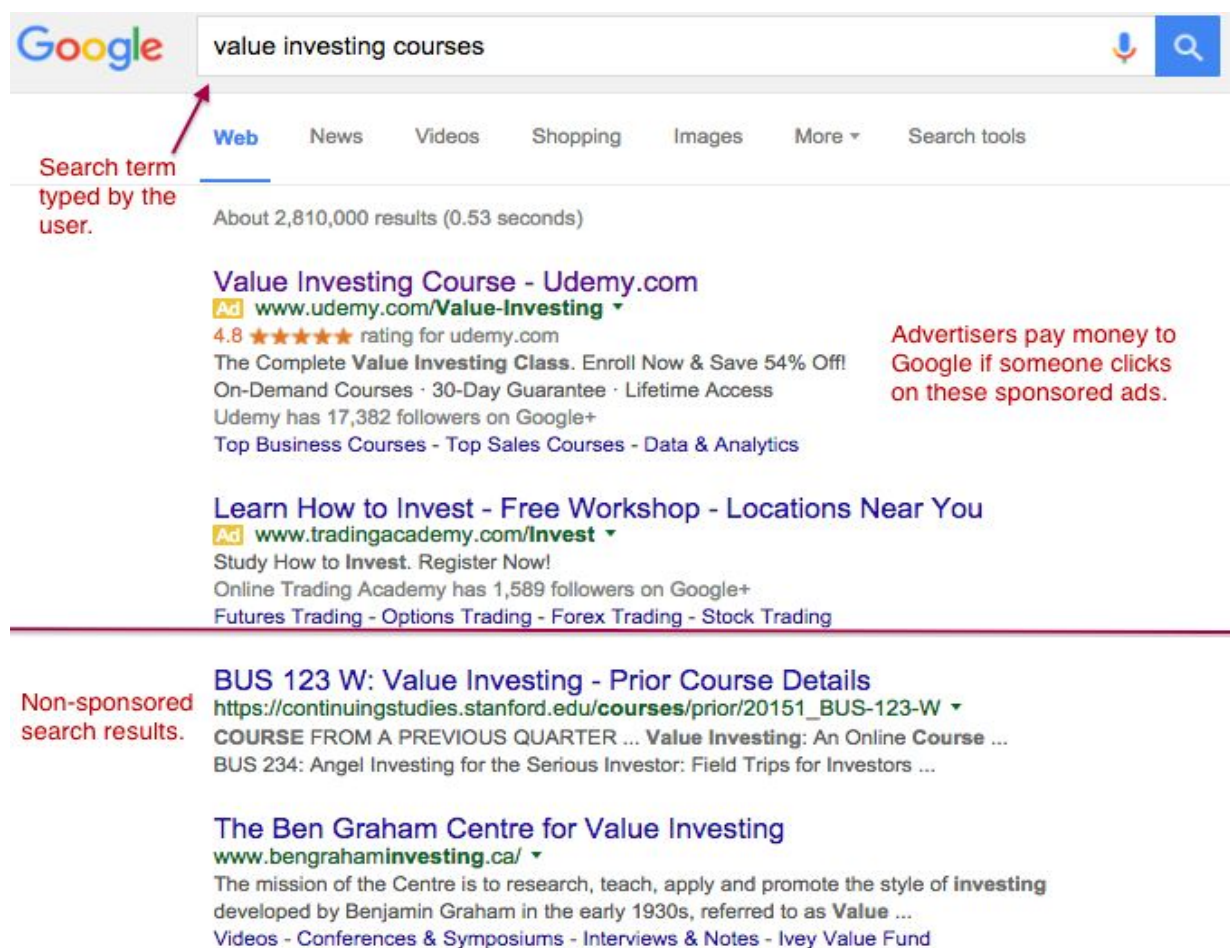


Whenever you see such phenomenal results the question that you need to ask is - "**What wave did Google surf to achieve such a phenomenal result?**" There were a couple of waves that helped it to produce such phenomenal results. They are **(1)** ads spending moved from offline to online **(2)** its search algorithm was 10x superior than its competitors. Spend a couple of minutes to watch the fantastic video to see how its search can help to reunite people.
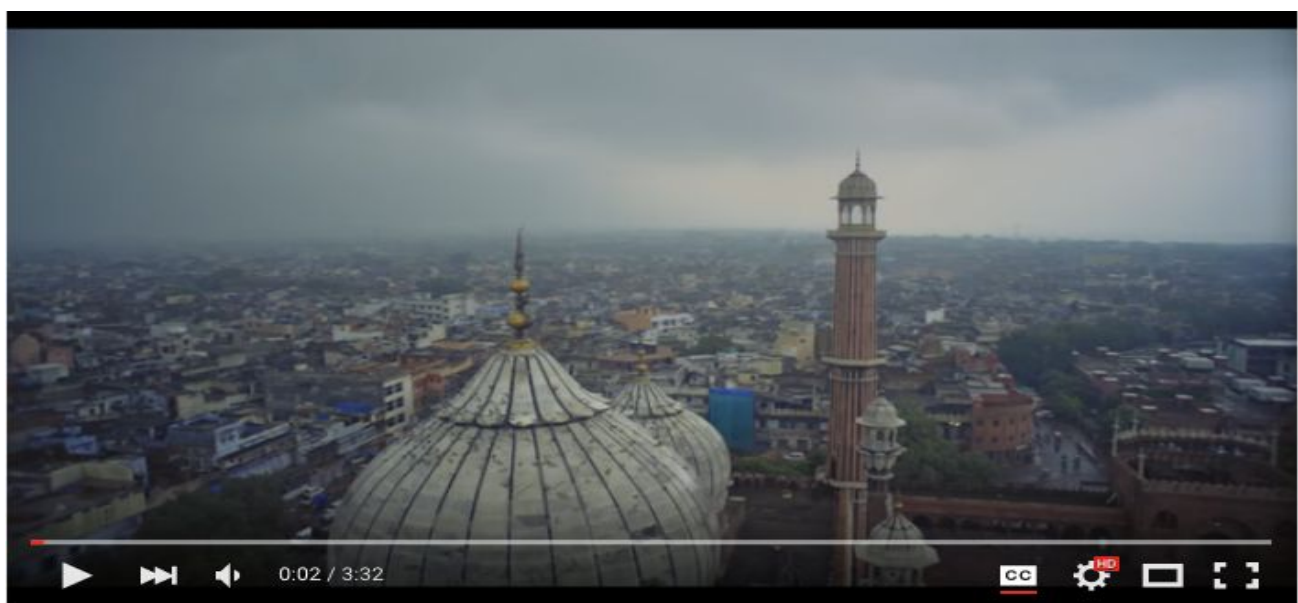
Google created a powerful search platform using which one can find anything on the internet for "free". Along with this it offered other useful services including Gmail, Maps, Chrome, and YouTube for "free". This attracted over one billion users to its platform. Why did I put the word free in quotes. There is no such thing as a free lunch. Billions of consumers are lending their eyeballs to Google by spending time (money) on its platform.

If you want to attract ants then you need to put some sugar. Advertisers (like ants) came running to Google's platform on seeing so many consumers (like sugar) using its platform. They paid Google to target relevant ads to millions of consumers by using Google's **AdWords** service.



To increase the reach, Google came up with an idea of showing these ads outside its own websites. So it created **AdSense** service using which third parties can show ads on their websites and earn a portion of advertising revenue. These third parties are called as Google Network Members. By allowing three independent groups of customers to interoperate, Google created a **multi-sided platform**.

| Customer Type | Google's Value Proposition |
|---|---|
| Consumers | It provides a powerful search engine which is 10x superior than its competitors for free. Along with that it provides other world class products including Gmail, Maps, Chrome, and YouTube for free. |
| Advertisers | Using AdWords service advertisers can target ads to millions of consumers. The service is attractive to advertisers because it allows them to tailor online campaigns to specific searches and particular demographic targets. |
| Network Members | Using AdSense service third parties can earn a portion of Google's advertising revenue by showing Google ads on their own sites. |

How do the customers of Alphabet know about its products and services? Alphabet spends money on advertising its products and services. Take a look at the table given below. What do you see? Alphabet spent less than 1.5 percent of sales on advertising in 2007 and 2009. What does this tell you? Its products are already well known to its customers and hence it doesn't spend a lot of money on advertising. This should not surprise you as the word "google" is now an official entry in the Oxford English Dictionary — as a verb.

| (in millions) | Alphabet Inc | | | |
|---|---|---|---|---|
| | 2007 | 2009 | 2012 | 2014 |
| Sales | $16,594 | $23,651 | $46,039 | $66,001 |
| Advertising and Promotional Expenses | $237 | $353 | $1,992 | $3,004 |
| Advertising / Sales | 1.43% | 1.49% | 4.33% | 4.55% |

Then why did the advertising and promotion expenses go up from 1.43 percent in 2007 to 4.55 percent in 2014? Before answering this question, let me ask you another question. Is there a reason why I presented you the data over an eight year period [2007 - 2014] instead of one or two years? Buffett answers this question in the picture shown below. Now you know the reason why I downloaded the 10-K reports from the year [2004 - 2014]. If you want to spot long term trends, then you need to read several years of 10-K reports.

"A company should be viewed as an unfolding movie, not as a still photograph."
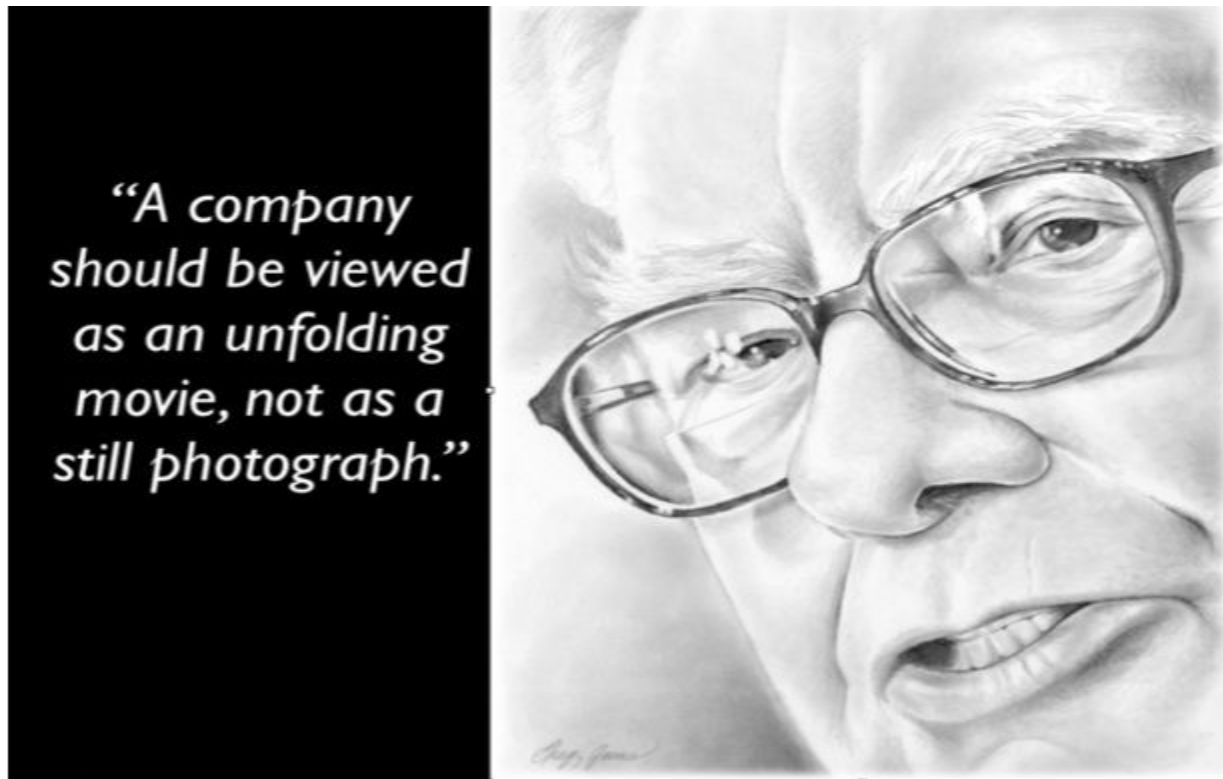
Take a look at the table given below. What do you see? Over the last 8 years Alphabet's other revenues contribution to sales has gone up. Other revenues include digital sales like apps, movies, and music sold via Google Play, and hardware sales like Chromecast and Nexus phones. My hypothesis is that Alphabet is spending money on advertising and promoting these digital items. This is the reason why its advertising expenses went up.

| (in millions) | Alphabet Inc | | | |
| --- | --- | --- | --- | --- |
| | 2007 | 2009 | 2012 | 2014 |
| | | | | |
| Sales | $16,594 | $23,651 | $46,039 | $66,001 |
| Advertising revenues | $16,413 | $22,889 | $43,686 | $59,056 |
| Other revenues | $181 | $762 | $2,353 | $6,945 |
| Other revenues / Sales | 1.09% | 3.22% | 5.11% | 10.52% |

The table shown below contains the revenue breakdown of Alphabet for the last five years. What do you see? Advertising accounted for 89 percent of its revenue in 2014. The good news is that its other revenue is growing at a faster pace compared to advertising revenue. The hope is that at some point Alphabet will no longer be a one-trick-pony solely depending on advertising revenue.

| (in millions) | 2010 | 2011 | 2012 | 2013 | 2014 |
|---|---|---|---|---|---|
| Advertising Revenues | $28,236 | $36,531 | $43,686 | $50,547 | $59,056 |
| Google websites | $19,444 | $26,145 | $31,221 | $37,422 | $45,085 |
| Network members websites | $8,792 | $10,386 | $12,465 | $13,125 | $13,971 |
| Other Revenues | $1,085 | $1,374 | $2,353 | $4,972 | $6,945 |
| Total Revenues | $29,321 | $37,905 | $46,039 | $55,519 | $66,001 |



Revenue source percentage
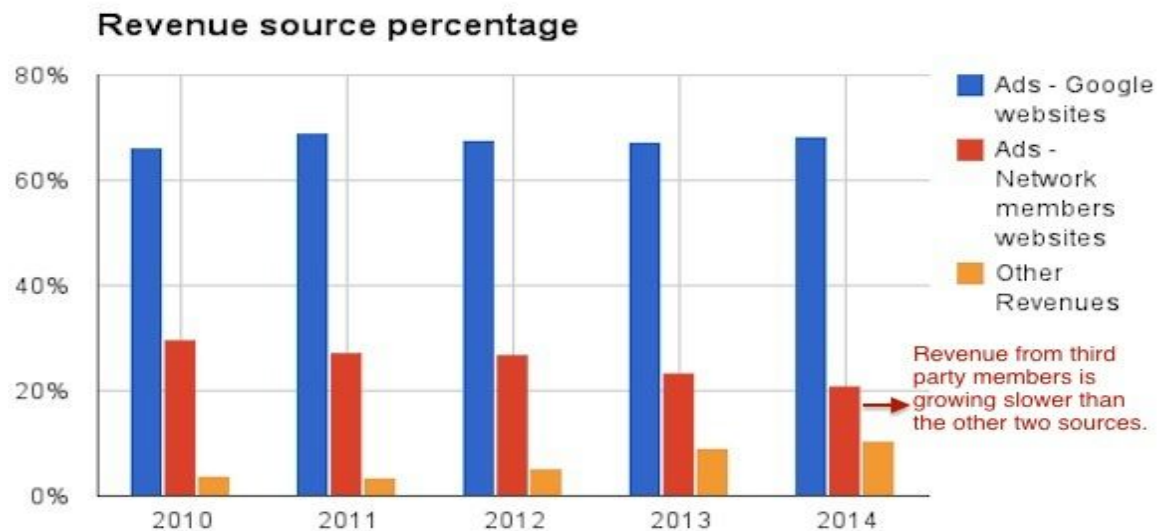
US accounted for 43 percent of its revenue and the remaining 57 percent came from the rest of the world. International sales are growing at a faster rate compared to US. Advertising revenue has been growing slower in the recent years. Why is that?



United States vs Rest of the world
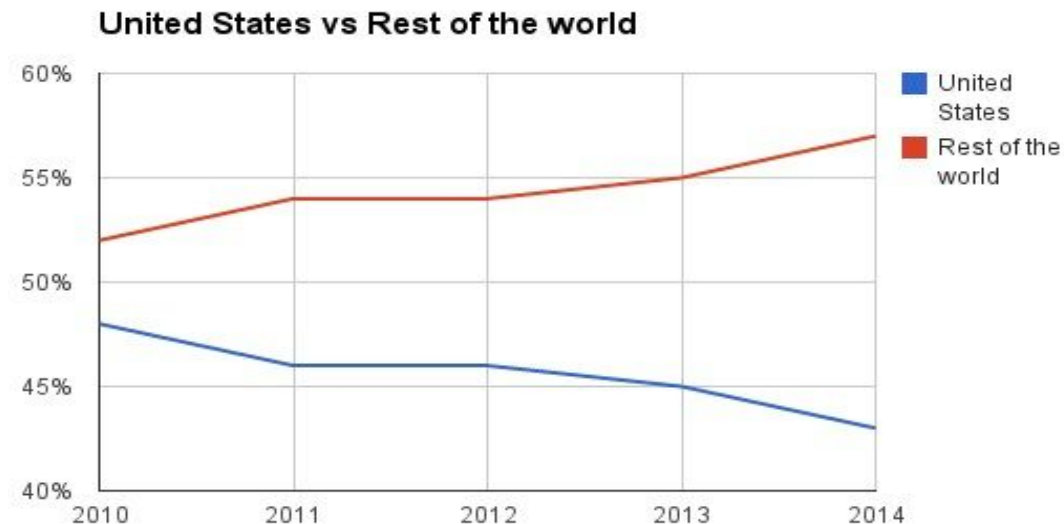
The reasons for the slow growth in advertising are **(1)** increased competition from social media companies, especially Facebook **(2)** dollar strengthened against other currencies and faster international growth affected the top line **(3)** revenue from network member websites growth slowed down to 6.4 percent in 2014. This is because of few policy changes and consumer traffic shifting to mobile **(4)** it's hard to maintain the growth rate on higher revenue base.

Google delivers two types of advertisements **(1) Performance advertising**; text based ads that appear on Google's and its partner websites and it gets paid by the advertiser when the user clicks on these ads **(2) Brand advertising**; video, images, and other interactive ads which increase user's awareness and affinity towards advertisers products and services; the ads that you see on YouTube falls under this category. Google charges its advertisers in a couple of ways.

> *Most of our customers pay us on a **cost-per-click basis**, which means that an advertiser pays us only when a user clicks on one of its ads. We also offer advertising on a **cost-per-impression** basis that enables our brand advertisers to pay us based on the number of times their ads display on Google websites and our Google Network Members' websites as specified by the advertisers. -* 2014 10-K

Advertising revenue is a function of the total **number-of-paid-clicks** and average **cost-per-click**. Google reports year-over-year changes on these two parameters. Take a look at the chart given below. What do you see?
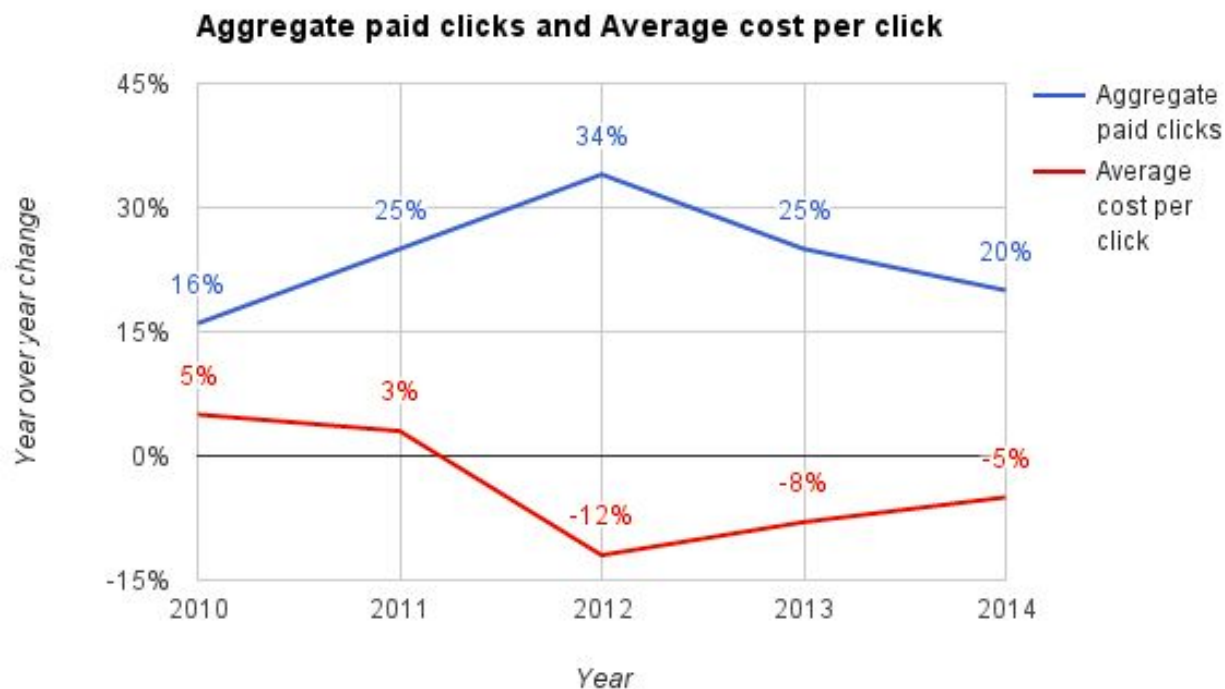
Aggregate paid clicks are a function of how many ads are shown to the consumers. This in turn is a function of how many consumers use its platform. Over the years the numbers of consumers using Google's platform have gone up. This resulted in increasing the year-over-year aggregate paid clicks. This is a good thing. Why did the second parameter average cost-per-click go down?

In order to answer this question we need to know who sets the price of cost-per-click. Is it Google? Of course not. The advertisers decide the price by bidding for an ad slot using generalized second-price auction. In the second price auction the highest bidder wins, but unlike first-price auction, the price paid is the second-highest bid.

Wall Street analysts speculate that this is going down because of the traffic shifting to mobile and the advertisers are not willing to spend more per click on Google's platform. But the company doesn't agree with this. They say that this is due to YouTube TrueView (read it as pay-per-watch) ads which has lower cost-per-click. Who is right?

Google delivers its products and services to customers online. It doesn't incur a lot of sales and marketing expenses as their products are mostly self served. Take a look at the chart given below. On average Google spends 10 cents on sales and marketing to bring in $1 of sales. On the other hand enterprise companies like Salesforce spends 51 cents to bring in $1 sales.
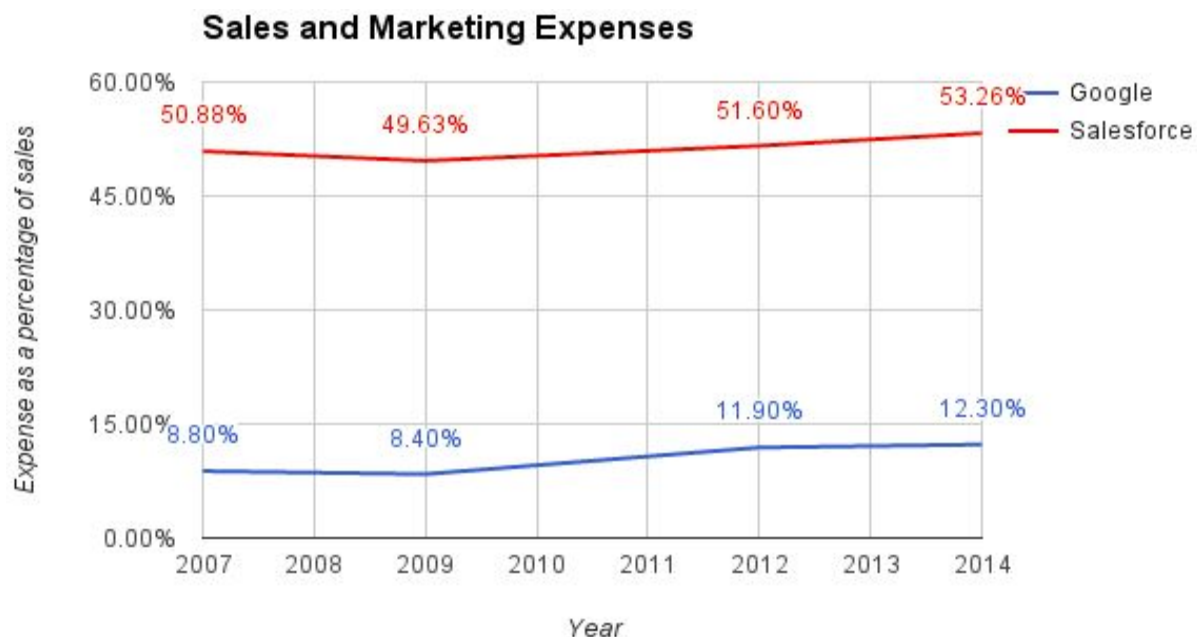


The cash conversion cycle measures the amount of time needed to sell the inventory, the amount of time needed to collect the receivables and the length of time the company is afforded to pay its bills without incurring penalties. It is measured in days and calculated by using the formula $[Days\ sales\ outstanding + Days\ inventory\ outstanding - Days\ payable\ outstanding]$. Alphabet

has very low cash conversion cycle of less than one month. This tells that advertisers love its products and services and pay their bills on time. In fact, advertisers pay the cash first before getting their ads delivered. How do I know? In the balance sheet you will find a liability item called Deferred Revenue with a value of $1.2 billion in 2014.

| | Alphabet Inc | | | |
| --- | --- | --- | --- | --- |
| | 2007 | 2009 | 2012 | 2014 |
| Cash conversion cycle | 25 | 37 | 34 | 21 |

Google costs can be divided into two major parts **(1)** cost of revenue; includes traffic acquisition costs that it shares with its network members and distribution partners, other costs; content acquisition costs for YouTube and Google play, operating data centers, and costs related to hardware sales **(2)** salaries, bonuses and stock compensation it pays to its employees. From the data shown below you can see that its total costs have been growing faster than sales and this resulted in lower pre-tax operating margins.

| (in millions) | 2010 | 2011 | 2012 | 2013 | 2014 |
| --- | --- | --- | --- | --- | --- |
| Cost of revenues | $10,417 | $13,188 | $17,176 | $21,993 | $25,691 |
|   Traffic acquistion costs | $7,317 | $8,811 | $10,956 | $12,258 | $13,497 |
|     Network members | $6,162 | $7,294 | $8,791 | $9,293 | $9,864 |
|     Distribution partners | $1,155 | $1,517 | $2,165 | $2,965 | $3,633 |
|   Other cost of revenues | $3,100 | $4,377 | $6,220 | $9,735 | $12,194 |
| R & D | $3,762 | $5,162 | $6,083 | $7,137 | $9,832 |
| Sales and Marketing | $2,799 | $4,589 | $5,465 | $6,554 | $8,131 |
| General and Administrative | $1,962 | $2,724 | $3,481 | $4,432 | $5,851 |
| Total cost and expenses | $18,940 | $25,663 | $32,205 | $40,116 | $49,505 |

Take a look at the table given below. In 2010, the company had a pre-tax operating margin of 35 percent. But in 2014 this came down to 25 percent. Why did this happen? This happened because in the last five years its gross profit margin went down by 3 percent due to higher costs it paid to its distribution partners and its media and hardware businesses have lower margins compared to advertising.

Also, it increased its headcount from 24,000 to 53,600 in five years and this explains the remaining difference of 7 percent. Should we worry about the operating profit margins going down by 10 percentage points? Hold on to this thought for some time. I will address this in the next section.

| Cost as a percentage of revenue | 2010 | 2011 | 2012 | 2013 | 2014 |
|---|---|---|---|---|---|
| Cost of revenues | 35.53% | 34.79% | 37.31% | 39.61% | 38.93% |
| R & D | 12.83% | 13.62% | 13.21% | 12.86% | 14.90% |
| Sales and Marketing | 9.55% | 12.11% | 11.87% | 11.80% | 12.32% |
| General and Administrative | 6.69% | 7.19% | 7.56% | 7.98% | 8.87% |
| Total cost and expenses % | 64.60% | 67.70% | 69.95% | 72.26% | 75.01% |
| Pre-tax operating margin % | 35.40% | 32.30% | 30.05% | 27.74% | 24.99% |
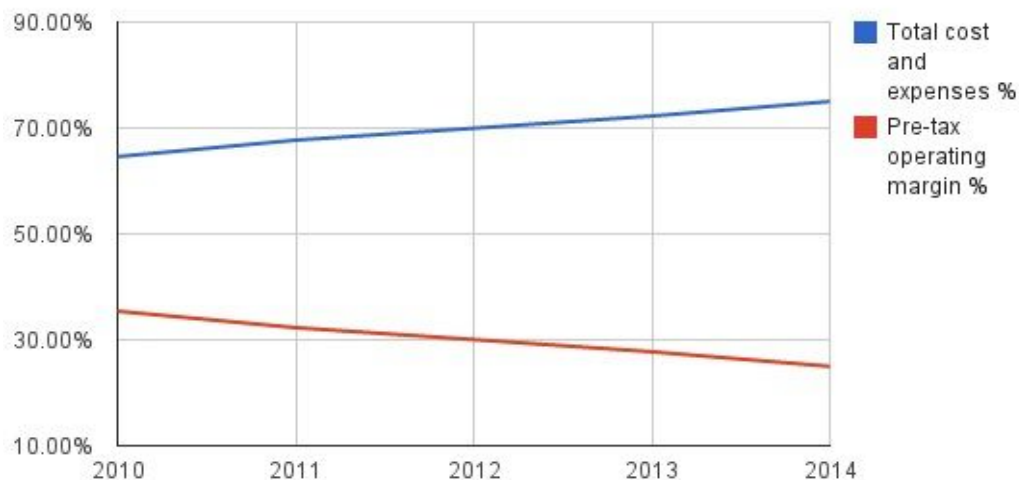


Given below is the business model generation canvas for Alphabet. I got this image from the book Business Model Generation.
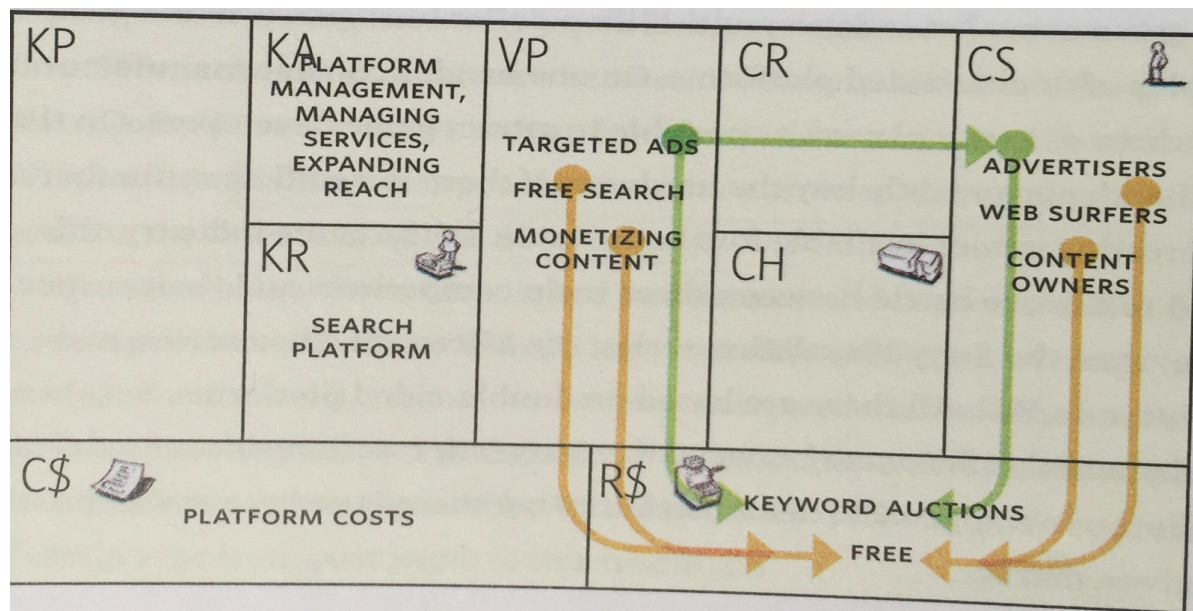
## Are bricks assets and brains expenses? It's Owner's Earnings that count

It is time to ask you a question. Take a look at the income statement of John and Peter which is given below. Both are of same age and their income and earnings (read it as profits) are also the same. If I ask you to assign an earnings multiple for them how much would you assign?

|          | John  | Peter |
|----------|-------|-------|
| Income   | $100  | $100  |
| Earnings | $10   | $10   |

You cannot assign the same multiple to both of them. Why is that? I have not given you the complete information. Now take a look at the complete information. It should be very clear that John's earnings should receive higher multiple than Peter. Why is that?

|           | John  | Peter |
|-----------|-------|-------|
| Income    | $100  | $100  |
| Rent      | $35   | $30   |
| Food      | $15   | $10   |
| Education | $40   | $0    |
| Gambling  | $0    | $30   |
| Drinks    | $0    | $20   |
|           |       |       |
| Earnings  | $10   | $10   |

John spends a lot of money in educating himself. Also, he pays higher rent which suggests that he is living in a better community and he is spending more on eating healthy foods. But Peter spends half his income on gambling and drinks and none on education. Given these facts, it should be obvious that John is likely to earn more in the future and it will result in his earnings growing at a faster rate.

What is the takeaway lesson? Companies are like people and the profits reported in the income statement vary so much in quality. Your job as an investor is to find out if the reported profits are of high quality (like John) or low quality (like Peter).

In a 1986 letter to shareholders, Buffett explained how to figure out the quality of profits. He does this by adjusting the reported profits to arrive at actual profits earned by the business. He

calls this actual profits as "**owners earnings**".  **It is defined as the earnings that you can take out of the business every year without affecting its competitive position.**

Owner Earnings =
        reported earnings plus [A] +
        depreciation, depletion, amortization, and certain other non-cash charges [B] -
        average annual amount of capitalized expenditures [C]

The capital expenditure (Capex) that Buffett refers to is maintenance capex and not growth capex. What is the difference? Capex that is needed to maintain the current sales and profits are called as maintenance capex. Capex that increases sales and profits is called as growth capex. The next question is why does he add back depreciation and subtract maintenance capex?

Remember that in the previous lecture notes, we learnt about the railroad company Union Pacific, which spent 2.3 times more on capital expenditure compared to depreciation? Most of the reinvestments are not for generating new sales, but instead to maintain current sales. Union Pacific's operating profits are overstated because its depreciation expense is understated.

In order to handle this situation Buffett adds back depreciation and subtracts maintenance capital expenditure. How did Alphabet do on this front? Take a look at the table given below. What can we conclude from this?

| | Alphabet Inc | | | | |
|---|---|---|---|---|---|
| (in millions) | 2010 | 2011 | 2012 | 2013 | 2014 |
| Depreciation | $1,067 | $1,396 | $1,988 | $2,781 | $3,523 |
| Capital expenditure (Capex) | $4,018 | $3,438 | $3,273 | $7,358 | $10,959 |
| Capex / Depreciation | 3.77 | 2.46 | 1.65 | 2.65 | 3.11 |

In the last five years Alphabet on average spent 2.73 times more on capital expenditure compared to depreciation. How much of it is related to maintenance capex? I don't know the answer as Alphabet doesn't disclose the break up. But that doesn't preclude me from making an educated guess.

Technology, unlike railroad business, doesn't require a lot of maintenance capex to maintain its current sales. So we can safely assume that most of the capex goes towards growth. To simplify things, let's also assume that depreciation equals maintenance capex. This means that we don't need to adjust Alphabet's reported profits to handle maintenance capex. There is one big item that Buffett missed out in his owner's earnings calculation. What is that?

**Sanjay Bakshi**
@Sanjay__Bakshi

This quote is the holy grail on earnings. But, Mr. Buffett inadvertently made a mistake.

Can you spot it?

> "If we think through these questions, we can gain some insights about what may be called "owner earnings." These represent (a) reported earnings plus (b) depreciation, depletion, amortization, and certain other non-cash charges less (c) the average annual amount of capitalized expenditures for plant and equipment, etc. that the business requires to fully maintain its long-term competitive position and its unit volume. (If the business requires additional working capital to maintain its competitive position and unit volume, the increment also should be included in (c)."- Warren Buffett in 1986 Letter of BRK

Certain expenses like Advertising and Research & Development are made today to provide benefits far out into the future. They're like seeds sown today that will provide fruits in the future. **One of the key concepts of accounting is matching principle in which expenses incurred are matched against the revenue it generated.** Did Alphabet follow this principle when it recognized expenses incurred on moonshot projects?

None of the moonshot projects bring in any revenue today. But it recognized all the expenses as and when they're incurred. In other words, it violated the matching principle of accounting. Why is that? In the fantastic book It's Earnings That Count author Hewitt Heiserman gives four reasons for this. Read, Reread, and Reflect on what he wrote.

> *The nation's economy has changed over the last 50 years. Half a century ago, our biggest companies extracted coal from the earth and forged I-beams in blast furnaces. Today, the prime creators of wealth for many firms are brands, patents, teamwork, customer service, licensing agreements, imagination, distribution routes, intellectual*

*property, innovative technology, and reputation. All of these are "intangible growth-producing initiatives," or intangibles for short.*

*No one really disputes the value of intangibles. Under the rules of accrual accounting, however, they are expenses—even if the payoff is realized over many years. Why, when it comes to intangibles, do accountants deviate from their basic policy of matching current sales with current expenses and future sales with future expenses? **Why in the accrual income statement are bricks assets and brains expenses?** Here are four reasons.*

*First, self-preservation. Since accountants are more likely to be sued for overstating than for understating earnings (and assets), it's in their best interest to err on the side of caution. Thus, intangibles are expensed in full when incurred rather than at some later date, even if most of the benefits will be booked down the road.*

*Second, intangibles are a use of cash. Every dollar a firm spends on R&D or advertising is a dollar less that is available to pay down debt, increase the dividend, or repurchase stock.*

*Third, if a company needs a few more pennies to meet Wall Street's quarterly expectations, management might be tempted to include with R&D a portion of operating expenses, say, rent on a research facility. When a company converts an operating expense to a capital asset, the effect is to reduce the current period's expenses and increase bottom-line earnings. (Of course, that capital asset will eventually make its way back onto the income statement as an expense.)*

*Fourth, there's no guarantee that intangibles will generate increases in future sales and earnings. - [It's Earnings That Count](#)*

By treating bricks as assets and brain as expenses, accounting violated the matching principle so that it can preserve its conservatism. Alphabet did the right thing by expensing R&D projects that won't produce anything today. But as shareholders we need to add some portion of the expense back to profits.

The logic behind this is similar to our treatment of John and Paul's profits. Even though they are the same, some portion of John's education expense should be added back to profits as we believe that it will provide additional revenue in the future. But how do we know if the current moonshot projects of Alphabet will provide any revenue in future? We don't know how the future will unfold. But we can look back and see if their previous R&D work produced something useful.

In 2015 Alphabet's products like Search, Android, Maps, Chrome, YouTube, and Google Play each have over one billion users. How many of the products existed ten years back? It only had

Search. From this we can conclude that the odds of its R&D expenses, producing revenue in the future is high. In the video given below watch from 11:00 to 12:30 minutes to see investor Tom Russo talk about how Brown-Forman expanded its whiskey brand Jack Daniel's from 5 to 50 markets. In the process, they were understating the reported profits, even though its brand strength was increasing every year.



There are a couple of ways to add back R&D expenses. The harder way is to capitalize them in the balance sheet and amortize it over a period of time. I wrote about this method in detail here. As this is an introductory course, let's approach this problem by taking the easy route.

The easy route is to take an average. Take a look at the chart given below. During the first five years [2005 to 2009] the company had an average pre-tax operating margin of 33 percent. During the next five years [2010 to 2014] its pre-tax operating margins came down to 28 percent. Going forward, let's assume that Alphabet can maintain a pre-tax operating margin of 30 percent.

Applying this to its 2014 sales of $66 billion we get pre-tax operating margin to be around $20 billion. The method that we followed to arrive at $20 billion is called as **normalizing margins**. Or we can also refer to this as **earning power** of Google. We will be using this concept when we come to the valuation part.

## Pre-tax operating margin
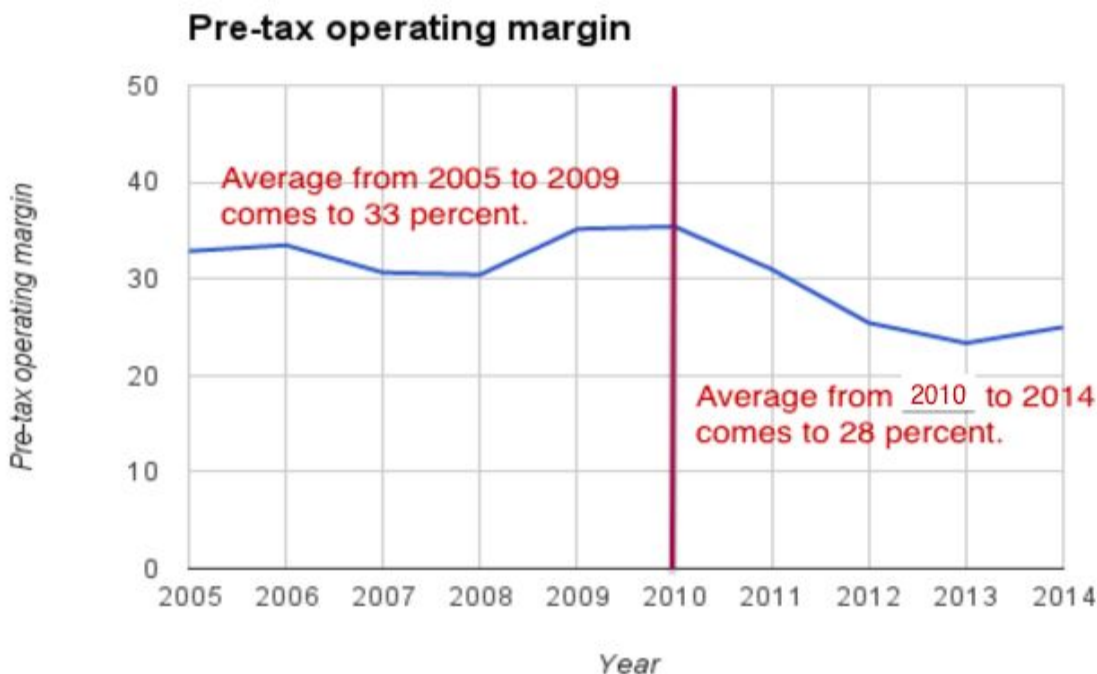


## What matters is Pizza slice not size - Earnings per share

Visualize a 14 inch pizza with 8 equal slices. You are one among the eight people to receive a slice. While you're about to take your slice the pizza doubled in size and became 28 inches with 32 equal slices. If you love eating pizza then you would be happy with the outcome as you will eat four slices instead of one. But what if I were to tell you that the number of people went up from 8 to 32. You will still get only one slice. **What matters more is not the overall size of the pizza, but the slice you're going to eat.**

When it comes to pizza everyone understands this fifth grade arithmetic. For some reason many fail to apply this logic when it comes to analyzing businesses. Sales and profits are important. But one can't conclude everything by looking at their absolute values. It has to be converted to per share values as they're your pizza slices.

Take a look at Alphabet's total shares outstanding which is given below. In four years, it went up by 6 percent from 637.40 million to 673.96 million. Along with the growing sales and profits (pizza size) the number of shareholders (pizza eaters) also went up.

|  | 2010 | 2011 | 2012 | 2013 | 2014 |
|---|---|---|---|---|---|
| Total shares outstanding (basic) | 637,404,000 | 645,556,000 | 654,426,000 | 665,692,000 | 675,935,000 |

We need to account for the increase in the total number of outstanding shares. How to do that? All we need to do is to divide all the key metrics by total number of outstanding shares for that year. Take a look at the table which is given below. It contains the per share values for net operating and financing assets. Also, it contains per share values (not normalized) of what those assets earned. We will be using the values in the table when we come to the valuation part.

| Year | Pre-tax operating income per share | Pre-tax net interest income per share | Net operating assets per share | Net financial assets per share | Book value per share |
|---|---|---|---|---|---|
| 2010 | $16.29 | $0.65 | $23.11 | $49.43 | $72.55 |
| 2011 | $18.96 | $0.90 | $27.45 | $62.62 | $90.07 |
| 2012 | $21.14 | $0.97 | $44.56 | $65.02 | $109.58 |
| 2013 | $23.14 | $0.75 | $50.83 | $80.33 | $131.16 |
| 2014 | $24.40 | $1.13 | $71.55 | $83.05 | $154.60 |

## Telltale signs of the market

As we learnt in the previous lecture that one can learn a lot by looking at the stock price chart over the long term and relate the changes in the chart to what actually happened in the business. At this point don't focus too much on the price. We will deal with that in the valuation part. All we are doing here is looking for telltale signs of the market. What do you see from the chart given below?



Why did the stock price languish? I am a big fan of neuroscientist V.S. Ramachandran. In one speech he explained about the recursive nature of human brain — "Human brain can contemplate the meaning of infinity. And it can contemplate that it's contemplating the meaning

of infinity." Applying the principle of recursion, let us find out why Google's stock price languished by using Google.



Here are some of the reasons that the market is concerned about **(1)** its cost-per-click is going down **(2)** it is being scrutinized by authorities in Europe over its monopoly **(3)** excess spending on moonshot projects and lack of transparency to shareholders **(4)** increased competition from social networking sites like Facebook **(5)** it is piling up cash which is earning less than one percent.

I will answer these questions in the next lecture notes when we study the company from the vantage point of Moats and People. **Until then reflect on these concerns as they can make or break Google.**

## Few Items To Read And Watch

1. In order to learn more about how to analyze a business read the book Business Model Generation. I would encourage you to take the free online Udacity course How To Build A Startup.
2. If you're interested in learning about the culture of Google then read the book How-Google-Works.

3.  In 1991 Warren Buffett gave three lectures to Notre Dame Faculty, MBA Students and Undergraduate Students. You can find the lecture notes [here](#).
4.  If someone asks me to recommend only one document to read on business analysis, then without blinking my eye I would recommend Sanjay Bakshi's analysis on Relaxo Footwear. You can read it [here](#).
5.  My friend Vishal Khandelwal, founder of [Safal Niveshak](#), interviewed Sanjay Bakshi in 2012. It is one of the best and I urge to read and reread it. You can find the interview [here](#).

# Vantage Point: Alphabet's Moat

Suppose I give you a check for $1 billion and tell you to start a business. What kind of business would you start? If you are a rational person then you would try to get into a business that earn high returns on invested capital. This is what every rational person will try to do in a free market economy. What can we infer from this? Capital seeks the highest returns possible. High profits attract competition as surely as night follows day. This means that companies earning high returns on capital today will see their returns **mean revert** over time as competition moves in.

But some companies are able to withstand the relentless onslaught of competition for long periods of time. For example, companies like Philip Morris and Oracle have been cranking out high returns on invested capital for a very long time. How are they able to do it? If I ask this question to Warren Buffett, what would he say? He would answer it in a single word - **Moat**

> *A truly great business must have an enduring "moat" that protects excellent returns on invested capital. The dynamics of capitalism guarantee that competitors will repeatedly assault any business "castle" that is earning high returns. Therefore a formidable barrier such as a company's being the low- cost producer (GEICO, Costco) or possessing a powerful world-wide brand (Coca-Cola, Gillette, American Express) is essential for sustained success. Business history is filled with "Roman Candles," companies whose moats proved illusory and were soon crossed. -* [Warren Buffett](Warren Buffett)

## Local Economies of Scale - Nebraska Furniture Mart

I am a big fan of theoretical physicist Richard Feynman. Whenever I see my 12th grade marksheet, I remember a Feynman's statement — "There is a huge difference between knowing the name of something and knowing something." Most of what I did in school was to know the name of something. I don't want to make the same mistake here. I want to learn about moats very deeply. How can we do that?

The best way to do that is to study companies (with moats) acquired by Buffett and reverse engineer his thought process. Nebraska Furniture Mart (NFM) is one such company which Buffett acquired in 1983. NFM is the largest home furnishing store in North America selling furniture, flooring, appliances and electronics.

Learning his thought process is very easy as he generously writes about them in his letters to shareholders. Do a google search using **site:www.berkshirehathaway.com "Nebraska Furniture Mart"** and read everything he wrote about NFM. In his 1983 letter to shareholders, Warren Buffett wrote about NFM in great detail. I have reproduced his writing here as it is. **Read, Reread, and reflect on what he wrote. They are pearls of business wisdom.**

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**Nebraska Furniture Mart**

Last year, in discussing how managers with bright, but adrenalin-soaked minds scramble after foolish acquisitions, I quoted Pascal: "It has struck me that all the misfortunes of men spring from the single cause that they are unable to stay quietly in one room."

Even Pascal would have left the room for Mrs. Blumkin.

About 67 years ago Mrs. Blumkin, then 23, talked her way past a border guard to leave Russia for America.  She had no formal education, not even at the grammar school level, and knew no English. After some years in this country, she learned the language when her older daughter taught her, every evening, the words she had learned in school during the day.

In 1937, after many years of selling used clothing, Mrs. Blumkin had saved $500 with which to realize her dream of opening a furniture store.  Upon seeing the American Furniture Mart in Chicago - then the center of the nation's wholesale furniture activity - she decided to christen her dream Nebraska Furniture Mart.

She met every obstacle you would expect (and a few you wouldn't) when a business endowed with only $500 and no locational or product advantage goes up against rich, long-entrenched competition. At one early point, when her tiny resources ran out, "Mrs.  B" (a personal trademark now as well recognized in Greater Omaha as Coca-Cola or Sanka) coped in a way not taught at business schools:

she simply sold the furniture and appliances from her home in order to pay creditors precisely as promised.

Omaha retailers began to recognize that Mrs. B would offer customers far better deals than they had been giving, and they pressured furniture and carpet manufacturers not to sell to her. But by various strategies she obtained merchandise and cut prices sharply. Mrs. B was then hauled into court for violation of Fair Trade laws. She not only won all the cases, but received invaluable publicity. At the end of one case, after demonstrating to the court that she could profitably sell carpet at a huge discount from the prevailing price, she sold the judge $1400 worth of carpet.

Today Nebraska Furniture Mart generates over $100 million of sales annually out of one 200,000 square-foot store. No other home furnishings store in the country comes close to that volume. That single store also sells more furniture, carpets, and appliances than do all Omaha competitors combined.

One question I always ask myself in appraising a business is how I would like, assuming I had ample capital and skilled personnel, to compete with it. I'd rather wrestle grizzlies than compete with Mrs. B and her progeny. They buy brilliantly, they operate at expense ratios competitors don't even dream about, and they then pass on to their customers much of the savings. It's the ideal business - one built upon exceptional value to the customer that in turn translates into exceptional economics for its owners.

Mrs. B is wise as well as smart and, for far-sighted family reasons, was willing to sell the business last year. I had admired both the family and the business for decades, and a deal was quickly made. But Mrs. B, now 90, is not one to go home and risk, as she puts it, "losing her marbles". She remains Chairman and is on the sales floor seven days a week. Carpet sales are her specialty. She personally sells quantities that would be a good departmental total for other carpet retailers.

We purchased 90% of the business - leaving 10% with members of the family who are involved in management - and have optioned 10% to certain key young family managers.

And what managers they are. Geneticists should do handsprings over the Blumkin family. Louie Blumkin, Mrs. B's son, has been President of Nebraska Furniture Mart for many years and is widely regarded as the shrewdest buyer of furniture and appliances in the country. Louie says he had the best teacher, and Mrs. B says she had the best student. They're both right. Louie and his three sons all have the Blumkin business ability, work ethic, and, most important, character. On top of that, they are really nice people. We are delighted to be in partnership with them.

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In the year 2014 a single NFM store in Omaha did sales of around $450 - $475 million. This is unheard of in the retail industry. I don't have the current year financial statements of NFM to study its business. Luckily Buffett published NFMs 1946 financial statements in the 2013 annual report.

The table given below contains the ROIC for NFM in the year 1946. How can a company selling commodity products like furniture and carpets is able to crank out 32 percent after tax ROIC. Even technology companies like Google is struggling to achieve this feat. Before reading further think about it?

| Nebraska Furniture Mart - 1946 | | |
|---|---|---|
| Net sales | $575,096.47 | 100.00% |
| Cost of sales | $472,890.80 | 82.23% |
| Gross profit | $102,205.67 | 17.77% |
| Operating expenses | $81,520.68 | 14.18% |
| Operating profit | $20,684.99 | 3.60% |
| Other Income | 9199.43 | 1.60% |
| Net profit | $29,884.42 | 5.20% |
| Invested capital | $92,994.95 | |
| | | |
| ROIC (after tax) | 32.14% | |
| Efficiency | 6.18 | |
| Profitability | 5.20% | |

In his 1989 letter to shareholders, Buffett gave the formula which NFM uses to generate high returns on capital — **(1)** unparalleled depth and breadth of merchandise at one location; **(2)** the lowest operating costs in the business; **(3)** the shrewdest of buying, made possible in part by the huge volumes purchased; **(4)** gross margins, and therefore prices, far below competitors'; and **(5)** friendly personalized service with family members on hand at all times.

Using the 1946 gross-and-net margins we will understand why it is hard to compete against NFM. The actual margins of NFM might be very different today. For this exercise, we will not worry about it. Imagine that you're going to compete against NFM. And you have unlimited amounts of capital. What would you need to do to dislodge NFM?

First, you want to lure away NFM customers to come to your store. In order to do that you need to sell furnitures at a lower price than NFM. This means your gross margin should be less than NFMs 17.77 percent. If not, why would the customers come to your store? Let's assume it to be 15 percent. And by doing that you have lured away half of NFMs customers. In the real world this won't happen as NFM can undercut you by operating with a gross margin of 14.5 percent.

Second, you need to run your operations very tightly. NFM generates a net profit margin of 5.2 percent. But you already lost 2.77 percent in gross margins. This means that your ship should

run under 2.43 percent to make a profit. NFM doesn't have a lot of rental expenses as it owns the real estate. Let's assume that your real estate expenses come to 1 percent. This means you need to run your ship under 1.43 percent profit margin to make a profit.

The table given below shows what would happen if you managed to take half of NFMs customers. Both of you will lose money and you will lose much more than NFM. Why would any rational person want to compete with NFM to lose money?

| (in millions) | NFM Before | NFM After | You |
|---|---|---|---|
| | NFM at 17.77 percent and you at 15 percent. | Fixed cost on $450 million. NFM at 14.18 percent and you at 15.18 percent. | |
| Sales | $450.00 | $225.00 | $225.00 |
| Gross Profit | $79.97 | $39.98 | $33.75 |
| Fixed cost | $63.81 | $63.81 | $68.31 |
| Profit | $23.40 | -$23.83 | -$34.56 |

The reason why both of you ended up in red is because of the presence of high fixed costs. NFM operates in Nebraska and the majority of its customers come from Nebraska and states that are adjacent to it. These states don't have enough customers to support two discount retailers of the same scale. If a second store were to enter the town, neither would have enough customer traffic to be profitable. This is clearly exhibited in the table shown above.

> *A simple example should help explain why small markets are more hospitable than large ones for attaining competitive advantages. Consider the case of an isolated town in Nebraska with a population of fifty thousand or less. A town of this size can support only one large discount store. **A determined retailer who develops such a store should expect to enjoy an unchallenged monopoly.** If a second store were to enter the town, neither would have enough customer traffic to be profitable. Other things being equal, the second entrant could not expect to drive out the first, so its best choice would be to stay away, leaving the monopoly intact. At the other extreme from our Nebraska town is downtown New York City. This large market can support many essentially similar stores. The ability of even a powerful, well-financed incumbent to prevent entry by a newcomer will be limited. It cannot, in other words, establish effective barriers to entry based on economies of scale relative to its competitors. - Competition Demystified*

NFM will be able to protect its high returns on capital because of its **local economies of scale.** This is one of the three sources of moats. You get local economies of scale if costs per unit decline as volume increases, because fixed costs make up a large share of total costs. In the retail business economies of scale happens at the distribution center level.

NFM achieves huge economies of scale as it has only one store. Take a look at NFMs 1946 operating expenses which is given below. The majority of these expenses is fixed in nature and they don't increase in proportion to increase in sales. NFM doesn't keep all the profits to itself. It passes on to its customers. How can anyone compete against this?

| Less – EXPENSES | | Source: http://www.berkshirehathaway.com/2013ar/2013ar.pdf | |
|---|---|---:|---:|
| Accounting & Legal | $ | 548.29 | .10% |
| Advertising | | 5,750.19 | 1.00 |
| Provision for Bad Debts | | 3,777.63 | .66 |
| Bank Charges | | 40.43 | .01 |
| Car & Truck Expense | | 2,000.54 | .35 |
| Commissions | | 434.74 | .08 |
| Depreciation | | 3,770.36 | .66 |
| Donations | | 1,067.50 | .19 |
| Drayage | | 57.17 | .01 |
| Dues & Subscriptions | | 49.00 | .01 |
| Fuel | | 1,175.10 | .20 |
| General Expense | | 2,836.75 | .49 |
| Insurance | | 1,543.49 | .27 |
| Interest | | 630.52 | .11 |
| Light, Power, Water | | 1,384.09 | .24 |
| Maintenance & Repair | | 222.25 | .04 |
| Postage | | 256.83 | .04 |
| Rent | | 9,294.00 | 1.62 |
| Salaries | | 40,288.00 | 7.00 |
| Sign Rental | | 600.00 | .10 |
| Stationery & Supplies | | 659.57 | .11 |
| Taxes | | 1,062.60 | .18 |
| Payroll Taxes | | 1,042.78 | .18 |
| Telephone & Telegraph | | 1,141.25 | .20 |
| Travel | | 1,887.60 | .32 |
| Total Expenses | | $ 81,520.68 | 14.17% |

What Mrs. Blumkin figured out in the 1940s is being used effectively by Jeff Bezos, CEO of Amazon, to take down his competitors and at the same time generate high returns on invested capital. Now you know why Bezos tells — **"Your margin is my opportunity."**

## Supply and Demand - Precision Castparts

Precision Castparts (PCP) is a leading manufacturer of high quality castings, forgings, and fasteners. Its products are used in the aerospace, industrial gas turbine, and defense industries. Take a look at the ROIC for PCP, which is given below. What do you see?

| (in millions) | Precision Castparts | | |
| --- | --- | --- | --- |
| | **2011** | **2013** | **2015** |
| | | | |
| Revenue | $6,220.00 | $8,378.00 | $10,005.00 |
| Gross profit (A) | $1,893.00 | $2,698.00 | $3,253.00 |
| Pre-tax operating income (B) | $1,494.00 | $2,130.00 | $2,612.00 |
| Invested capital | $7,850.00 | $14,642.00 | $16,783.00 |
| | | | |
| Gross Margin | 30.43% | 32.20% | 32.51% |
| Conversion ratio [ (B / A) * 100 ] | 78.92% | 78.95% | 80.30% |
| ROIC (pre tax) | 19.03% | 14.55% | 15.56% |
| Efficiency | 0.79 | 0.57 | 0.60 |
| Profitability | 24.02% | 25.42% | 26.11% |

Let's focus on the profitability component of ROIC. PCP enjoys high gross profit margins. Who are its customers and why are they paying up for PCPs products? Jet engine manufacturers like Boeing and Rolls-Royce use parts supplied by PCP to construct their engines. These companies don't want their engine to malfunction while an airplane is in flight.  Also PCP products last five times longer than competitor's products. Criticality and quality of PCP products matter more to the customer than price. So they're willing to pay up for its products.

PCP has been selling its products to some of its customers like General Electric (GE) for more than 30 years. PCP engineers work closely with GE when they design new products like steam turbines that are used in power plants. GE can switch to another supplier who will be willing to supply parts for less. The benefit for GE is that it can save on costs and increase its profit margins. But what about the costs?

The new supplier has to spend a lot of time to know about GE's products as deeply as PCP. But what if the new supplier screw up? Visualize a steam turbine, weighing more than 200 tons and spinning at 3,000 revolutions per minute, blow up. GE can't let that happen. So it "happily" pays up for PCP's products.

PCP will be able to protect its high returns on capital because of **demand side advantages.** This is the second source of the moat. Demand side advantages create customer captivity and it arises due to three reasons **(1)** habit forming products [Gillette] **(2)** switching costs [Oracle and PCP] **(3)** search costs [Coke].

PCP has been running its operations for more than 60 years. Supplying parts to jet engines and steam turbines involves lots of complicated processes. Knowledge is cumulative. And what PCP learnt over 60 years can be used to perfect its operations. This will result in producing better quality products at lower costs. The chart given below tells you this story. A new entrant would find it hard to manufacture high quality products at the same cost as PCP.

## PCP Margins
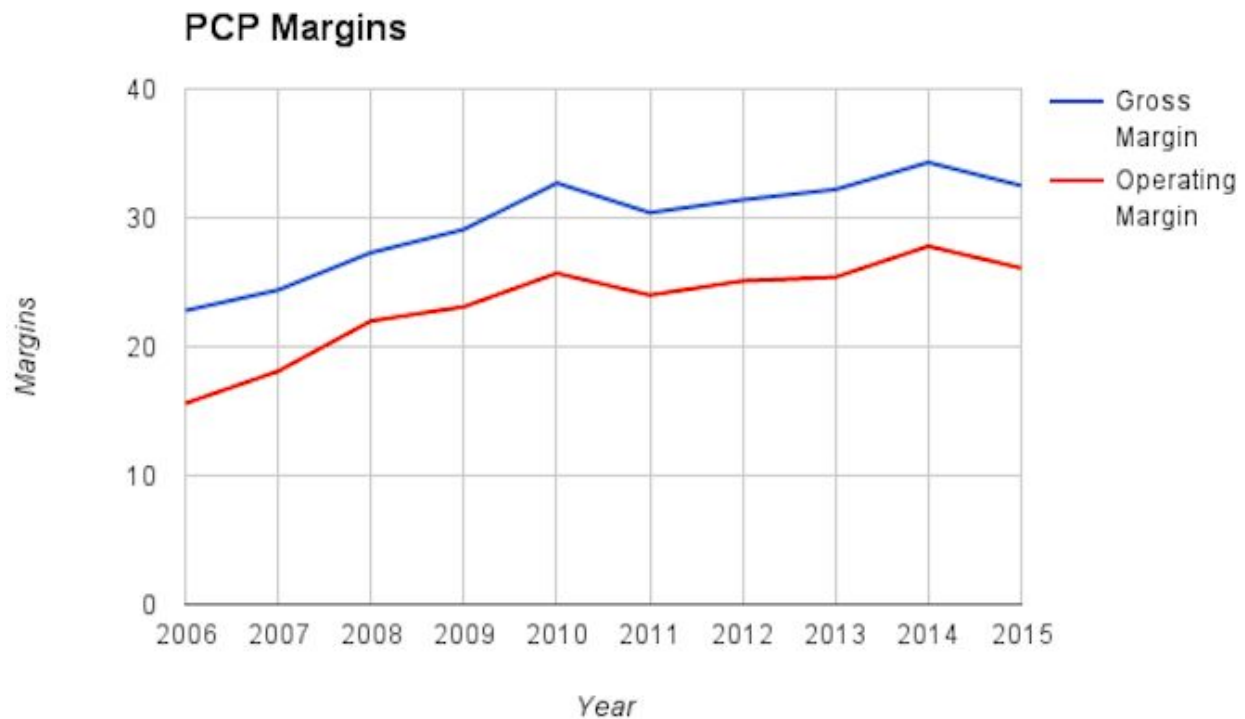


PCP runs a very tight ship by having a conversion ratio of 80 percent. This means that the company spends only 20 percent of gross profits on operational expenses. PCP will be able to protect its high returns on capital because of **supply side advantages.** This is the third source of the moat.

Supply side advantages enables companies to deliver its products or services cheaper than its competitors. It arises due to the following reasons **(1)** privileged access to crucial inputs, like unique geology [Compass Minerals] or land locked at a cheap price [Ultra Petroleum] **(2)** due to proprietary technology that is protected by patents [3M] or by know-how [PCP].

Buffett acquired PCP on August 2015 by paying $37 billion. He paid a 21 percent premium above the market price. Why would he do that? I would highly encourage you to watch the video given below. In it, he talks about Demand-and-Supply side moats of PCP.

## Three Sources Of Moats

In the table given below I have summarized three sources of moat that we discussed so far. I learnt about this by reading the fantastic book Competition Demystified. You should also read the book Understanding Michael Porter and The Little Book That Builds Wealth which talks about moats along the same lines. **If you want to be an active investor then all three books are a must read.**

| Moat Type | Definition | Notes |
|---|---|---|
| Economies of scale | If costs per unit decline as volume increases, because fixed costs make up a large share of total costs, then even with the same basic technology, an incumbent firm operating at large scale will enjoy lower costs than its competitors. | You can find scale advantages in Manufacturing [Electronic Arts], Distribution [UPS], and Niche Markets [Blackboard and NFM]. |
| Demand | Some companies have access to market demand that their competitors cannot match. This access is not simply a matter of product | Demand side advantages create customer captivity and it arises due to three reasons **(1)** habit forming products |

| | | |
|---|---|---|
| | differentiation or branding, since competitors may be equally able to differentiate or brand their products. These demand advantages arise because of customer captivity that is based on habit, on the costs of switching, or on the difficulties and expenses of searching for a substitute provider. | [Gillette] **(2)** high switching costs [Oracle and PCP] **(3)** reduce search costs which branded products like [Coke] does. Interaction among customers can produce an emergent property called as network effects [Visa and Linkedin] which is another moat that belongs here. |
| Supply | These are strictly cost advantages that allow a company to produce and deliver its products or services more cheaply than its competitors. | It arises due to the following reasons **(1)** privileged access to crucial inputs, like unique geology [Compass Minerals] or land locked at a cheap price [Ultra Petroleum] **(2)** due to proprietary technology that is protected by patents [3M] or by know-how [PCP]. Having better processes like selling directly to customers [Dell] or providing egalitarian service [Southwest] creates supply side advantages. But the moat formed is weak and not enduring. |

## Alphabet's Moat

Google was incorporated in the year 1998 by Larry Page and Sergey Brin. The founders operated out of a garage at Menlo Park, California. They wrote web crawlers which indexed the contents of the web and allowed the users to search the internet for free. Just over three months of incorporation, PC Magazine chose Google as the search engine of choice.

But commercial search engines like Lycos and Alta-Vista existed since 1994. The predecessors had four years of head start compared to Google. Why did PC Magazine chose Google and not the incumbents? Google's search algorithm, called as PageRank, was much superior compared to the incumbents. It was able to find needles in haystacks by consistently delivering the most relevant results as the top hits to a search query.

Google did that by giving more weight to websites that are referred (hyperlinked) by other authority websites. This is same as everyone wanting to do a deal with the banker Byron Trott of Goldman Sachs. Why is that? This is what Warren Buffett wrote about him - "Byron is the rare investment banker who puts himself in his client's shoes. Charlie and I trust him completely."

Authority Bias is a concept from psychology, which under the hoods powers Google's algorithm. See how ideas interplay across disciplines. In late 90s Yahoo, AltaVista, and Ask Jeeves were the search engine leaders. Did they not notice the superiority of PageRank algorithm?

Of course they did. Then why did they not copy the algorithm and incorporate it in their own search engine? At that time internet portal was making tons of money for these incumbents and they were spending their time building it. Search was secondary to them and they let Google specialize in it.

> To grow its search platform in the late 90s, **Google focused on one thing: being great at search, which we measured along five axes** — speed (fast is always better than slow), accuracy (how relevant are the results to the user's query?), ease of use (can everyone's grandparents use Google?), comprehensiveness (are we searching the entire Internet?), and freshness (how fresh are the results?). The company was so intent on getting users the right answers, that Google search results often included links to Yahoo, AltaVista, and Ask Jeeves at the bottom of the page so users could easily try those sites if they didn't like Google's results. - *How Google Works*

By focusing on only one thing Google made its search engine 10X better than its competitors. What happens when you have a product which is 10X better? Customers came in droves and started using its search engine. Google gained market share and it eventually monopolized search.

> For example , U.S. airline companies serve millions of passengers and create hundreds of billions of dollars of value each year. But in 2012, when the average airfare each way was $178, the airlines made only 37 cents per passenger trip. Compare them to Google, which creates less value but captures far more. Google brought in $ 50 billion in 2012 (versus $ 160 billion for the airlines), but it kept 21% of those revenues as profits— more than 100 times the airline industry's profit margin that year. Google makes so much money that it's now worth three times more than every U.S. airline combined. The airlines compete with each other, but Google stands alone… Think about how Google talks about its business. It certainly doesn't claim to be a monopoly. But is it one? Well, it depends: a monopoly in what? **Let's say that Google is primarily a search engine. As of May 2014, it owns about 68% of the search market. (Its closest competitors, Microsoft and Yahoo!, have about 19% and 10%, respectively.)** If that doesn't seem dominant enough , consider the fact that the word "google" is now an official entry in the Oxford English Dictionary—as a verb. Don't hold your breath waiting for that to happen to Bing. — *Zero To One*

**Of the three moats [Economies of scale, Demand, Supply] which moat does Google fall into. If you answered Supply, then you're correct.** Google started with a supply side advantage and extended it to the demand side. Take a look at the graph which clearly shows the domination of its search engine over others.
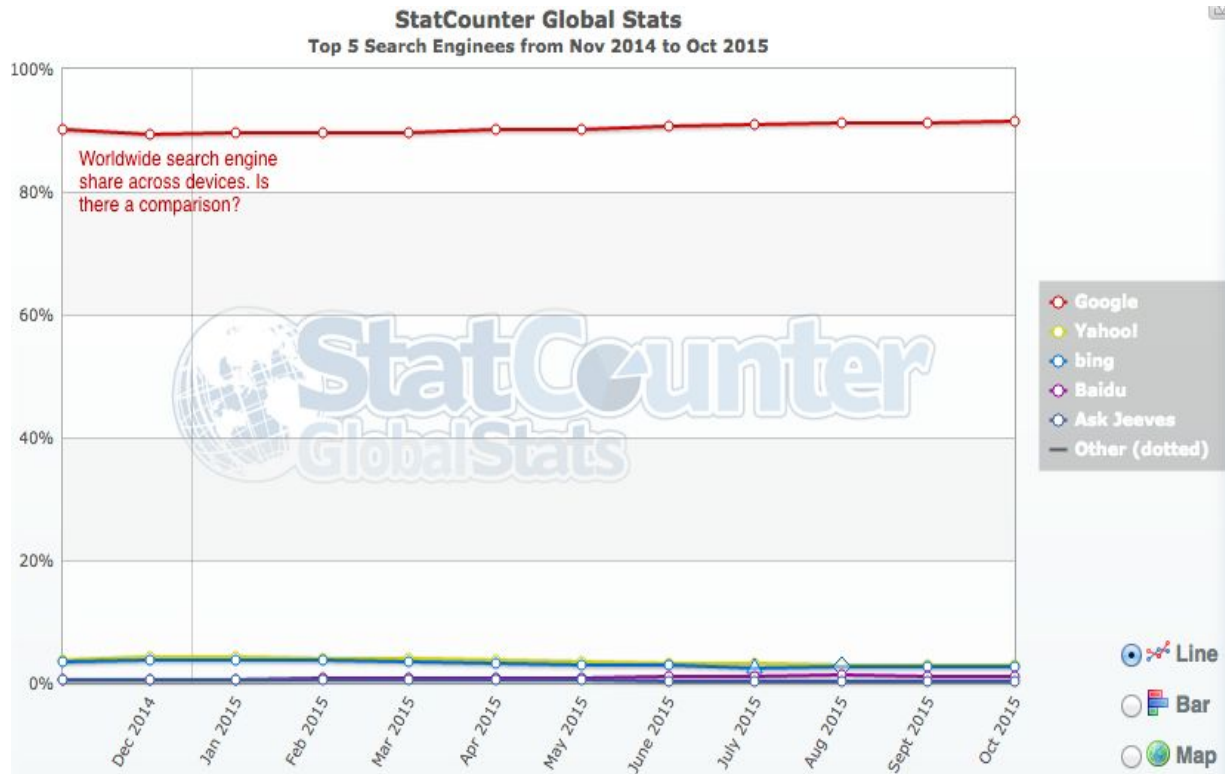


I don't know about the accuracy of the above chart. To be conservative let us assume that Google has a 70 percent market share. And the only way to maintain such a high market share is to have customer captivity. There are a couple of reasons for that **(1)** Superior product which we know is a supply side advantage **(2)** Habit formation which is a demand side advantage. We discussed about the first point in detail. Let me explain the habit formation part. For that we need to understand the science of habit formation.

Picture the human brain as an onion composed of layer upon layer of cells. Most of our complex thinking happens in the outermost layers of the brain. Without this you will not be able to comprehend this lecture notes. On the evolutionary timescale, the outermost layer got added very recently. As you go deep inside the brain towards the center of the skull, you will find a golf ball sized lump of tissue. **This is called as basal ganglia where our habits are stored.**

Since basal ganglia is a primitive structure, you can also find this inside the rat's brain. In order to study the functions of the basal ganglia, researchers from MIT conducted experiments with the rats. They placed probes inside the rat's skull and put them in a T-shaped maze. While the rat wandered inside the maze to get the chocolate, the researchers monitored its brain activity.
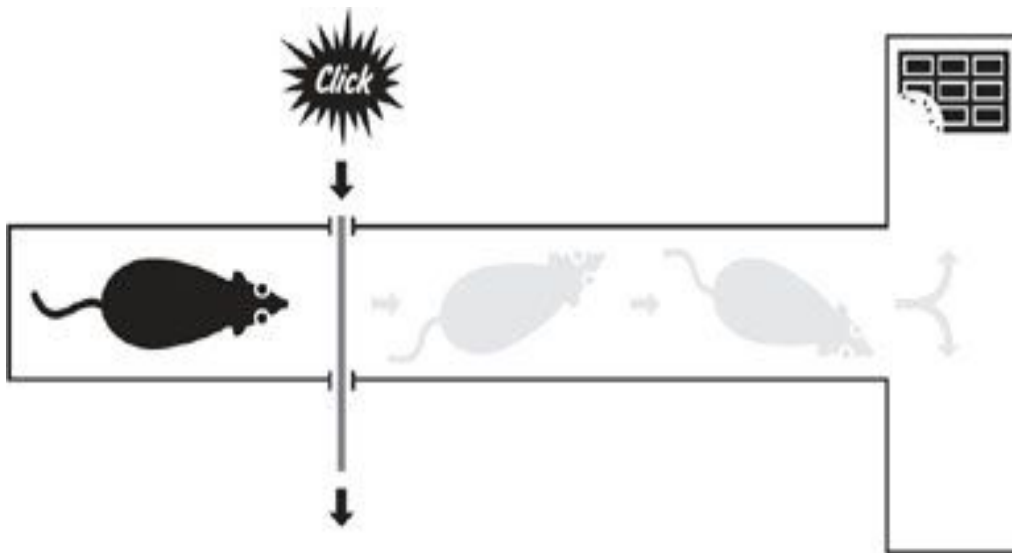
*The maze was structured so that each rat was positioned behind a partition that opened when a loud click sounded. Initially, when a rat heard the click and saw the partition disappear, it would usually wander up and down the center aisle, sniffing in corners and scratching at walls. It appeared to smell the chocolate, but couldn't figure out how to find it. When it reached the top of the T, it often turned to the right, away from the chocolate, and then wandered left, sometimes pausing for no obvious reason. Eventually, most animals discovered the reward. But there was no discernible pattern in their meanderings. It seemed as if each rat was taking a leisurely, unthinking stroll. The probes in the rats' heads, however, told a different story.* ***While each animal wandered through the maze, its brain — and in particular, its basal ganglia — worked furiously. Each time a rat sniffed the air or scratched a wall, its brain exploded with activity, as if analyzing each new scent, sight, and sound. The rat was processing information the entire time it meandered.*** *—* [*The Power of Habit*](#)

The scientists repeated their experiments several times and monitored the brain activity of the rats. For the first few rounds each rat had a lot of activity in its brain. This is reflected clearly in the image on the left side. Now focus only on the image on the right hand side. Why did the rat's brain spike upon hearing the click sound?

As soon as it heard the click sound its brain recognized that it's time to get the chocolate. This is why there is an initial spike. At this point its basal ganglia takes over the control and retrieves the information necessary to navigate the maze and get the chocolate. Any habits executed by the basal ganglia are less taxing on the brain and this is the reason why its brain activity is low. When the rat gets the chocolate it becomes happy which is reflected by another spike at the very end.

First few rounds

High brain activity

Click  First Section  Second Section  Chocolate

After several rounds

Low brain activity

Click  First Section  Second Section  Chocolate
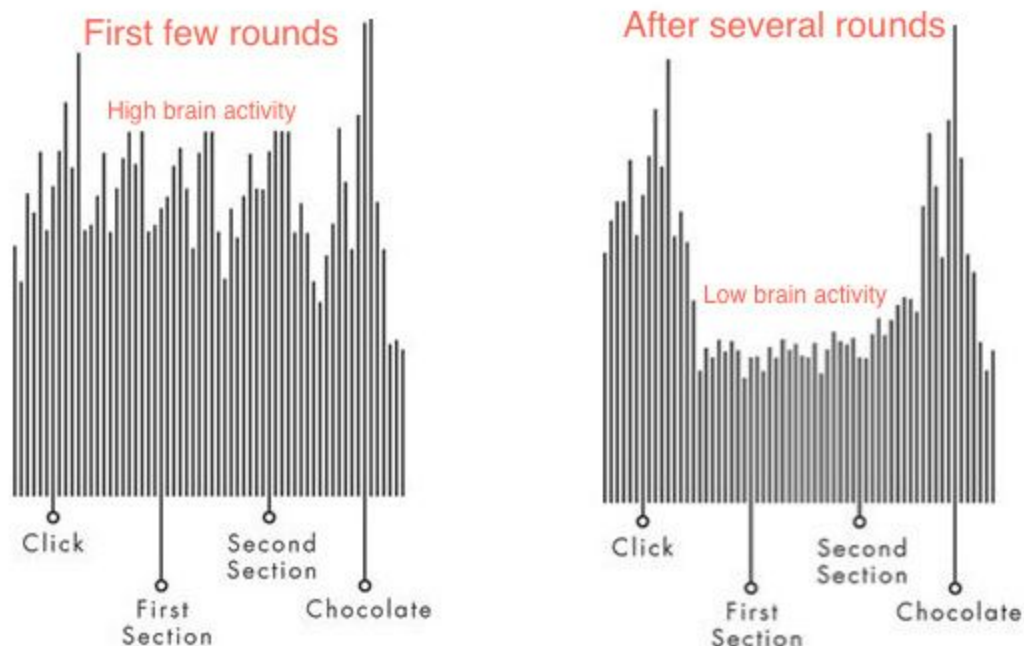
By navigating the maze over and over the rats formed a habit loop. There are three steps involved in the habit loop. You need a cue. For rats the click sound acted as a cue. This cue in turn makes the basal ganglia to execute the stored routine subconsciously. The routine for rats is to navigate the maze and get the chocolate. The final step is the reward which for rats is to eat the chocolate. **This cue-routine-reward is the habit loop.**



Routine

Cue  Click

Reward
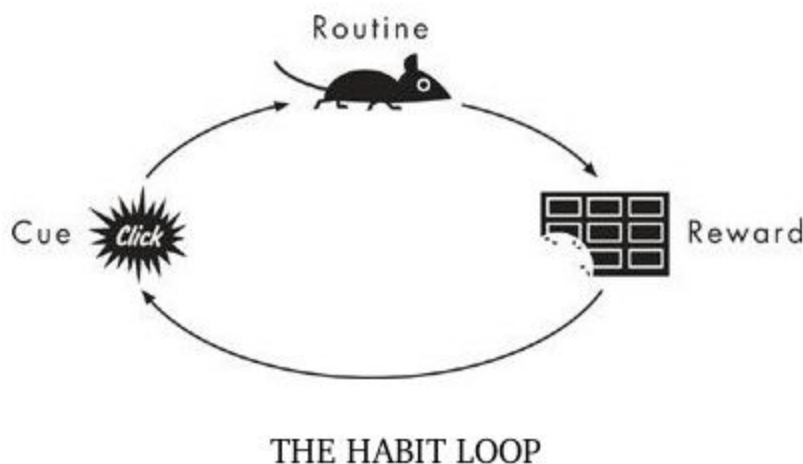
THE HABIT LOOP

This habit loop happens to be the same for humans also. Imagine that you (like a rat) are a software engineer sitting in the office (like a maze) trying to solve a complex problem. You don't know how to arrive at the solution (like reward). Using Google search you navigate from one website to another. After 30 minutes of searching you find out the solution. All these steps are stored in your basal ganglia without your awareness. What happens when you encounter

another problem? Without thinking you execute the instructions stored in basal ganglia and do a Google search. Like a rat inside the T-maze we keep using Google search over and over. I have been doing this for almost 15 years. **Habit formation along with superior search engine creates customer captivity which is a demand side advantage.**

In order to strengthen its demand side further Google came up with several other products that are 10X better than its competitors. What is the result? Products like Search, Android, Maps, Chrome, Play, and YouTube each have over a billion users. On seeing this advertisers came in droves to spend money on its platform.

Alphabet spends a lot of money on several moonshot projects, including self driving cars and flying balloons through the stratosphere to get internet access to everyone. These projects cost a lot of money and they don't bring in any revenue today. How does it fund these projects?

Luckily for Google its advertising business generates boatloads of free cash flow. It can spread the massive development costs of its moonshot projects over a large and growing sales base. **In other words, it has economies of scale [manufacturing].** From all this we can conclude that Alphabet has all three moats [Supply, Demand, Economies of scale]. And this enables the company to earn high returns on invested capital.

## Invert, always Invert

At this point our job is only half done. We answered the first part by finding out the moats that are allowing Alphabet to earn excess returns above the cost of capital. But money is made in the stock markets by knowing where the puck is going to be. This means we need to find out if Alphabet can retain its moat for several years into the future. How do we do that? Let us ask the man with the best 30-second mind who goes from A-Z in one move. Charlie Munger answers this question succinctly by using inversion which is a powerful mental model.

> *"Frequently, you'll look at a business having fabulous results. And the question is, 'How long can this continue?' Well, there's only one way I know to answer that. **And that's to think about why the results are occurring now – and then to figure out what could cause those results to stop occurring."** - Charlie Munger*

In the evolutionary world, genes work by controlling protein synthesis. This is a powerful way of manipulating the living things. But it's very slow. To put a human in place, it took billions of years. But changes in the technology world is not evolutionary but revolutionary. Things happen at a very fast rate.

Take a look at the price chart of Microsoft, which is given below. What do you see? At the peak of 1999, Microsoft's stock price almost touched $60. After 16 long years its stock price is hovering around $53. Why did its stock price languish for such a long period? Back in the late

90s Microsoft's moat looked impregnable. Investors were willing to pay a higher multiple for its earnings.



But things are very different today. Take a look at the chart which is given below. In the year 1999, who could have predicted that personal computer shipments would slow down and smartphones will dominate the planet? The honest answer is nobody. The moat that its Windows operating system and Office applications enjoy in the personal computer world is no longer relevant in the mobile world. Ten years back, I would have been writing this lecture notes using Microsoft Word. But today I am using Google Docs and it is free. Internet and Cloud computing has leveled the playing field for other companies against Microsoft.

What happened to Microsoft can happen to Alphabet. Let's apply Munger's inversion and see what can bring down Alphabet. If someone can dislodge Google's search monopoly then its moat can be weakened. Can Bing or Yahoo do it? If that needs to happen then Bing has to first break the supply side advantage of Google. For that to happen Bing search should be 80 to 90 percent as good as Google. That feat is very hard to achieve. But let's assume that Bing achieves it.

The next question is why only 80 to 90 percent and not 100 percent. First, it's almost impossible to get to 100 percent as Google's search is improving everyday with more and more people using it. Knowledge is cumulative and this applies to search engines also. All Bing can hope for is to stay as close as possible to Google. Second, you don't need 100 percent perfection to compete with Google. Why is that? **The answer to that question is platforms and partnerships. It's the only way to break the demand side advantage [habit formation] of Google.**

Last November Mozilla ended its partnership with Google and replaced Yahoo as the default search engine for Firefox, the popular Internet web browser. This resulted in Yahoo's search market share to go up from 8.6 to 10.4 percent. How can a simple change produce 1.8 percent increase in market share? In order to understand that we need to jump into the field of psychology and learn about status-quo-bias.

> *In a real-life experiment on auto insurance rates car drivers in New Jersey and Pennsylvania were given the choice of a limited right to sue for pain and suffering in exchange for lower insurance rates. But the default option was different for each state. Car owners in New Jersey were automatically given the limited right unless they made an active decision and said differently. In Pennsylvania, the default option was the full right to sue. What happened? **Citizens of both states preferred the default option**. 79% of New Jersey drivers preferred the limited right to sue, whereas 70% of Pennsylvania drivers preferred the full right to sue. The difference in amount spent on insurance in the two state was about $200 million. - Seeking Wisdom: From Darwin to Munger*

Now you know why humans are not rational, but a rationalizing one. On the mobile side, Apple's iOS commands 25 percent share. Bing is the default search engine for Siri [iPhone's voice assistant]. Also Apple partners with Yahoo to power Siri's sports query results as well as its weather and stock market apps.

Google has been the Safari's default search engine since the iPhone went on sale in 2007. This deal is supposed to expire earlier this year. And I don't know if Apple changed the default option. But with the launch of iOS 8 it definitely gives users the choice to select the search engine.

With the emergence of powerful platforms like iOS, Microsoft and Yahoo have one more opportunity to dislodge Google's monopoly in search advertising. Only time will if they can do it. How does Google management think about this?

> *The last question is, you've all heard the announcements about Mozilla. And so when we don't comment on the details of any of our partnerships that we have. Having said that, we continue to do two things that really matter.* ***One is our users continue to actually go in, if they love Google, they will continue to find Google, whichever platform, whichever browser, and that's really what we've focused on doing.*** *-*
> *Patrick Pichette; Google's Ex-CFO*

Take a look at the financial data for Facebook (FB) which is given below. In four years its sales compounded at 59 percent and operating income compounded at 49 percent. Also the company generates mouth watering operating margins of around 40 percent. How did that happen?

| (in millions) | Facebook | | | | |
| --- | --- | --- | --- | --- | --- |
| | 2010 | 2011 | 2012 | 2013 | 2014 |
| Revenue | $1,974 | $3,711 | $5,089 | $7,872 | $12,466 |
| Operating income | $1,032 | $1,756 | $538 | $2,804 | $4,994 |
| Pre-tax operating margin | 52.28% | 47.32% | 10.57% | 35.62% | 40.06% |

Industries that are prone to rapid and continuous changes weakens the moat for some companies and strengthens the moat for others. With the surge in usage of smartphones, social networking platforms like FB attracted lots of users. Advertisers (like ants) came running to its platform on seeing so many users (like sugar) using its platform.

More than 95 percent of FB's revenue come from advertising. Had social networking platforms like FB not existed then most of the ad dollars would have come to Google. Such is life in the big city. For now, Google should be happy as it has dominant market share in mobile ad revenue.

**Net US Mobile Ad Revenue Share, by Company, 2013-2016**
% of total and billions

|                  | 2013   | 2014   | 2015   | 2016   |
|------------------|--------|--------|--------|--------|
| Google           | 37.7%  | 37.2%  | 35.2%  | 33.2%  |
| Facebook         | 14.4%  | 17.6%  | 16.7%  | 14.6%  |
| Twitter          | 3.0%   | 3.6%   | 3.7%   | 3.8%   |
| Yahoo            | -      | 3.2%   | 3.7%   | 4.2%   |
| Pandora          | 3.5%   | 3.0%   | 2.6%   | 2.2%   |
| YP               | 3.5%   | 2.7%   | 2.2%   | 1.9%   |
| Apple (iAd)      | 2.44%  | 2.6%   | 2.8%   | 2.9%   |
| Yelp             | 0.5%   | 0.7%   | 0.9%   | 1.0%   |
| Amazon           | 0.1%   | 0.5%   | 0.6%   | 0.7%   |
| Millennial Media | 0.7%   | 0.4%   | 0.3%   | 0.3%   |
| LinkedIn         | 0.1%   | 0.3%   | 0.4%   | 0.4%   |
| Other            | 34.1%  | 28.4%  | 31.0%  | 34.9%  |
| **Total (billions)** | **$10.7** | **$19.0** | **$28.5** | **$40.2** |

Note: net ad revenues after companies pay traffic acquisition costs (TAC); includes display (banners and other, rich media and video), search and messaging-based advertising; ad spending on tablets is included; numbers may not add up to 100% due to rounding
Source: company reports; eMarketer, Dec 2014

182498                                    www.eMarketer.com

Because of limited space in mobile, advertisers prefer display ads like videos. In display ads, Facebook has a higher market share compared to Google. This should not be surprising as users engage more in FB and it knows a lot more about its users. Using this knowledge FB can target better ads. Companies like Coke and Nike spend a lot of money on display ads to strengthen their brands. And it's very important for Google to close the gap with Facebook by productively using YouTube, its video platform.

**Net US Mobile Display Ad Revenue Share, by Company, 2013-2016**
% of total and billions

|                  | 2013   | 2014   | 2015   | 2016   |
|------------------|--------|--------|--------|--------|
| Facebook         | 28.9%  | 34.7%  | 32.4%  | 28.3%  |
| Google           | 11.9%  | 11.8%  | 10.0%  | 9.1%   |
| Twitter          | 6.0%   | 7.0%   | 7.2%   | 7.3%   |
| Pandora          | 7.0%   | 5.8%   | 5.0%   | 4.3%   |
| Apple (iAd)      | 4.9%   | 5.0%   | 5.4%   | 5.6%   |
| Yahoo            | -      | 1.9%   | 2.9%   | 3.6%   |
| Millennial Media | 1.5%   | 0.9%   | 0.7%   | 0.5%   |
| Amazon           | 0.2%   | 0.9%   | 1.1%   | 1.3%   |
| LinkedIn         | 0.1%   | 0.5%   | 0.7%   | 0.7%   |
| Yelp             | 0.0%   | 0.1%   | 0.1%   | 0.1%   |
| Other            | 39.5%  | 31.4%  | 34.5%  | 39.2%  |
| **Total (billions)** | **$5.31** | **$9.65** | **$14.67** | **$20.80** |

Note: net ad revenues after companies pay traffic acquisition costs (TAC); includes display (banners and other, rich media and video); ad spending on tablets is included; excludes SMS, MMS and P2P messaging-based advertising; numbers may not add up to 100% due to rounding
Source: company reports; eMarketer, Dec 2014

182508                                    www.eMarketer.com

*YouTube now has more than 1 billion users. Everyday people watch hundreds of millions of hours of video on YouTube, generating billions of views. Watch time is up 50% year over year. We continue to invest in our YouTube Partners and Partner revenue has increased by more than 50% year over year.* **We are seeing great momentum in mobile advertising on YouTube. Mobile revenue on YouTube is up more than 100% year over year.** *-* [*2014-Q4-Earnings-Call*](#)

From all of the above, we can see that Google is challenged by Microsoft and Yahoo on the search ads front. And social networking platforms like Facebook is challenging it on the display ads front. Clearly Google's moat is being challenged. Only time will tell if it would be able to protect it.

Apart from the threat of competition, Google is fighting European Union (EU) on its antitrust charges. For more than five years, the EU has been blaming Google for being anti competitive by artificially favoring its own products [Samsung Galaxy runs on Android] over its competitors [iPhone]. If proven guilty, then Google will have to pay a fine of up to 10 percent of its revenues.

That might not be a big problem for Google. Along with that it would have to reveal how it ranks its search results. This is not good as it will reveal its secret to its competitors. Read about this news [here](#) and [here](#). In the table given below I have summarized all the threats that we discussed so far.

| Source | Threat | Notes |
|---|---|---|
| Platforms [iOS] and Browsers [Firefox] | Capable of breaking the demand side advantage of Google by defaulting Bing and Yahoo search in browsers and speech assistants. | Monitor the search market share of top three players. |
| Social Networks [Facebook] | Users engage a lot more in social networks. All they do is swipe and click. It's easy to show them brand ads. Brands and Ad agencies love these platforms and commit more budget. | Monitor the display ad share of Google. And make sure YouTube's watch time and the revenue is increasing year over year. Also make sure that users are searching more on mobile year over year. Finally monitor the trend of cost-per-click. |
| EU Antitrust charges | Google can be proven guilty for being anti competitive. | Read Wall Street Journal and make sure how the case is proceeding. |

Depending on how the above threats play out over time you need to update your likelihood ratio $[Posterior\ odds\ =\ Prior\ odds\ *\ Likelihood\ ratio]$. If you don't know what a likelihood ratio is then read Sanjay Bakshi's fantastic write up on worldly-wisdom-in-an-equation. Like an experienced poker player your job is to constantly evaluate your posterior odds. What should you do if it goes against Alphabet? You should do what Richard Feynman tells — "**No matter how beautiful your theory, no matter how clever you are or what your name is, if it disagrees with experiment, it's wrong. In this statement is the key to science.**"

## Few Items To Read

1. If you want to be an active investor then you must read Competition Demystified, Understanding Michael Porter and The Little Book That Builds Wealth.
2. Read Michael Mauboussin's fantastic write up on Measuring the Moat.
3. Companies like Berkshire Hathaway and Amazon operate profitably with other people's money which has no cost [Floats]. Read how Sanjay Bakshi identifies companies with moats by looking for floats in their balance sheet. You can find his write up here, here, and here.
4. A dozen things you can learn from Charlie Munger about Moats. Excellent blog post by Tren Griffin can be found here.

# Vantage Point: Alphabet's Management

Take a look at the stock price of Home Depot given below. For six years the stock price didn't go anywhere. Is there a reason why I chose the period [ December 2000 to December 2006 ]? During this period Robert Nardelli was the CEO of the company. The stock price under his tenure was $45 when he joined and $39 when he left. During this period shareholders wealth got eroded by over 13 percent. How much did Nardelli lose?



Surprisingly, he was given $30 million in restricted stock awards, plus $7 million in cash when he joined the company. Furthermore, after pulling in $38 million in 2006, Nardelli was also given an astronomical $210 million in severance when he exited the business. In total he received $285 million for reducing the wealth of shareholders by 13 percent.

In contrast, let us look at Dave Gold, co-founder of 99 Cent Only Stores. Dave made an acquisition for 99 Cents Only Stores by paying $17 million. That acquisition didn't work as expected. What did he do? Instead of writing off this investment, Dave accepted his mistake and acquired the company back from 99 Cents Only Stores with his personal funds. He paid $34 million, which was twice what his company paid for it previously.

> ***Dave Gold, co-founder of 99 Cent Only Stores, was paid $62,000 to $180,000 in total cash compensation (and did not receive any stock options or bonuses) when he was CEO, yet he owned approximately 40 percent of the business.*** *Under his tenure, the stock price increased from $3.81 per share at its initial public offering (IPO) on May 23, 1996, to $15.32 per share when he stepped down as CEO in January 2005—again, a huge increase: more than 400 percent. - The Investment Checklist*

Would you partner with Nardelli or Dave? Of course Dave. As shareholders we need to partner with management whose financial fortunes move in lockstep with ours. In other words, our job is to find the Dave's of the world and partner with them. Evaluating management is more of an art than a skill. How do we go about developing that art?

Luckily Warren Buffett has written about it in detail. His fifteen owner related business principles contains everything you need to know about evaluating the management. You can find his owner's manual here. Take a look at his second principle which is given below. Clearly Dave followed this principle and Nardelli didn't. I will be evaluating Alphabet's management using Buffett's owner related business principles.

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*In line with Berkshire's owner-orientation, most of our directors have a major portion of their net worth invested in the company. We eat our own cooking.*

Charlie's family has the majority of its net worth in Berkshire shares; I have more than 98%. In addition, many of my relatives – my sisters and cousins, for example – keep a huge portion of their net worth in Berkshire stock.

Charlie and I feel totally comfortable with this eggs-in-one-basket situation because Berkshire itself owns a wide variety of truly extraordinary businesses. Indeed, we believe that Berkshire is close to being unique in the quality and diversity of the businesses in which it owns either a controlling interest or a minority interest of significance.

Charlie and I cannot promise you results. But we can guarantee that your financial fortunes will move in lockstep with ours for whatever period of time you elect to be our partner. We have no interest in large salaries or options or other means of gaining an "edge" over you. We want to make money only when our partners do and in exactly the same proportion. Moreover, when I do something dumb, I want you to be able to derive some solace from the fact that my financial suffering is proportional to yours.

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## The Team

Alphabet has 680 million shares outstanding and they are collectively owned by few million shareholders. In order to oversee the day-to-day operations of the company these shareholders elect the members of the board. The board in turn selects the executive officers, including the CEO, to run the business. This process appears to be same as electing the president of the United States.

The only problem is that minority shareholders like you and me don't have any voting power. Larry, Sergey, and Eric together control 60 percent of the votes by owning class B shares. In other words, they decide the board members and the executive officers. The only chance for minority shareholders is to check the actions of the management before partnering with them.

In order to check the actions of the management you need to read the proxy statement along with the 10-K report. A proxy statement is mandated by the SEC to be filed before requesting the shareholders to vote. This statement is filed before the annual meeting. You can download the 2015 proxy statement of Alphabet from here.

The table shown below contains the members of the Alphabet board. The median age of the board members is 59 years. Google was incorporated in the year 1998; almost 18 years ago. The average tenure of the board member is around 13 years. This tells that the board members are sticking with the company for a long time.

| Sno | Name | Age | Director Since | Occupation | Experience/Qualification |
|---|---|---|---|---|---|
| 1 | Larry Page | 42 | 1998 | Chief Executive Officer, Co-Founder, and Director of Google | Leadership, Technology |
| 2 | Sergey Brin | 41 | 1998 | Co-Founder and Director of Google | Leadership, Technology |
| 3 | Eric E. Schmidt | 59 | 2001 | Executive Chairman of the Board of Directors of Google | Leadership, Technology |
| 4 | L. John Doerr | 63 | 1999 | General Partner of Kleiner Perkins Caufield & Byers | Leadership, Technology, Finance, Global, Industry |
| 5 | Diane B. Greene | 59 | 2012 | Former Chief Executive Officer and President of VMware | Leadership, Technology, Finance |
| 6 | John L. Hennessy | 62 | 2004 | President of Stanford University | Leadership, Education, Technology |
| 7 | Ann Mather | 54 | 2005 | Former Chief Financial Officer of Pixar | Leadership, Finance |
| 8 | Alan R. Mulally | 69 | 2014 | Former Chief Executive Officer and President of Ford | Leadership, Finance, Global, Industry |
| 9 | Paul S. Otellini | 64 | 2004 | Former Chief Executive Officer and President of Intel | Leadership, Technology, Global, Industry |
| 10 | K. Ram Shriram | 58 | 1998 | Managing Partner of Sherpalo Ventures | Leadership, Technology, Finance, Global, Industry |
| 11 | Shirley M. Tilghman | 68 | 2005 | Former President of Princeton University | Leadership, Education |

Larry, Sergey, and Eric are non-independent directors. And the remaining 8 are independent directors. An independent director does not have a material or pecuniary relationship with company or related persons, except sitting fees. The average compensation for each independent director in the year 2014 came to around $497,000. There are no family relationships among any of the directors.

8 out of 11 board members have experience in the technology industry, which is very relevant to what Google is doing. For example, John Hennessy is the President of Stanford and has a Doctoral degree in computer science. In the year 2014 Google has appointed former Ford chief executive Alan Mulally to its board of directors. Why did it do that? Google wants its Android software to be the standard platform for everything from messaging to media in cars. And Alan Mulally's auto industry expertise may come in handy for this job.

Consider the addition of Shirley M. Tilghman to Google's board in 2005. Tilghman was the President of Princeton University, and Professor of Molecular Biology. She made her mark

during postdoctoral studies at the National Institutes of Health, where she participated in cloning the first mammalian gene. Why did Google hire a molecular biologist as a board member? This is what Eric Schmidt wrote in 2005 — "Google is a company born out of university research, so we look forward to tapping into her extraordinary talents as an accomplished academic, and as a champion of discovery."

In the last ten years technology has penetrated deeply into the human affairs. Google is partnering with Novartis to develop a glucose-sensing contact lens. Tilghman's expertise may come in handy to orchestrate the marriage of technology-and-biology. Overall the composition of Google's independent directors looks solid. And I don't see any red flags in them. Let's analyze the composition of its non-independent directors — Larry, Sergey, and Eric.



Larry Page and Sergey Brin, co-founded Google in the year 1998. Both of them hold a Master of Science degree in computer science from Stanford University. While doing their graduation, they invented PageRank algorithm. The superiority of this algorithm helped them to monopolize search. Both of them are highly intelligent. But an intelligent person can be dishonest and take money away from other shareholders. So we need to check for actions that prove their integrity. Are there any?

Inspired by Warren Buffett's essays in his annual reports and his "An Owner's Manual" to Berkshire Hathaway shareholders, Larry and Sergey came up with "An Owner's Manual" for Google's Shareholders. I would urge you to read, reread, and reflect on it. It contains all the values that guide Alphabet's action and decisions.

*When it was published in April 2004, the letter generated a lot of curiosity and some criticism. What most people didn't understand, though, was exactly why the company's founders had spent so much time getting the letter exactly right (and why Jonathan dug his heels in every time one of the bankers or lawyers tried to change something). The letter was not primarily about Dutch auctions, voting rights, or showing off a blatant disregard for everything Wall Street.* **The founders didn't care about maximizing the short-term value and marketability of their stock, because they knew that recording the company's unique values for future employees and partners would be far more instrumental to long-term success. As we write this today, the arcane details of that IPO a decade ago are a matter of history, but phrases like "long term focus," "serving end users," "don't be evil," and "making the world a better place" still describe how the company is run.** *-* [How Google Works](#)

Ok the idea of coming up with an owner's manual is great. What if the founders compensated themselves exorbitantly? Larry and Sergey receive $1 as a base salary. And they don't receive any other form of compensation. The table given below proves this point.

| Name and Principal Position | Year | Salary[1] ($) | Bonus[2] ($) | Stock Awards[3] ($) | Option Awards[4] ($) | Non-Equity Incentive Plan Compensation ($) | Non-Qualified Deferred Compensation Earnings[5] ($) | All Other Compensation[6] ($) | Total ($) |
|---|---|---|---|---|---|---|---|---|---|
| Larry Page[7] Chief Executive Officer, Co-Founder | 2014 | 1 | — | — | — | — | — | — | 1 |
| | 2013 | 1 | — | — | — | — | — | — | 1 |
| | 2012 | 1 | — | — | — | — | — | — | 1 |
| Sergey Brin[7] Co-Founder | 2014 | 1 | — | — | — | — | — | — | 1 |
| | 2013 | 1 | — | — | — | — | — | — | 1 |
| | 2012 | 1 | — | — | — | — | — | — | 1 |

A cynical reader would point out that they already own millions of Google shares. And they each are worth $35 billion. Then why do they need more money? I would agree with that view if money like other commodities follow [diminishing-marginal-utility](#). But for some reason money doesn't follow this rule. The more money one has, the more money they want. Larry and Sergey are able to resist chasing more money because they are passionate in running the business. I would classify them as true owner-operators.

*These are the ideal managers to partner with in a business.* **An owner-operator is a manager who has genuine passion for their particular business and is typically the founder of that business.** *These passionate leaders run the business for key stakeholders such as customers, employees, and shareholders alike, instead of emphasizing one constituency over the other. They typically are paid modestly and have high ownership interests in the business. -* [The Investment Checklist](#)

The table given below shows Larry and Sergey combined share-ownership and voting-power. What do you see? Together they own about 13 percent of shares, but control 54 percent of the voting power through supervoting stock [class B]. Over the years the total share ownership has come down. But their voting power almost stayed intact.

| Larry-and-Sergey | 2015 | 2012 | 2009 |
|---|---|---|---|
| Share ownership | 13.08% | 16.09% | 18.32% |
| Voting power | 54.30% | 56.40% | 58.30% |

Having multiple classes of stock with different voting power is common in Silicon Valley. This is the only way for the founders to execute on their long-term vision without being bothered by the activist investors and their short-termism. I am fine with the concept of having supervoting stock. But what bothered me was the way in which Larry and Sergey handled the 2-for-1 stock split.

Under their original proposal each class A [one-vote-per-share] will get one additional class C share. Most of the class B shares are owned by the insiders [Larry, Sergey, and Eric]. Each class B [10-vote-per-share] will get one additional class C share. And class C doesn't have any voting power. If the original proposal were implemented as is, then it would have made life easy for the trios to cash in a large part of their holdings without giving up their voting power. **Their strategy would have been sell-C-and-hold-B.**

The existing class A shareholders got angry [rightly so] with the proposal and filed a class action lawsuit. The trios settled the lawsuit by agreeing to convert one class B share into class A for every share of class C they sell. According to me the trios should have done the right thing before not after the lawsuit.

Eric Schmidt has been on Google's board since 2001. He was a CTO of Sun Microsystems. He was also CEO of Novell and has a Ph.D. in computer science. His expertise is highly valuable to the company. As Executive Chairman, Eric advises both Larry and Sergey. He is also involved in key matters, such as major transactions, broader business and customer relationships, and government relations. Unlike the founders, Eric is compensated very well at Google. Most of his compensation is in the form of stock grants, which vests over a four year period. I am fine with his compensation as there are only few Eric's in the world.

| Year | Eric's Compensation (in millions) |
|---|---|
| 2010 | $0.31 |
| 2011 | $100.98 |
| 2012 | $7.63 |
| 2013 | $19.32 |
| 2014 | $108.69 |

Few months back, Larry Page announced his plans to create a new holding company called Alphabet. Google will become a wholly-owned subsidiary of Alphabet. I like Larry's plans as he is emulating the proven model of Berkshire Hathaway. Also, he made India-born and bred Sundar Pichai as the new CEO of Google. What did Sundar do to get promoted through the ranks from an entry level PM to CEO of Google?

There are several articles on the internet which talks about the meteoric rise of Sundar Pichai. I am not going to repeat them here. Leaving serendipity aside, there are few key things that he did which helped him to become a CEO. Google search has demand side advantage due to its habit forming nature. Sundar helped to deepen this habit formation by coming with a simple insight to develop a toolbar and integrate it with all the browsers. At that time Google Chrome didn't exist.

> *Not long after we launched it, one of our smart creatives, Sundar Pichai, realized that all those people who were downloading and installing Google Earth might be interested in Google Toolbar as well. Toolbar was a simple utility that integrated with the browser. It had a lot of interesting features for users, one of which was a little Google search box that constantly resided in the browser's interface. People with Toolbar could initiate a Google search without going to Google.com, so they tended to conduct more searches, click on more ads, and generate more revenue. Sundar's idea met some resistance, but, with a push from Urs Hölzle, it was quickly implemented. This simple insight — that people downloading Earth might be interested in getting Toolbar as well — increased Toolbar's user base significantly and generated lots of revenue. - How Google Works*

The success of his toolbar product made Sundar ask, "What if Google had its own browser?" Chrome browser went into alpha over the objections of then-CEO Eric Schmidt, who thought it a pointless distraction. Chrome was 10X better than the other browsers and it was a super hit.



StatCounter Global Stats
Top 5 Desktop, Tablet & Console Browsers from July 2008 to Oct 2015
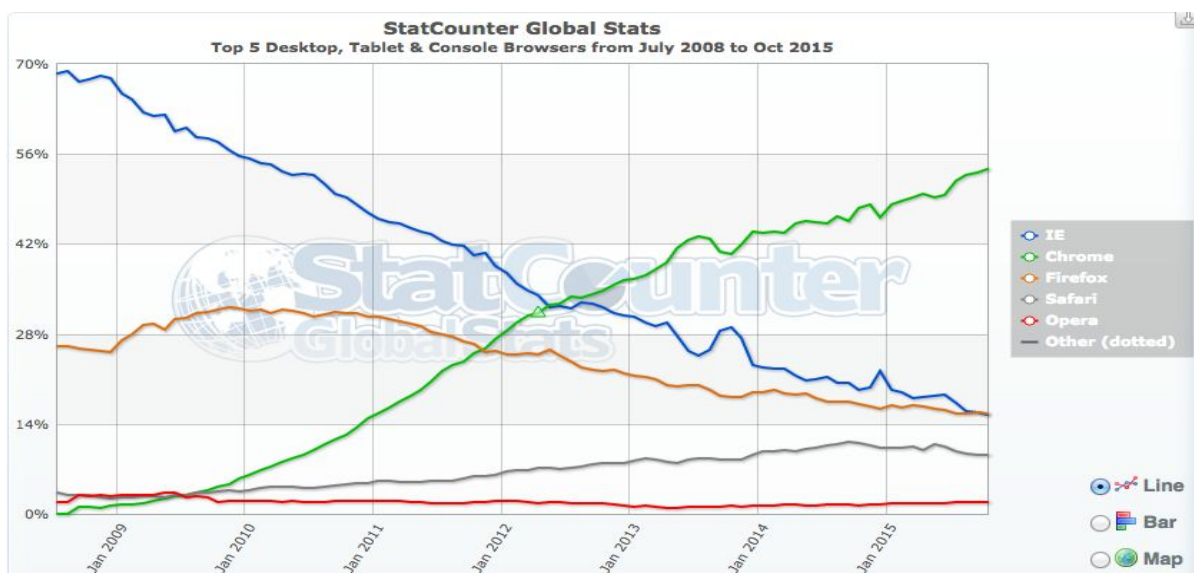
With the success of Chrome browser he spearheaded the development of products like Chrome OS and the Chromebook — laptop that stores everything in the cloud. Chromebook's low cost [some models cost less than $250] and ease of use enabled it to seize iPad's place as the future of tech education. Today, Chromebooks make up around 30 percent of all PC sales.
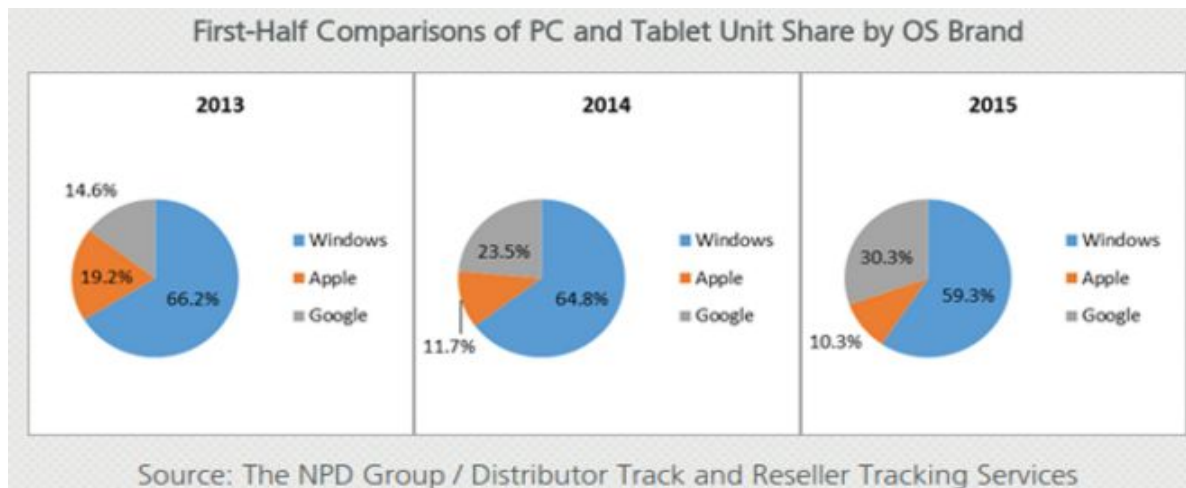


What happens when someone comes up with so many blockbuster products? Along with his existing responsibilities, Sundar was asked to lead other products including Maps and Gmail. In 2013 Andy Rubin, the creator of Android, decided to leave Google for reasons that I am not sure of. Sundar was asked to lead the Android initiative. This role required to keep up with Android's various partners, including handset makers and wireless-network operators. Sundar, being more open and collaborative, fit into this role very well. And his actions sealed the CEO spot for him.
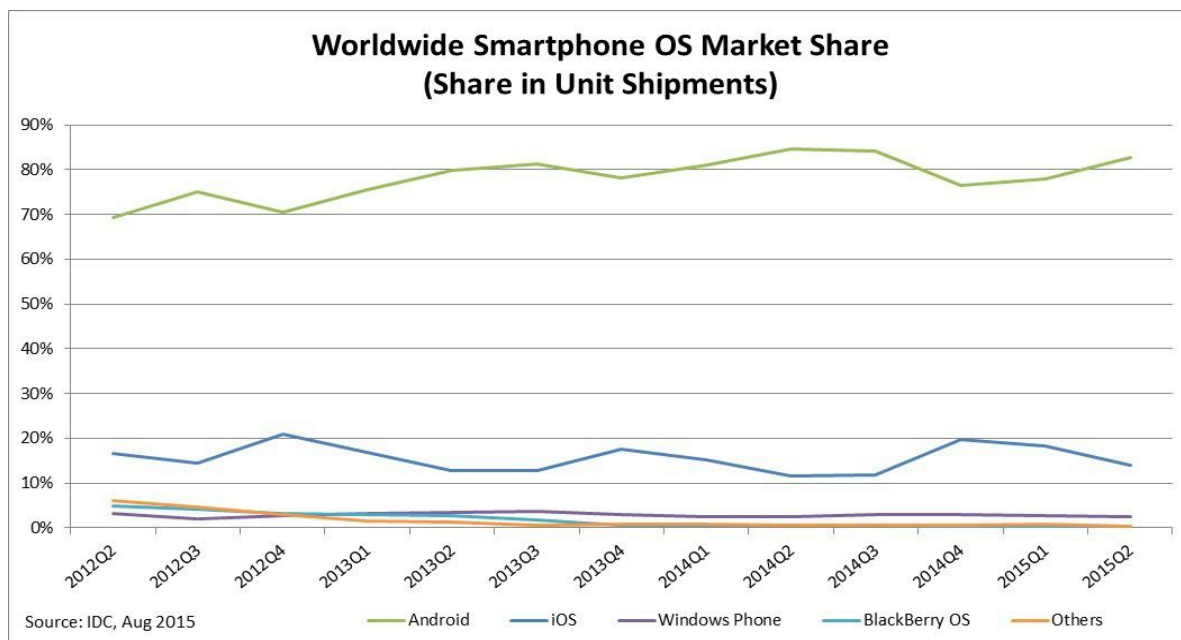
## Long Term Focus

Many companies are under constant pressure to meet the sales and profit estimates of analysts every quarter. Therefore, they often accept smaller, predictable earnings rather than larger and less predictable returns. It is very easy for a company to cut down its spending on R&D and boost its short term earnings. But that action will be detrimental over the long term. All else being equal we should invest in companies that focuses on the long-term instead of short-term. Take a look at Buffett's owner's manual principle six, which talks about this.

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*Accounting consequences do not influence our operating or capital-allocation decisions. When acquisition costs are similar, we much prefer to purchase $2 of earnings that is not reportable by us under standard accounting principles than to purchase $1 of earnings that is reportable. This is precisely the choice that often faces us since entire businesses (whose earnings will be fully reportable) frequently sell for double the pro-rata price of small portions (whose earnings will be largely unreportable). In aggregate and over time, we expect the unreported earnings to be fully reflected in our intrinsic business value through capital gains.*

We have found over time that the undistributed earnings of our investees, in aggregate, have been fully as beneficial to Berkshire as if they had been distributed to us (and therefore had been included in the earnings we officially report). This pleasant result has occurred because most of our investees are engaged in truly outstanding businesses that can often employ incremental capital to great advantage, either by putting it to work in their businesses or by repurchasing their shares. Obviously, every capital decision that our investees have made has not benefitted us as shareholders, but overall we have garnered far more than a dollar of value for each dollar they have retained. We consequently regard look-through earnings as realistically portraying our yearly gain from operations.

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In Google's owner's manual the founders talk about their long-term focus in great detail. This is what the founders wrote.

> *As a private company, we have concentrated on the long term, and this has served us well. As a public company, we will do the same. In our opinion, outside pressures too often tempt companies to sacrifice long term opportunities to meet quarterly market expectations. Sometimes this pressure has caused companies to manipulate financial results in order to "make their quarter." In Warren Buffett's words, "We won't 'smooth' quarterly or annual results: If earnings figures are lumpy when they reach headquarters, they will be lumpy when they reach you." - Google's Owner's Manual*

The next question is did the founders walk the talk? In order to find that out, let's check the trend for R&D expenses and Capital expenditures. The chart given below clearly shows that Google is focusing on the long-term.

**Google's R&D And Capex**
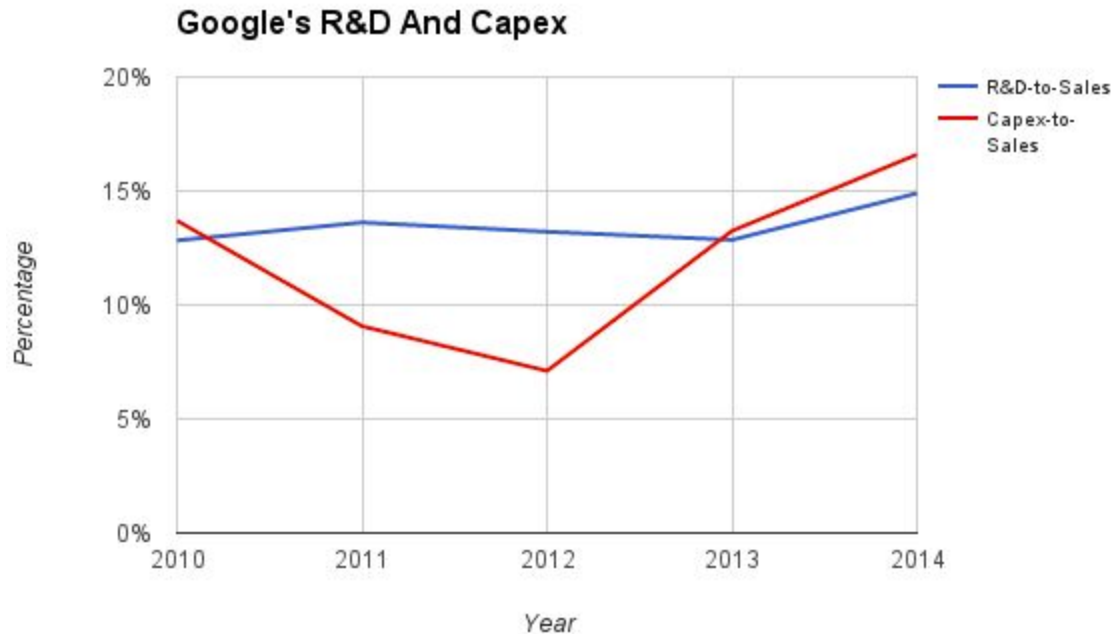


Apart from the above chart are there any other evidences for long-term focus? Yes, there is. Google has a rule called **70-20-10**. Seventy percent of the effort goes to core products like search and advertising. Twenty percent of the effort goes to projects that are promising - Gmail in the early days. The remaining ten percent for everything else.

What is so special about this? Android came out of this 10 percent effort and this helped Google to survive the massive shift to mobile. As of today Android controls 75+ percent of the mobile market. Imagine the fate of Google if it hadn't developed the Android operating system.

> *We are still keeping to our long-standing plan of devoting 70% of our resources to search and advertising. We debate where we should classify our Apps (Gmail, Docs, etc.) products, but they currently fall into the 20% of resources we devote to related businesses. We use the remaining 10% of our resources on areas that are farther afield but have huge potential, such as Android. We strongly believe that allocating modest resources to new areas is crucial to continuing to innovate. – 2007 Founder's Letter*

Ok, Android turned out to be a successful bet. But what about money poured into several other projects like Orkut that failed miserably? Is there a way to know beforehand if a project will be a blockbuster hit? The honest answer is no. Technology companies including Google and Amazon are playing a game of **Heads-I-win-Tails-I-do-not-lose-much**. Before understanding the meaning of this term, let's spend some time understanding two big ideas — **Serendipity and Asymmetry.**

On one occasion, Larry and Sergey tried selling Google for $1 million. The buyer refused, telling that the price was too high. Had the buyer obliged, then I would be writing this lecture note on some other company. Serendipity plays a huge role in life.

The best scientists and engineers know about the importance of serendipity. Most of what scientists were looking for, they did not find. Most of what they found they were not looking for. For example, Viagra, the biggest medical moneymaker, was originally devised to treat heart disease and high blood pressure.

> ***If you think that the inventions we see around us came from someone sitting in a cubicle and concocting them according to a timetable, think again: almost everything of the moment is the product of serendipity.*** *In other words, you find something you are not looking for and it changes the world, while wondering after its discovery why it "took so long" to arrive at something so obvious. No journalist was present when the wheel was invented, but I am ready to bet that people did not just embark on the project of inventing the wheel and then complete it according to a time table. -* [*The Black Swan*]

Can Google get lucky on purpose? No, it cannot. But it can position itself in a way that increases its chances of getting lucky. Google is trying to improve its odds by **(1)** hiring a lot of smart engineers **(2)** who work very hard **(3)** on a lot of little bets with big payoffs and **(4)** willing to fail fast and learn from it. This is what Louis Pasteur meant when he said, **"Chance favors the prepared mind"**. Now let's understand the meaning of asymmetry. In the video given below watch from 17:25 to 19:55 minutes to see Mohnish Pabrai talk about it.



Google spent millions of dollars on its Glass wearable technology. What happened to that initiative? The project didn't turn out as expected and it has been put on a pause. If it had been a success then it would have generated billions of dollars. Is this a sensible bet to make?

In order to answer this question, let's assume that the company spent $100 million and the project has the potential to bring in $10 billion. What is the downside? It can lose all $100 million. What happens to Google if it loses $100 million. Absolutely nothing. Why is that? The loss of $100 million is a rounding error compared to $83 billion of operating cash flows it generated from 2010 to 2014. What about the upside?

It has the potential to make $10 billion. The bet which Google made on project Glass is called as an asymmetric bet — **An investment strategy where the upside potential is greater than the downside risk.** The advantage with this strategy is that **(1)** it will not bankrupt the company if the bet blows up **(2)** few winners will make up more for several losers. This is the reason why Mohnish Pabrai said that Google is playing the game of Heads-I-win-Tails-I-do-not-lose-much. The chart given below shows that Google is funding all the asymmetric bets with operating cash flows. And it doesn't need to fund it by taking huge debts.
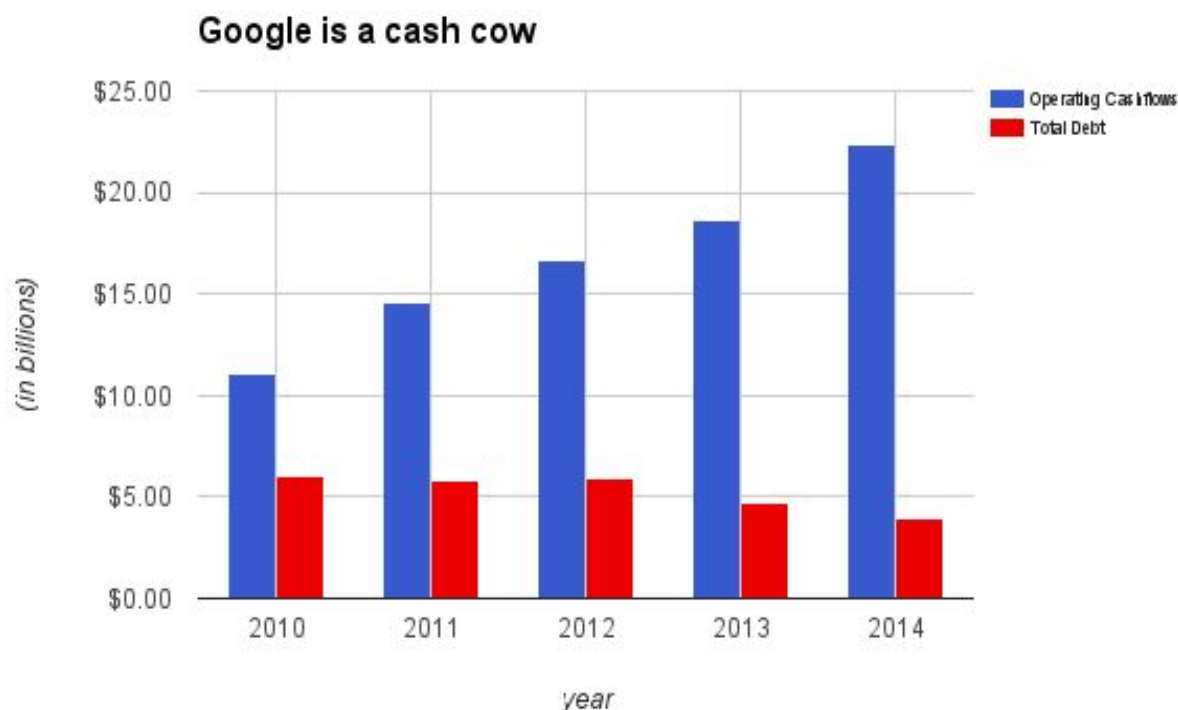


## Capital Allocation

In the fantastic book The Outsiders, author William N. Thorndike, writes about eight terrific CEOs who generated extraordinary returns to the shareholders. Given below is their results compared with their peers in the same industry and S&P 500. Take a look at the result produced by John Malone. One dollar invested with TCI at the beginning of the Malone era was worth over $900 by mid 1998. That same dollar was worth $180 if invested in the other publicly traded cable companies and $22 if invested in the S&P 500.

| CEO/Chairman | Company | Period | Return | Peer's Return | S & P 500 Return |
|---|---|---|---|---|---|
| Tom Murphy | Capital Cities | 1966 to 1995 | 19.9% | 13.2% | 10.1% |
| Henry Singleton | Teledyne | 1963 to 1990 | 20.4% | 11.6% | 8% |
| Bill Andres | General Dynamics | 1991 to 2008 | 23.3% | 17.6% | 8.9% |
| John Malone | TCI | 1973 to 1998 | 30.3% | 20.4% | 14.3% |
| Katharine Graham | Washington Post | 1971 to 1993 | 22.3% | 12.4% | 7.4% |
| Bill Stiritz | Ralston Purina | 1980 to 2000 | 20% | 17.7% | 14.7% |
| Dick Smith | General Cinema | 1962 to 2005 | 16.1% | 9.8% | 9% |
| Warren Buffett | Berkshire Hathaway | 1965 to 2011 | 20.7% | not available | 9.3% |

The next question one should ask is how did these eight CEOs achieve such extraordinary results? The author calls these eight CEOs as outsiders. And they all share a few common traits which their peers don't have. In this lecture notes I will be focusing on the most important trait that set the outsiders miles apart from their peers — **Capital Allocation**.

| | Outsider CEOs | Peer CEOs |
|---|---|---|
| **Experience** | First-time CEOs with little prior managerial experience | Experienced managers with Gladwell's 10,000 hours |
| **Primary Activity** | Capital Allocation | Operations management and external communication |
| **Objective** | Optimize long-term value per share | Growth |
| **Key metrics** | Margins, returns, free cash flow | Revenues, reported net income |
| **Personal qualities** | Analytical, frugal, independent | Charismatic, extroverted |
| **Orientation** | Long-term | Short-term |
| **Furry animal** | Fox | Hedgehog |

The sad part is that most of the CEOs in corporate America don't posses this most important skill. In his 1987 letter to shareholders, Buffett wrote about the importance of capital allocation. I have reproduced it here as is. Read, reread, and reflect on what he said.

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I would say that the controlled company offers two main advantages. First, when we control a company we get to allocate capital, whereas we are likely to have little or nothing to say about this process with marketable holdings. This point can be important because the heads of many companies are not skilled in capital allocation. Their inadequacy is not surprising. Most bosses rise to the top because they have excelled in an area such as marketing, production, engineering, administration— or, sometimes, institutional politics.

Once they become CEOs, they face new responsibilities. They now must make capital allocation decisions, a critical job that they may have never tackled and that is not easily mastered. To stretch the point, it's as if the final step for a highly-talented musician was not to perform at Carnegie Hall but, instead, to be named Chairman of the Federal Reserve.

The lack of skill that many CEOs have at capital allocation is no small matter: After ten years on the job, a CEO whose company annually retains earnings equal to 10% of net worth will have been responsible for the deployment of more than 60% of all the capital at work in the business. CEOs who recognize their lack of capital-allocation skills (which not all do) will often try to compensate by turning to their staffs, management consultants, or investment bankers. Charlie and I have frequently observed the consequences of such "help." On balance, we feel it is more likely to accentuate the capital-allocation problem than to solve it. In the end, plenty of unintelligent capital allocation takes place in corporate America. (That's why you hear so much about "restructuring.") Berkshire, however, has been fortunate. At the companies that are our major non-controlled holdings, capital has generally been well-deployed and, in some cases, brilliantly so.

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How did Google do on the capital allocation front. Take a look at the table shown below. What do you see? From 2007 to 2014 it added $82 billion to its operating and financing assets. Of which around $40 billion of incremental capital got added to operating assets. This in turn produced a pre-tax operating profit of $11.41 billion. And this translates to ROIC of 29 percent.

| (in millions) | 2007 | 2014 | Delta |
|---|---|---|---|
|  |  |  |  |
| Net operating assets [A] | $8,573 | $48,363 | $39,790 |
| Net financing assets [B] | $14,117 | $56,137 | $42,020 |
| Pretax Operating profit [C] | $5,084 | $16,496 | $11,412 |
| Interest income [D] | $590 | $763 | $173 |
| ROIC [ C / A ] | 59% | 34% | 29% |
| RNFA [ D / B ] | 4% | 1% | 0.41% |

When seen in isolation ROIC of 29 percent is fantastic. But it appears pale when compared with the ROIC of 59 percent it generated in 2007. Most of the incremental capital is spent on several other initiatives like moonshot projects. And they don't generate much returns today. This is the reason why Google ROIC came down a lot.

Google is playing the game of Heads-I-win-Tails-I-do-not-lose-much. Let's hope that some of the bets turn into a positive black swan and increase its ROIC. In the current low interest rate environment, let's be happy with 29 percent. And conclude that the management is doing a decent job on capital allocation.

The company added $42 billion to its financing assets. This in turn generated a miniscule amount of $173 million. This translates to a paltry return of 0.41 percent. Now you know why a lot of retail investors and Wall Street analysts are unhappy with Google. Their argument is that the company can return the cash back to its shareholders via dividends and share buybacks. I partially agree with that view because of three reasons.

First, around 60 percent of its cash is in non-US countries. If the money is repatriated back to the US then it would incur a hefty tax bill. Second, the huge pile of cash is like an "elephant gun" which it could be used for making major acquisitions. Third, if $1 retained by the company over time delivers shareholders at least $1 of market value, then the shareholders can sell the stock and get their money. This test is called as **Buffett's earnings retention test**. Take a look at Buffett's owner's manual principle nine, which talks about this.

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We feel noble intentions should be checked periodically against results. We test the wisdom of retaining earnings by assessing whether retention, over time, delivers shareholders at least $1 of market value for each $1 retained. To date, this test has been met. We will continue to apply it on a five-year rolling basis. As our net worth grows, it is more difficult to use retained earnings wisely.

I should have written the "five-year rolling basis" sentence differently, an error I didn't realize until I received a question about this subject at the 2009 annual meeting.

When the stock market has declined sharply over a five-year stretch, our market-price premium to book value has sometimes shrunk. And when that happens, we fail the test as I improperly formulated it. In fact, we fell far short as early as 1971-75, well before I wrote this principle in 1983.

The five-year test should be: (1) during the period did our book-value gain exceed the performance of the S&P; and (2) did our stock consistently sell at a premium to book, meaning that every $1 of retained earnings was always worth more than $1? If these tests are met, retaining earnings has made sense.

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Shareholders make money either through dividends or price appreciation. Google doesn't pay any dividends and retains all the earnings. If every one dollar retained by Google resulted in

more than one dollar in stock price appreciation then why should the shareholders complain? They can sell the stock and get the retained earnings. Let's find out how if Google's decision to retain earnings added value or not. In order to do that we need to find out how much earnings did it retain. The table given below contains this detail.

| Year | Operating cashflows | Depreciation | Retained cashflows |
|---|---|---|---|
| 2008 | $7,853 | $1,212 | $6,641 |
| 2009 | $9,316 | $1,240 | $8,076 |
| 2010 | $11,081 | $1,067 | $10,014 |
| 2011 | $14,565 | $1,396 | $13,169 |
| 2012 | $16,619 | $1,988 | $14,631 |
| 2013 | $18,659 | $2,781 | $15,878 |
| 2014 | $22,376 | $3,523 | $18,853 |
| 2015 (9 months) | $19,609 | $2,979 | $16,630 |

I did this test on a five year rolling basis so that the ebb and flow of the stock market is normalized. Also, I chose 31-Dec-2007 as the start date because at that time Google was the darling of Wall Street. And the market was paying $27 for every $1 in operating cash flows. The table given below contains the earning retention test for Google. What do you see?

| Start Date | End Date | Retained cashflows | Start Market cap | End Market cap | Delta Market cap | Increase in market value for $1 retained |
|---|---|---|---|---|---|---|
| 31-Dec-2007 | 31-Dec-2012 | $52.53 | $216 | $233 | $17 | 0.32 |
| 31-Dec-2008 | 31-Dec-2013 | $61.77 | $97 | $376 | $279 | 4.52 |
| 31-Dec-2009 | 31-Dec-2014 | $72.55 | $197 | $362 | $165 | 2.27 |
| 31-Dec-2009 | 25-Dec-2015 | $89.18 | $191 | $522 | $331 | 3.71 |

During the first period from [31-Dec-2007 to 31-Dec-2012] for every dollar retained by the company shareholders lost 70 cents. Why did this happen? In this five year period operating cash flows compounded at a healthy rate of 27 percent. But shareholders were willing to pay only $14 for $1 in operating cash flows. Why is that? Back in 2007, Apple and Google were buddies and Facebook was a minion. Google had no competitive threats. But in 2012 Google was struggling to adapt to the mobile platform. Whereas Apple and Facebook became dominant players in the mobile world.

During the second period from [31-Dec-2008 to 31-Dec-2013] for every dollar retained by the company shareholders made $4.52. This result is an aberration as the financial crisis was underway in 2008. At that time Google was generating $8 billion in operating cash flows and the entire company was selling at $97 billion. The valuation was so ridiculous that any rational investor would have sold his house and bought Google stock. Who says that the markets are perfectly efficient? In the last two periods for every dollar retained by the company shareholders on average made $3. From all this we can conclude that Google passed the Buffett's earnings retention test.

In this lecture note, I haven't discussed much about Google's acquisitions. But it's an important criteria to consider in evaluating the management. In late 2011 it acquired Motorola Mobility for $12.5 billion. Later in 2014 it sold Motorola Mobility handset business to China's Lenovo Group for $2.9 billion. But Google retained the ownership of the vast majority of Motorola's patents. **Why did it do this? I am leaving that to you as a homework assignment. This article contains the answer.**

## Few Items To Read And Watch

1. In the fantastic book The Outsiders, author William N. Thorndike, writes about eight terrific CEOs who generated extraordinary returns to the shareholders. If you don't have time to read the book, then watch his presentation at Google.
2. In the fantastic book The Investment Checklist, author Michael Shearn, talks about the questions that every investor need to ask in evaluating a company from the vantage point of business and management. If you don't have time to read the book, then watch his presentation here and here.
3. In the book A Few Lessons for Investors and Managers, author Peter Bevelin, talks about how managers and investors can increase their chance of success and reduce the chance of harm if managers think more like investors and investors more like businessmen.
4. Sanjay Bakshi recently delivered a talk titled Seven Intelligent Fanatics from India. In it, he talks about three qualities [integrity, energy and intelligence] that is possessed by an intelligent fanatic.
5. Every Buffett and Munger fan should read the book 100 to 1 in the stock market. If you don't have time to read the book, then you can read my blog post from here.

# Vantage Point: Alphabet's Intrinsic Value

Over the last ten years I read a lot of books on valuation. Some of them are well over 500 pages long. But none of them could match what Warren Buffett wrote in his 1994 letter. In four paragraphs he explained everything you need to know about how to value a business. I have reproduced his writing here as it is. Read, reread, and reflect on what he wrote.

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We define intrinsic value as the discounted value of the cash that can be taken out of a business during its remaining life. Anyone calculating intrinsic value necessarily comes up with a highly subjective figure that will change both as estimates of future cash flows are revised and as interest rates move. Despite its fuzziness, however, intrinsic value is all-important and is the only logical way to evaluate the relative attractiveness of investments and businesses.

To see how historical input (book value) and future output (intrinsic value) can diverge, let's look at another form of investment, a college education. Think of the education's cost as its "book value." If it is to be accurate, the cost should include the earnings that were foregone by the student because he chose college rather than a job.

For this exercise, we will ignore the important non-economic benefits of an education and focus strictly on its economic value. First, we must estimate the earnings that the graduate will receive over his lifetime and subtract from that figure an estimate of what he would have earned had he lacked his education. That gives us an excess earnings figure, which must then be discounted, at an appropriate interest rate, back to graduation day. The dollar result equals the intrinsic economic value of the education.

Some graduates will find that the book value of their education exceeds its intrinsic value, which means that whoever paid for the education didn't get his money's worth. In other cases, the intrinsic value of an education will far exceed its book value, a result that proves capital was wisely deployed. In all cases, what is clear is that book value is meaningless as an indicator of intrinsic value.

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## How much would you pay for an Ivy League college student?

Imagine that you are entering an Ivy League college. It is graduation day and you see smiling faces all around. While you are watching the graduation ceremony, four students [Adam, Bruce, Chris, and Dave] come and sit next to you and they propose the following, "Each one of us paid $500,000 towards our college education. Starting tomorrow we will all be gainfully employed. And you have an option to buy one of us by quoting a price. If we agree on the price, then you own that person and have access to all his future earnings."

Let us treat the cost of $500,000 they paid for education as their book value. How much would you pay for each person on the graduation day? Would you pay below, at, or above their book value? At this point you can't answer that question as I haven't given you enough information about the future earnings of each student. Take a look at the table given below. Using this additional information can you answer my question?

| Name of the student | Description |
| --- | --- |
| Adam | His annual net income after covering all his expenses is $40,000. This will never grow and it will remain fixed forever. |
| Bruce | His annual net income after covering all his expenses is $50,000. This will never grow and it will remain fixed forever. |
| Chris | His annual net income after covering all his expenses is $70,000. This will never grow and it will remain fixed forever. |
| Dave | His annual net income after covering all his expenses is $100,000 in the first year. For the next four years this will increase by 20 percent every year, and after the fifth year it will increase by 5 percent. |

In order to answer my question you need know about two key concepts in finance — Time value of money and Discounted cash flows. The next few pages will contain some middle school level mathematics. Please do not stop reading because I used the word mathematics. A few pages of pain that you're going to bear now will result in a lifelong gain.

## Time Value of Money

Time value of money states that a dollar in hand today is worth more than a dollar to be received in the future. Why is that? This is because a dollar today can be invested to earn some return. Imagine that your friend is asking you to partner with him in a real estate business. After one year the business will fetch you $110,000. How much would you pay for it today? If you expect a 10 percent return, then you will pay $100,000.

$$FV = PV * (1 + \text{rate of return})$$
$$PV = FV / (1 + \text{rate of return})$$
$$PV = \$110,000 \ / (1 + 0.1)$$
$$PV = \$110,000 \ / (1.1)$$
$$PV = \$100,000$$

This process of finding out the present value given the future value is called as discounting which is the opposite of compounding that we learnt in the first lecture. The 10 percent rate of

return that we used is called as the discount rate. People also refer to the discount rate as the cost-of-capital or hurdle rate to mean the same thing. If you get the same $110,000 after two years, then it would be worth only $90,909 today.

$$FV = PV * (1 + \textit{rate of return})^2$$
$$PV = FV / (1 + \textit{rate of return})^2$$
$$PV = \$110,000 / (1 + 0.1)^2$$
$$PV = \$110,000 / (1.1)^2$$
$$PV = \$110,000 / (1.21)$$
$$PV = \$90,909$$

Consider the cash flows produced by a rental property which is given below. After all expenses you receive a net income of $10,000 from the property each year for five years. At the end of the fifth year you are planning to sell the property for $200,000. How much would you pay for the property today if you are expecting a 10 percent return? From the calculations given below, we can see that the property is worth $162,092 today. **The key takeaway from the time value of money principle is that, "A dollar in the hand is worth more than a dollar in the future."**

| Year | Cash Flow | Discounted at 10% |
|---|---|---|
| 1 | $10,000 | $9,091 |
| 2 | $10,000 | $8,264 |
| 3 | $10,000 | $7,513 |
| 4 | $10,000 | $6,830 |
| 5 | $10,000 | $6,209 |
| 5 | $200,000 | $124,184 |
| | | |
| **Value of the house today** | | **$162,092** |

## Discounted Cash Flow

In the rental property example, we used annual net rental income and final sale price to arrive at the present value of the property. We can apply the same technique for valuing a business. Instead of yearly net rental income we will use free cash flows and instead of a final sale price we will use continuing value. This technique is called as Discounted Cash Flow (DCF). Let us understand this with a simple example.

Take a look at the table given below for a company I made up. What do you see? The company is growing its free cash flow at a decent rate of 30 percent. What is a free cash flow? The cash that is left over after investing back into the business is called as free cash flow. After discounting this at 10 percent the present value of free cash flows comes to $475 million.

| Year | (in millions) Free cash flow | Discounted at 10% |
|------|------------------------------|-------------------|
| 2016 | $100 | $91 |
| 2017 | $130 | $107 |
| 2018 | $169 | $127 |
| 2019 | $220 | $150 |
| Value of the company today | | $475 |

In the rental property example, we sold the house after five years. But a company is a going concern which will generate free cash flows for a very long time into the future. Looking at the trend it is clear that the company will be able to grow its free cash flow beyond the year 2019. At this point we have to ask the following questions **(1)** For how many years into the future should we project the future free cash flows? **(2)** What should be the growth rate of free cash flows?

Assuming that the company is a going concern the answer to the first question is forever. For the second question, I am going to assume a growth rate of 5 percent. But how can we compute the value of free cash flows for infinite years? Luckily a smart man named Myron J. Gordon already solved this problem for us. In the year 1956 he came up with an equation called as Gordon Growth Model.

Using Gordon's equation, I have calculated the continuing value of the company beyond the year 2019. Continuing value is also known as terminal value or horizon value. And it is defined as the present value of all future cash flows beyond the horizon period. In this example the horizon period is 2019.

$Continuing\ value\ beyond\ 2019 = (Free\ cash\ flow\ in\ 2019 * Growth\ rate) / (Discount\ rate - Growth\ rate)$
$Continuing\ value\ beyond\ 2019 = (\$220\ million * 1.05) / (1.10 - 1.05)$
$Continuing\ value\ beyond\ 2019 = (\$231\ million) / (0..05)$
$Continuing\ value\ beyond\ 2019 = \$4,620\ million$
$Continuing\ value\ worth\ in\ 2015 = \$4,620\ million / (1.1)^4$
$Continuing\ value\ worth\ in\ 2015 = \$3,156\ million$

If you want to know how Gordon arrived at the continuing value equation then you should my read my post geometric-series-and-gordon-growth-model. From the calculations given below, we can see that the total value of the company comes to $3,631 million.

$$PV \ of \ company \ = PV \ of \ free \ cash \ flows \ up \ to \ 2019 \ + PV \ of \ continuing \ value \ beyond \ 2019$$
$$PV \ of \ company \ = \$475 \ million \ + \$3,156 \ million$$
$$PV \ of \ company \ = \$3,631 \ million$$

## Back to the Ivy League college

Using the principles of time-value-of-money and discounted-cash-flows, let us find out how much should we pay for Adam's future earnings today. In other words, we are going to find out Adam's intrinsic (read it real or true) value. Let us start with something that is known and reliable about Adam. What is that? We know that his book value is $500,000, the fees he paid towards his college education. Let's hypothesize that his intrinsic value should be worth at least his book value.

There is no such thing as a free lunch in life. If you are going to pay $500,000 to Adam today then he should earn you at least your expected rate of return. Let us assume that your expected rate of return is 10 percent. This means that Adam should earn you at least $50,000 after covering all his expenses. How much is Adam going to earn for you? We know that Adam's annual net income after covering all his expenses will stay fixed at $40,000 forever. Using the continuing value principle, we get Adam's intrinsic value to be worth $400,000.

$$Adam's \ intrinsic \ value \ = \$40,000 \ / \ (discount \ rate - growth \ rate)$$
$$Adam's \ intrinsic \ value \ = \$40,000 \ / \ (0.1 - 0)$$
$$Adam's \ intrinsic \ value \ = \$400,000$$

Why is Adam's intrinsic value less than his book value? We expected a 10 percent return on his book value. But he is earning only 8 percent [$40,000 / $500,000]. Adam fell short of our expectations by 2 percent. This 2 percent deficit when capitalized at 10 percent will result in intrinsic value which is worth less than book value by 20 percent [0.02 / 0.1].

Applying the same logic, we get Bruce's intrinsic value to be worth $500,000. This is same as his book value. This should not be surprising as we expected 10 percent from Bruce and he met our expectations by earning that.

$$Bruce's \ intrinsic \ value \ = \$50,000 \ / \ (discount \ rate - growth \ rate)$$
$$Bruce's \ intrinsic \ value \ = \$50,000 \ / \ (0.1 - 0)$$
$$Bruce's \ intrinsic \ value \ = \$500,000$$

Applying the same logic, we get Chris's intrinsic value to be worth $700,000. His intrinsic value is worth more than his book value. This should not be surprising as we expected 10 percent from Chris and he exceeded our expectations by generating 14 percent. This 4 percent excess when capitalized at 10 percent will result in intrinsic value exceeding book value by 40 percent.

$Chris's\ intrinsic\ value\ = \$70,000\ /\ (discount\ rate - growth\ rate)$

$Chris's\ intrinsic\ value\ = \$70,000\ /\ (0.1 - 0)$

$Chris's\ intrinsic\ value\ = \$700,000$

The excess $20,000 earned by Chris is called as **residual earnings**. And Buffett was referring to residual earnings when he wrote, "First, we must estimate the earnings that the graduate will receive over his lifetime and subtract from that figure an estimate of what he would have earned had he lacked his education. That gives us an excess earnings figure, which must then be discounted, at an appropriate interest rate, back to graduation day. The dollar result equals the intrinsic economic value of the education."

In the table given below I have summarized what we learnt so far. This is extremely important that you need to remember it forever. Before proceeding further make sure that you understand it very deeply.

| Name | Expected Rate | Actual Rate | Intrinsic value | Book value | Key take away |
|---|---|---|---|---|---|
| Adam | 10 percent | 8 percent | $400,000 | $500,000 | If the actual rate of return on book value is less than the expected rate of return, then the intrinsic value of the asset should be worth less than the book value. |
| Bruce | 10 percent | 10 percent | $500,000 | $500,000 | If the actual rate of return on the book value is same as the expected rate of return, then the intrinsic value of the asset should be equal to the book value. |
| Chris | 10 percent | 14 percent | $700,000 | $500,000 | If the actual rate of return on book value exceeds the expected rate of return, then the intrinsic |

| | | | | | value of the asset should be worth more than the book value. |
|---|---|---|---|---|---|
| | | | | | |

Dave's intrinsic value calculations are a little more involved as we need to factor in growth. His annual net income after covering all his expenses is $100,000 in the first year. For the next four years this will increase by 20 percent every year, and after the fifth year it will increase by 5 percent. Using the principle of discounted cash flows, we get Dave's intrinsic value to be worth $3,248,890.

| Dave's intrinsic value | | |
|---|---|---|
| Year | Free cash flow | Discounted at 10% |
| 1 | $100,000 | $90,909 |
| 2 | $120,000 | $99,174 |
| 3 | $144,000 | $108,189 |
| 4 | $172,800 | $118,025 |
| 5 | $207,360 | $128,754 |
| After 5th year | $217,728 | $2,703,839 |
| Continuing value = [ $217,728 / (0.1 - 0.05) ] / (1.1)^5 | | |
| | Intrinsic value today | $3,248,890 |

Dave, like Chris, exceeded expectations by earning a 20 percent return on book value. But he surpassed Chris by growing his free cash flow every year without requiring any additional capital. Now it's time to answer my earlier question. How much will you pay for each student? Take a look at the table given below. What do you see?

| | Book value | Intrinsic value | Price | Price-to-book | Price-to-intrinsic value |
|---|---|---|---|---|---|
| Adam | $500,000 | $400,000 | $400,000 | 0.8 | 1 |
| Bruce | $500,000 | $500,000 | $500,000 | 1 | 1 |
| Chris | $500,000 | $700,000 | $750,000 | 1.5 | 1.07 |
| Dave | $500,000 | $3,248,890 | $1,500,000 | 3 | 0.46 |

Adam is willing to sell himself out for $400,000. Comparing this with his book value of $500,000 the deal appears to be a steal. But when you compare it with his intrinsic value of $400,000 the bargain disappears. We can arrive at similar conclusions for Bruce and Chris. Take a look at

Dave. He is willing to sell himself out for $1.5 million. He is demanding three times his book value and two times more than Chris. Should we pay up for Dave?

The answer is a resounding yes. Dave is a steal when you compare his asking price with his intrinsic value. You are getting an opportunity to buy a $1 for 0.46 cents. Dave is the poster child of a great business. He pays an extraordinarily high interest rate that will rise as the years pass. At this point, let me summarize what we learnt so far.

Price (what you pay) is different from intrinsic value (what you get). We paid a price of $1.5 million for Dave. But his actual worth (intrinsic value) is $3.25 million. Book value is meaningless as an indicator of intrinsic value. All four students had the same book value of $500,000. But their intrinsic values are very different. Finally, when we purchased Dave we only paid half the price [$1.5 million] of his actual worth [$3.25 million]. **In other words, we bought $1 for 0.46 cents. Buffett would bless our transaction as it has a huge Margin Of Safety. The act of buying a dollar for 50 cents is called as value investing.**



## Interest earned by four students

To sum up, think of three types of "savings accounts." The great one pays an extraordinarily high interest rate that will rise as the years pass. The good one pays an attractive rate of interest that will be earned also on deposits that are added. Finally, the gruesome account both pays an inadequate interest rate and requires you to keep adding money at those disappointing returns. - Warren Buffet

## From Ivy College to the world of Business

Companies are like students earning different rate of returns on its operating assets. Take a look at the table given below. What do you see? For companies like JCPenney and Ford the market is willing to pay only $1 for every dollar of net operating assets. But IBM commands $3

and Google commands $9. Why is the market paying up for IBM and Google's net operating assets?

| (in millions) | 2014 | | | |
| --- | --- | --- | --- | --- |
| | JCPenney | Ford | IBM | Google |
| Net operating assets (NOA) | $7,856 | $155,000 | $53,072 | $48,363 |
| Pre-tax operating income | -$308 | $3,745 | $17,790 | $17,259 |
| Pre-tax ROIC | -3.92% | 2.42% | 33.52% | 35.69% |
| Enterprise value (EV) | $7,000 | $161,000 | $165,000 | $448,000 |
| EV / NOA | 0.89 | 1.04 | 3.11 | 9.26 |
| Maps to student | Adam | Bruce | Chris | Dave |

This question can be answered by looking at pre-tax ROIC. Like Chris and Dave, IBM and Google are earning above average return on invested capital. But JCPenney and Ford, like Adam and Bruce, could not earn such high returns on capital. In fact JCPenney is not even profitable. Why do JCPenney and Ford earn very low returns on capital? This is because of the absence of durable competitive advantage or moats. **If a company doesn't have a moat, then its intrinsic value will be equal to the reproduction cost of its assets.** Why is that?

> *Imagine that we find a company, First-In, operating on a level playing field. The reproduction costs of its assets (including intangibles not necessarily listed on the balance sheet) are $1 billion. Its market value is $2 billion. What happens? Existing competitors and new entrants will calculate that by spending $1 billion to reproduce the assets, they can create an enterprise with a market value of $2 billion. Why should they have a different economic experience from First-In, since there is nothing it can do that they can't do as well? So we see First-In confronted by newcomers, expanding competitors, or both. A load of new capacity starts to come on line. As the level of customer demand hasn't changed much, there is now more competition for the same business. Either prices fall or, for differentiated products, each producer sells fewer units. In both cases, profits decline, and market value drops with them.*

> *Capacity continues to expand, and profits and market value continue to sink. The game is over when the market value of First-In has been driven down to the $1 billion reproduction costs of its assets. Competitors suffer the same fate; everybody sinks. Certainly this process doesn't happen as smoothly or automatically as we have described, but things do ultimately turn out this way. The incentives to get into the business and take advantage of the market's excessively generous valuation are too powerful, until the market takes back its free money.*

*This basic process also works in the opposite direction. If the market value of First-in falls substantially below the $1 billion asset reproduction cost, then existing producers will stop replacing their assets. Capacity will decline until either prices rise or sales increase to generate enough profit so that the market raises the value of First-In back to $1 billion. Asset value in strategic terms corresponds, therefore, to the free-entry (no competitive advantage, level playing field) value of the firm-a circumstance that probably characterizes a substantial share of all industries and markets. For these firms, the intrinsic value is the asset value. - [Value Investing: From Graham to Buffett and Beyond](#)*

What makes IBM and Google earn such high returns? This is because of the presence of moats. If a company has a moat, then it will be able to generate high returns on capital and this will result in higher intrinsic value. The next question is why does market value Google more than IBM?

Google like Dave can grow its earnings without requiring a lot of additional capital to engender its growth. **High returns on capital combined with growth that are protected by moats will result in higher intrinsic value. The intrinsic value of companies like IBM that doesn't grow, but has a moat will be equal to its earning power value.** As shown in the image given below, a company can derive its intrinsic value from three different slices. In the next section we will make use of three slices to calculate the intrinsic value of Alphabet.



**Value of Growth:** →
- *Only if the growth is within the franchise and benefits from the competitive advantage*

**Earnings Power Value:** →
- *Franchise value from current competitive advantage*

**Asset Value** →
Reproduction Cost of Assets
- *Free Entry*
- *No Competitive Advantage*
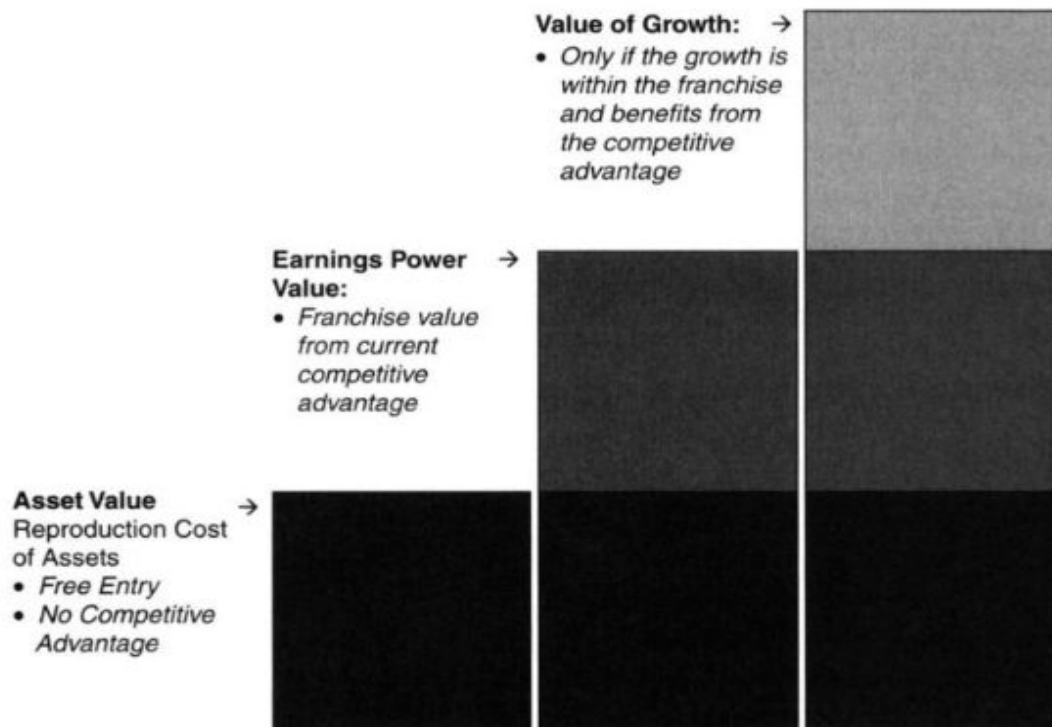
*Figure 3.1* Three Slices of Value [ Source: Value Investing - From Graham to Buffett and Beyond ]

*The first slice represents the asset value. Under conditions of free entry and no competitive advantage, this is all the value there is. The second slice, which is the difference between the asset value and EPV, represents the franchise value of the firm. Superior management may be considered here as a variety of franchise value, though it is probably less durable than a competitive advantage in its pure form. Estimates about the value of this slice are less reliable than estimates of asset value. The third and last slice is the difference between the EPV and the full value of growth within the franchise. Of all the estimates, this one is the most difficult to make and therefore the least reliable.* ***A value investor may in fact conclude that the intrinsic value of the firm lies somewhere within this slice, and then compare that (after a suitable reduction to provide for a margin of safety) to the market price to see if a purchase makes sense.*** *-* [Value Investing: From Graham to Buffett and Beyond](#)

## Alphabet's Intrinsic Value

If we were to replace Google's assets how much would it cost? In order to find out the answer to this question, let's look into its 2015 [third quarter](#) balance sheet. At the end of the third quarter Google had 687,693,000 shares outstanding. I used this number to compute all per share values. Take a look at the table given below. What do you see? Based on the replacement cost each share of Google should be worth $169.

| (per share) | 2015 Third Quarter |
|---|---|
| Net operating assets | $73 |
| Net financing assets | $96 |
| Asset value | $169 |

But balance sheet contains the historical cost of property-and-equipment.  Are we not under reporting Google's replacement cost by using the balance sheet value as is? The answer is yes. But for Google property-and-equipment represents only 20 percent of its total assets. And half of that are Information technology assets which gets replenished within a few years. So the under reporting is not as bad as it appears.

Google has $29 per share in Goodwill and Intangibles. Are they really worth that much? By using their values as it is are we not over reporting Google's replacement cost? The answer is no. Google spent $54 per share in R&D over the last five years. This cost has been expensed already in the income statement. By not capitalizing R&D costs, we are under reporting its actual replacement cost. If we capitalize the R&D expense and remove Goodwill and Intangibles, then Google's replacement cost will be $194 per share. **Let's embrace**

**conservatism and stick with the replacement cost of $169 per share. This is Alphabet's intrinsic value based on the value of its assets.**

Stocks go up and down for many reasons. Even their earnings may go up or down for many reasons. As an investor what we should think about is earning power. What is the difference between earnings and earning power?

> *Earnings are simply reported profits no matter how obtained. As we have already seen, earnings may rise because of a sudden, non-recurring surge in demand, because of a price advance, because of a change in accounting practices, because of improvement in business generally which permits utilization of what previously was excess productive capacity. None of those reasons reflects earning power any more than the movement of a cork downstream attests its motive power.*
>
> ***Earning power is competitive strength. It is reflected in above averages rates of return on invested capital, above average profit margins of sales, above average rates of sales growth. It shows to best advantage in new or expanding markets.***
>
> *Failure to distinguish between ephemeral earnings fluctuations and basic changes in earning power accounts for much over trading, many lost opportunities to make 100 for one in the stock market. - 100 to 1 in the Stock Market*

In the year 2014 Google's total revenue came to $66 billion. From the table given below, we can see that the company on average is growing its sales at 23 percent. In the last couple of years its revenue growth slowed down. One of the key reasons for the slowdown is because of dollar strengthening over other currencies in the recent years. And 57 percent of Google's revenue comes from international markets.

| | 2010 | 2011 | 2012 | 2013 | 2014 | Last Quarter (constant currency) |
|---|---|---|---|---|---|---|
| Year-over-year sales growth | 24% | 29% | 32% | 19% | 10% | 21% |

Let's assume that Google will be able to grow its 2014 revenue of $66 billion by 20 percent. This means that it will be able to generate $79 billion [$66 billion * 1.2] in revenue. On top of this, let's assume that its revenue will stay fixed at $79 billion forever. As discussed before we know that Google has an earning power to generate a pre-tax operating margin of 30 percent. This means that it will be able to earn a pre-tax operating income of around $24 billion [79 billion * 0.3] every year.

In the last ten years Google is paying an average effective tax rate of 22 percent. Going forward, let's assume that it will pay an effective tax rate of 25 percent. This means that Google

will be able to generate an after tax operating income of $18 billion [24 * 0.75] every year. The next question is how much should we pay for getting $18 billion every year? To answer this question we need to know our cost-of-capital or opportunity cost. Take a look at the pre-tax interest rates that are currently available. What would Buffett tell if he sees this table?

| | Pre-tax Interest rate |
|---|---|
| Average US savings account | 0.06% |
| US 10-year treasury yield | 2.12% |
| US 30-year treasury yield | 2.69% |
| Vanguard High yield dividend | 3.04% |
| Vanguard REIT Index Fund | 3.77% |

*We use the same discount rate across all securities. We may be more conservative in estimating cash in some situations. Just because interest rates are at 1.5% doesn't mean we like an investment that yields 2-3%. **We have minimum thresholds in our mind that are a whole lot higher than government rates.** When we're looking at a business, we're looking at holding it forever, so we don't assume rates will always be this low. - Warren Buffett*

Following Buffett's advice I am going to assume a pre-tax cost-of-capital of 10 percent. This is 2.7 times higher than Vanguard REIT Index Fund's pre-tax yield of 3.77 percent. Applying an effective tax rate of 25 percent the after-tax cost-of-capital for Google comes to 7.5 percent. This means that for generating $18 billion at an yield of 7.5 percent Google's operating business should be worth $240 billion [$18 billion / 7.5 percent]. **From the calculations given below, we can see that Alphabet's intrinsic value based on its earning power comes to $445 per share. This is Alphabet's Earning Power Value.**

*Alphabet's operating business value* $= \$240\ billion$
*Alphabet's operating business value per share* $= \$349$
*Alphabet's financing assets value per share* $= \$96$
*Alphabet's intrinsic value per share* [*no growth*] $= \$445$

Why is Alphabet's earning power value (EPV) higher than its asset value? This is because of its moat which protects its high returns on invested capital from being eroded by competition.

*The difference between the EPV and the asset value is the value of the franchise enjoyed by the company in question. Competitive advantages enjoyed by incumbent firms constitute barriers to entry that protect the incumbents from profit-eroding competition. These advantages and barriers are responsible for the firm's franchise. In fact, the three terms all describe the same basic phenomenon. **The defining character***

*of a franchise is that it enables a firm to earn more than it needs to pay for the investments that fund its assets. The EPV is greater than the asset value; the difference between the two, as we said, is the value of the franchise.* Therefore, the intrinsic value of a firm is either the reproduction costs of the assets, which should equal the EPV, or those assets plus the competitive advantages of the firm that underlie its franchise. - *Value Investing: From Graham to Buffett and Beyond*

The current share price of GOOG (class C) is $760. But the EPV of $445 represents only 59 percent of the current share price. Why is that? The market pays the balance $315 for future growth in sales and profits. At this point we need to ask how much growth is already reflected in the current stock price? Before answering that question there are a couple of things that you need to know about growth.

First, in order to generate growth a business needs to make additional investments in working and fixed capital. That cuts into the amount of free cash flow that can be distributed to the shareholders in the near term. Second, the only growth that creates value is growth in markets where the firm enjoys a competitive advantage. Why is that? You can find out the answer by reading my post what-is-growth-worth. Take a look at the table given below. On average Google has been investing around 54 percent of its operating cash flows back into the business. These investments are made to generate growth in sale and profits.

| (in millions) | 2010 | 2011 | 2012 | 2013 | 2014 |
|---|---|---|---|---|---|
| Cash flow from operations (CFO) | $11,081 | $14,565 | $16,619 | $18,659 | $22,376 |
| Investments | $5,085 | $5,338 | $13,841 | $6,281 | $15,461 |
| Capital Expenditure | $4,018 | $3,438 | $3,273 | $7,358 | $10,959 |
| Net Acquisitions | $1,067 | $1,900 | $10,568 | -$1,077 | $4,502 |
| Investments / CFO | 45.89% | 36.65% | 83.28% | 33.66% | 69.10% |

How much growth is already reflected in the current stock price? To answer this question I did a DCF with the several assumptions that are shown in the table given below. To justify the current stock price, Google needs to grow its sales at 15 percent for the next 5 years. Beyond the year 2020 it needs to grow its after-tax operating profits at 1.3 percent forever. And it has to maintain its after-tax operating margins at 22.5 percent.

| (in billions) | 2016 | 2017 | 2018 | 2019 | 2020 |
|---|---|---|---|---|---|
| Revenue (grow at 15%) | $90.85 | $104.48 | $120.15 | $138.17 | $158.90 |
| After-tax operating profit (22.5%) | $20.44 | $23.51 | $27.03 | $31.09 | $35.75 |
| Investements (50%) | $10.22 | $11.75 | $13.52 | $15.54 | $17.88 |
| Free cash flow (FCF) | $10.22 | $11.75 | $13.52 | $15.54 | $17.88 |
| Discounted FCF (7.5%) | $9.51 | $10.17 | $10.88 | $11.64 | $12.45 |
| | | | | | |
| **Sum Discounted FCF** | $54.65 | | | | |
| **Continuing value beyond 2020 (1.3% growth)** | $401.67 | | | | |
| **Net financing assets (30-Sep-2015)** | $66.00 | Intrinsic value per share matches the current stock price of $760. | | | |
| **Total value of the company** | $522.32 | | | | |
| **Intrinsic value per share** | $759.52 | | | | |

**From the above calculations we can see that Alphabet's intrinsic value based on its future growth potential comes to $760 per share. I arrived at this value by reverse engineering the current stock price.** In other words I am assuming that the market is right in judging the future growth potential of the company. What if the market is wrong? I will discuss this in the next section. Take a look at the chart given below which shows all three slices of Alphabet's intrinsic value.



**Three slices of Alphabet's value**

Asset value — $169 — Few assumptions went into intrinsic value calculations.

Earning power value — $445 — Too many assumptions went into intrinsic value calculations. Future growth is damn hard to predict.

Growth — $760

$0    $250    $500    $750    $1,000
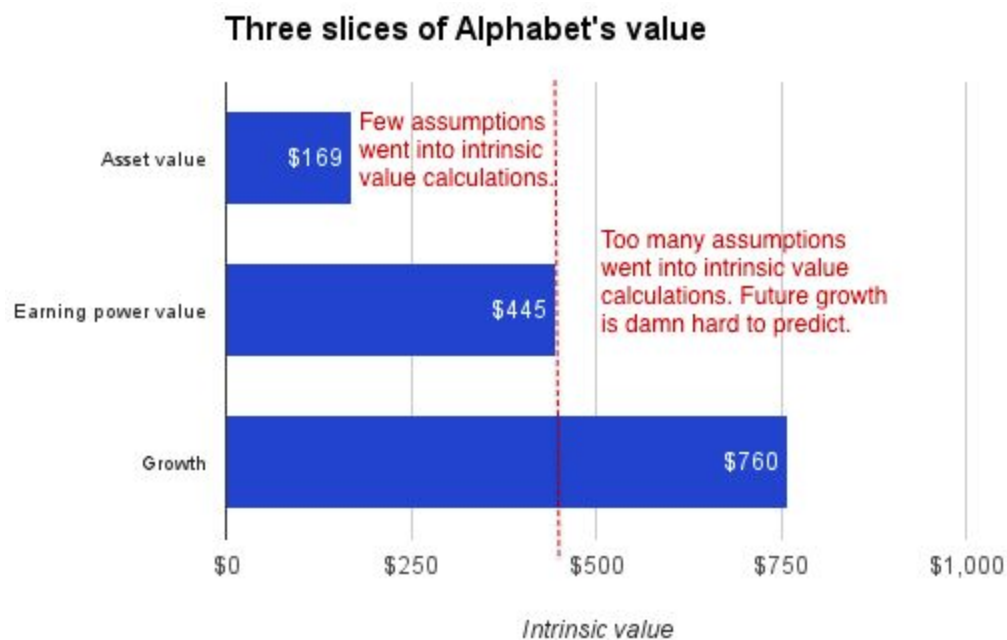
*Intrinsic value*

## Bedrock principles of value investing

One of the key principles that every value investor should adhere to when calculating intrinsic value is to not to use the stock price in the calculation. I adhered to this principle, while computing the intrinsic value based on assets and earning power. But I didn't follow this principle, while calculating intrinsic value based on growth as I arrived at it by reverse engineering the stock price. Why did I do that?

The answer to that question is that future growth rates are damn hard to predict. It's hard to solve certain classes of problems by looking forward. Predicting future growth rates fall into this category. **Carl Jacobi, a great 19th century German Mathematician, who found that the solutions for many difficult problems could be found if the problems were expressed in the inverse - by working backwards.**

I followed Jacobi's principle by avoiding the prediction of future growth rates. Instead, I inverted the problem by asking two questions **(1)** How much growth is already reflected in the current stock price? **(2)** Do I agree with the market expectations? At the current price of $760 the market expects the company to grow at 15 percent for the next five years. And at 1.3 percent beyond the forecast horizon. The growth rate expectations looks reasonable and I agree with the judgement of the market.

Would I buy the stock at the current price? No, I wouldn't. The reason is because I need to allow some room for error in my judgement about the future prospects of Alphabet's business. The only way to get that room is to have a decent margin of safety — It is the difference between the intrinsic value of a stock and its market price. If you buy something that is worth a dollar by paying 50 to 70 cents, then you get a decent margin of safety. **Margin of safety is the first bedrock principle of value investing.**

> *When you build a bridge, you insist it can carry 30,000 pounds, but you only drive 10,000-pound trucks across it. And that same principle works in investing. We insist on a margin of safety in our purchase price. If we calculate the value of a common stock to be only slightly higher than its price, we're not interested in buying. We believe this margin-of-safety principle, so strongly emphasized by Ben Graham, to be the cornerstone of investment success. - Warren Buffett*

This means that I would buy the stock when it is selling in the range of $380 to $535. If the price you pay is closer to EPV ($445) then you get all the future growth of the company for free. You don't pay too much for the growth, as it is uncertain, instead get it for free. This is akin to having the cake and eating it too. The next question is did Google ever sell near EPV. Take a look at the chart given below. What do you see?

EPV vs Low-High Price

There were several times during which one could have bought the stock when it was selling near EPV. Why does the stock price fluctuate so much every year? The reason is because of Mr. Market, an allegory used by Benjamin Graham. If Mr. Market gets excited then the stock price goes to the roof. On the other hand, if he gets moody then the price falls down. **The second bedrock principle of value investing is that Mr. Market is there to serve you, not to guide you.** Buffett wrote about Mr. Market in his 1987 letter and I have reproduced it here as it is. Read, reread, and reflect on what he wrote.

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Ben Graham, my friend and teacher, long ago described the mental attitude toward market fluctuations that I believe to be most conducive to investment success. He said that you should imagine market quotations as coming from a remarkably accommodating fellow named Mr. Market who is your partner in a private business. Without fail, Mr. Market appears daily and names a price at which he will either buy your interest or sell you his.

Even though the business that the two of you own may have economic characteristics that are stable, Mr. Market's quotations will be anything but. For, sad to say, the poor fellow has incurable emotional problems. At times he feels euphoric and can see only the favorable factors affecting the business. When in that mood, he names a very high buy-sell price because he fears that you will snap up his interest and rob him of imminent gains. At other times he is depressed and can see nothing but trouble ahead for both the business and the world. On these occasions he will name a very low price, since he is terrified that you will unload your interest on him.

Mr. Market has another endearing characteristic: He doesn't mind being ignored. If his quotation is uninteresting to you today, he will be back with a new one tomorrow.

Transactions are strictly at your option. Under these conditions,the more manic-depressive his behavior, the better for you.

But, like Cinderella at the ball, you must heed one warning or everything will turn into pumpkins and mice: Mr. Market is there to serve you, not to guide you. It is his pocketbook, not his wisdom, that you will find useful. If he shows up some day in a particularly foolish mood, you are free to either ignore him or to take advantage of him, but it will be disastrous if you fall under his influence. Indeed, if you aren't certain that you understand and can value your business far better than Mr.Market, you don't belong in the game. As they say in poker, "If you've been in the game 30 minutes and you don't know who the patsy is, you're the patsy."

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Take a look at the table given below. What do you see? In 2004 investors were willing to pay $89 for every dollar of pre-tax operating income. They were paying up for Google's growth. But in 2014 they were paying only $21. In eleven years the earnings multiple shrank by over 75 percent. But the market capitalization during the same period compounded by 27 percent. How did this happen?

| (in millions) | Google | | |
| --- | --- | --- | --- |
| | 2004 | 2014 | CAGR |
| Sales | $1,032.00 | $66,001 | 46% |
| Pre-tax operating income (OI) | $303 | $17,259 | 44% |
| Market capitalization (Mcap) | $27,000 | $362,000 | 27% |
| Mcap / OI | 89 | 21 | -12% |

This happened because Google compounded its pre-tax operating income at an astounding rate of 44 percent, while maintaining high returns on invested capital. In fact it was able to grow its operating income with virtually no major capital expenditures. Google is a true compounding machine. **The third bedrock principle of value investing is that time is the friend of the wonderful business (compounding machines) and the enemy of the mediocre. Big money is made by sitting on these compounding machines.**

> *Over the long term, it's hard for a stock to earn a much better return than the business which underlies it earns. If the business earns 6% on capital over 40 years and you hold it for that 40 years, you're not going to make much different than a 6% return even if you originally buy it at a huge discount.* ***Conversely, if a business earns 18% on capital over 20 or 30 years, even if you pay an expensive looking price, you'll end up with a fine result. So the trick is getting into better businesses.*** *- Charlie Munger*

In the video given below watch from 18:00 to 22:45 minutes to see Tom Gayner, President and CIO of Markel Corporation, talk about the power of compounding machines.



Thomas J. Watson Sr. of IBM once said, "I'm no genius. I'm smart in spots— but I stay around those spots.". **The fourth and the final bedrock principle of value investing is to know your limits and stay well within the limits. Buffett calls this as "circle of competence".** He wrote about it in his 1996 letter and I have reproduced it here as it is. Read, reread, and reflect on what he wrote.

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Let me add a few thoughts about your own investments. Most investors, both institutional and individual, will find that the best way to own common stocks is through an index fund that charges minimal fees. Those following this path are sure to beat the net results (after fees and expenses) delivered by the great majority of investment professionals.

Should you choose, however, to construct your own portfolio, there are a few thoughts worth remembering. Intelligent investing is not complex, though that is far from saying that it is easy. What an investor needs is the ability to correctly evaluate selected businesses. Note that word "selected": You don't have to be an expert on every company, or even many. You only have to be able to evaluate companies within your circle of competence. The size of that circle is not very important; knowing its boundaries, however, is vital.

To invest successfully, you need not understand beta, efficient markets, modern portfolio theory, option pricing or emerging markets. You may, in fact, be better off knowing nothing of these.  That, of course, is not the prevailing view at most business schools, whose finance curriculum tends to be dominated by such subjects. In our view, though, investment

students need only two well-taught courses - How to Value a Business, and How to Think About Market Prices.

Your goal as an investor should simply be to purchase, at a rational price, a part interest in an easily-understandable business whose earnings are virtually certain to be materially higher five, ten and twenty years from now. Over time, you will find only a few companies that meet these standards - so when you see one that qualifies, you should buy a meaningful amount of stock.  You must also resist the temptation to stray from your guidelines: If you aren't willing to own a  stock for ten years, don't even think about owning it for ten minutes. Put together a portfolio of companies whose aggregate earnings march upward over the years, and so also will the portfolio's market value.

Though it's seldom recognized, this is the exact approach that has produced gains for Berkshire shareholders:  Our look-through earnings have grown at a good clip over the years, and our stock price has risen correspondingly.  Had those gains in earnings not materialized, there  would have been little increase in Berkshire's value.

The greatly enlarged earnings base we now enjoy will inevitably cause our future gains to lag those of the past. We will continue, however, to push in the directions we always have. We will try to build earnings by running our present businesses well - a job made easy because of the extraordinary talents of our operating managers - and by purchasing other businesses, in whole or in part, that are not likely to be roiled by change and that possess important competitive advantages.

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## Few Items To Read And Watch

1. Read the fantastic book Value Investing: From Graham to Buffett and Beyond in which Bruce Greenwald talks about three slices of intrinsic value.
2. According to Buffett The Intelligent Investor is by far the best book on investing ever written. In chapters 8 and 20 Benjamin Graham talks about Mr. Market and Margin of safety.
3. Read the fantastic book Accounting for Value in which Stephen Penman explains why an asset earning above the cost-of-capital should be worth more than its book value.
4. In the year 1984 Warren Buffett gave a speech commemorating the 50th anniversary of Security Analysis. In the talk The Superinvestors of Graham-and-Doddsville he demonstrated how a handful of super investors were able to beat the market by adhering to the margin of safety principle.
5. In 1996 Charlie Munger delivered a talk titled Practical Thought About Practical Thought. In it, he talks about how to build a $2 trillion business in 150 years.
6. Read the fantastic post Vantage Point in which Sanjay Bakshi explains how to analyze a stock from eight different angles.
7. Great investor Chuck Akre explains how he finds compounding machines. Click here to watch the video.

# The Psychology of Human Misjudgment

Economists assume that people are rational in the sense that they use all available information as they take actions intended to achieve their goals. But behavioral economists don't agree with the view of standard economics. They believe that humans are far less rational. Who is right? Let us test our rationality by answering the questions that are given below.

1. Linda is thirty-one years old, single, outspoken, and very bright. She majored in philosophy. As a student, she was deeply concerned with issues of discrimination and social justice, and also participated in antinuclear demonstrations. Which of the alternatives is more probable about Linda **(a)** She is a bank teller **(b)** She is a bank teller and is active in the feminist movement?

2. A cab was involved in a hit-and-run accident at night. Two cab companies, the Green and the Blue, operate in the city. 85 percent of the cabs in the city are Green and 15 percent are Blue. A witness identified the cab as Blue. The court tested the reliability of the witness under the circumstances that existed on the night of the accident and concluded that the witness correctly identified each one of the two colors 80 percent of the time and failed 20 percent of the time. What is the probability that the cab involved in the accident was Blue than Green?

For the first question did you choose the second option? If yes, then you committed an error which is called as a conjunction fallacy. This fallacy happens when we judge that the probability of two events (bank teller and feminist) occurring is higher than that of a single event (bank teller). Don't feel bad about this as 85 to 90 percent of university students made the same mistake like you.

Let us solve the Linda problem by using middle school mathematics. Let us assume that there are 1000 people and 20 percent of them are bank tellers. Of the 20 percent bank tellers 2 percent of them are active in the feminist movement. This means that there are 200 bank tellers $[1000 * 0.2]$. And 4 feminist bank tellers $[1000 * 0.2 * 0.02]$. You don't need a genius to tell you that 200 bank tellers are more probable than 4 bank teller feminists.

For the second question did you answer 80 percent? If yes, then you failed to evaluate the problem from a Bayesian angle. The correct answer is 41 percent. Once again, let us solve the problem by using middle school mathematics. Let us assume that there are 100 cabs. This means that 85 of them will be green in color and the remaining 15 will be blue in color.

The witness identified the color of the cab to be blue. We know that the witness is correct 80 percent of the time. There are 15 blue cabs in total. This means that the witness will correctly

identify 12 blue cabs $[15 * 0.8]$. But the witness is also incorrect 20 percent of the time. There are 85 green cabs in total. This means that he will incorrectly identify 17 green cabs $[85 * 0.2]$. So the probability of the witness correctly identifying the blue cab is 41 percent.

$P(correct\ blue\ cab) = P(correct\ blue\ cab) / [\ P(correct\ blue\ cab) + P(incorrect\ green\ cab)]$
$P(correct\ blue\ cab) = 12 / [\ 12 + 17]$
$P(correct\ blue\ cab) = 12 / 29$
$P(correct\ blue\ cab) = 41\ percent$

What can we conclude from all of the above? Humans are not perfectly rational as economists are assuming. The next question one should ask is what prevents us from being rational at all the times? The simple answer to this question is evolution.

> *To understand who we really are as humans (and investors), it also helps to consider the environment in which we evolved. Roughly speaking, anatomically modern humans with large brains have been around for about 200,000 years. The part of our brain that evolved most recently is the rational neocortex. But for much of our history, we operated in a dramatically different environment.* ***Today there are substantial parts of our mental apparatus that evolved to help us survive in the wilderness that was home to our hunter-gatherer ancestors. These primitive survival routines embedded in our brains are easily capable of bypassing the neocortex.*** *We might like to perceive ourselves as potential Isaac Newtons, but it's perilous to forget that we also have this other aspect of our nature. Indeed, Newton himself would have been better off if he'd recognized this, given that he was an infamously dumb investor who lost his life savings in the South Sea Bubble. As Newton wryly observed: "I can calculate the movement of stars, but not the madness of men." - [The Education of a Value Investor](#)*

At this point we need a mechanism to identify the conditions under which our brain acts irrationally. How do we go about finding them? If you want to know about the properties of elements, then you should read the periodic table. If you want to know about the solvency of a company, then you should look at its balance sheet. **For learning about our own irrationality we need to read Charlie Munger's [Psychology of Human Misjudgment](#). This is a rare gem and you need to spend a lot of time reading, rereading, and reflecting on it.**

Charlie Munger gave this speech at Harvard Law School in June 1995. If you want to listen to the speech, then click on the image given below. It's very important to apply Munger's teachings on a daily basis. Knowledge without application is useless [use-it-or-lose-it]. To apply it on a daily basis, we need to make it second nature. There are 24 standard causes of human misjudgment. How do we remember all of them? Several years back, I learnt about a powerful technique called as mind mapping. Using this technique we can organize the information visually so that we can recall them easily when needed.
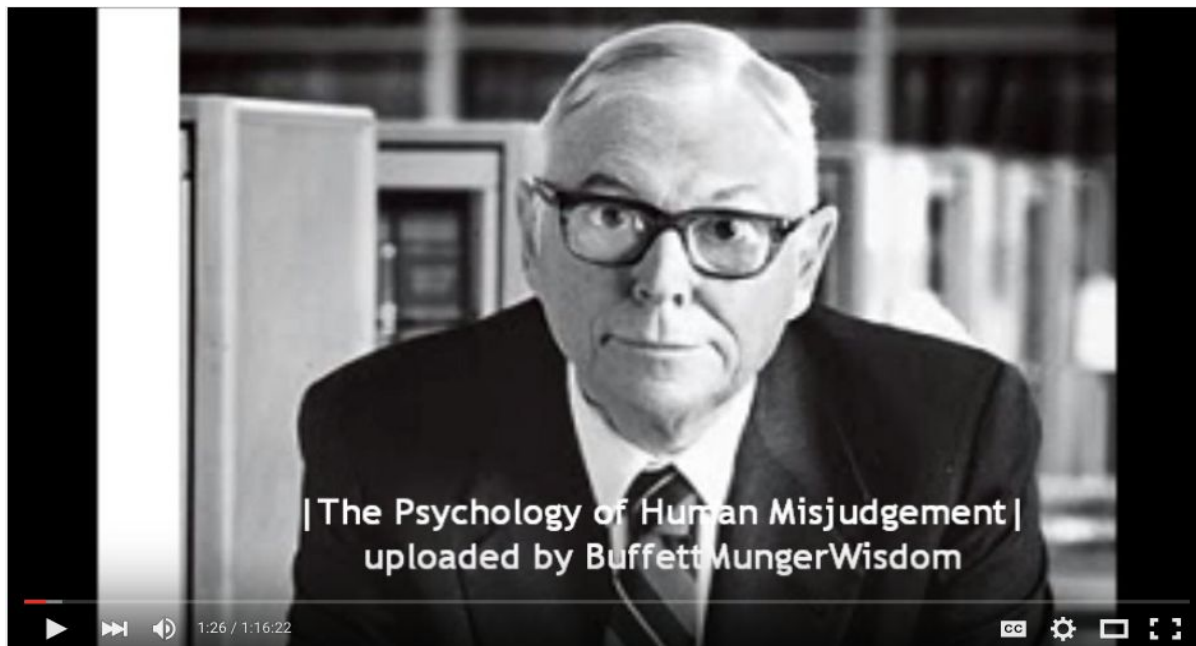
I mind mapped all 24 causes of human misjudgment. You can find all of them here. A few things to note before looking at the mind maps **(1)** In order to understand the mind maps you should have read Munger's psychology of human misjudgment several times **(2)** Click on the mind map **(3)** Enlarge the mind map to view it clearly **(4)** Read them in the clockwise direction **(5)** Repeat several times. Given below is the mind map for one of the misjudgment — Association.
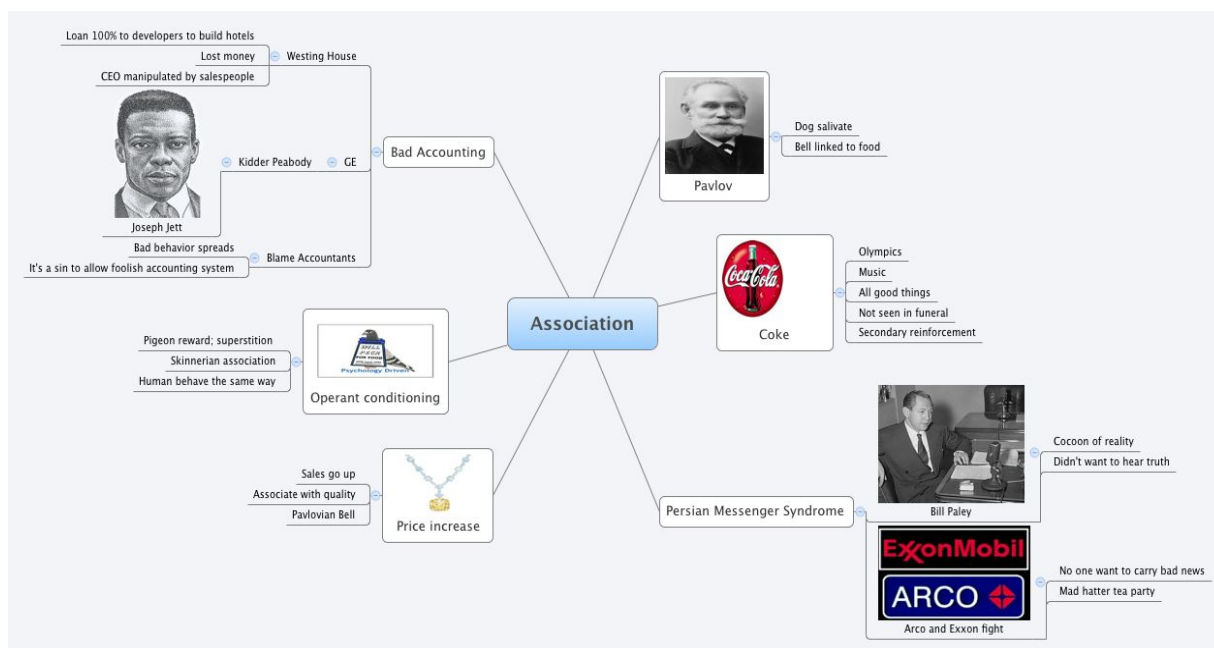


Let us apply Munger's psychology of misjudgment to study the irrational behaviors of people (including those of the luminaries) from many disciplines.

## Thomas Edison and his Liking Bias

Thomas Edison was an American inventor and businessman. He has more than 2300 patents filed under his name. One of his inventions was Direct Current (DC). Nikola Tesla was a Serbian-American inventor who worked for Edison. Under Edison's supervision Tesla developed Alternating Current (AC). DC and AC are different types of current used for the conduction and transmission of electrical energy.

AC has definite advantages over DC. Some of the advantages are **(1)** AC can illuminate light bulbs over greater distances **(2)** AC can power gigantic industrial machines using the same electrical grid. Tesla also claimed that the modern world requires AC and it could only provide the scale and scope needed for extensive use of electricity. Tesla was absolutely correct about his claims. Did Edison accept the superiority of AC and adapt it for commercial use?



> *As a competitive inventor, Edison was not about to let the future of direct current be dictated by chance, so he started a big public relations campaign against alternating current, attempting to generate public fear about the competing technology.* **He initially demonstrated the dangers of AC by directing his technicians to electrocute stray cats and dogs, and used this to show the potential risks of alternating current. As his next step, he secretly funded the development of an electric chair based on alternating current for the purpose of capital punishment.** *The first person ever to be executed in the electric chair, William Kemmler, was slowly cooked alive. Not Edison's finest moment, to be sure, but it was a very effective and rather frightening demonstration of the dangers of alternating current. -* [The Upside of Irrationality](#)

Edison fell in love with his own invention (DC). Even though his invention was inferior compared to AC he tried very hard to campaign against AC. **Edison fell for liking bias and failed to consider the merits of AC**. **If a genius like Edison behaved this way, then how would a normal person like you and me behave?**

## George W. Bush and his Commitment-and-Consistency Bias

In 2003 George W. Bush was the president of the United States. That year he invaded Iraq for the following reasons **(1)** disarm Iraq of weapons of mass destruction **(2)** to end Saddam Hussein's support for terrorism **(3)** to free the Iraqi people. Six weeks after the invasion, Bush gave a speech claiming that the mission is accomplished and the major combat in Iraq has ended. Did Bush find any weapons of mass destruction in Iraq?

> *Bush was wrong in his claim that Saddam Hussein had weapons of mass destruction, he was wrong in claiming that Saddam was linked with Al Qaeda, he was wrong in predicting that Iraqis would be dancing joyfully in the streets to receive the American soldiers, he was wrong in predicting that the conflict would be over quickly, he was wrong in his gross underestimate of the financial cost of the war, and he was most famously wrong in his photo-op speech six weeks after the invasion began, when he announced (under a banner reading **MISSION ACCOMPLISHED**) that "major combat operations in Iraq have ended." -* [Mistakes Were Made (But Not by Me)](#)

As claimed by Bush did the combat really end in six weeks? Of course not. From the chart given below, we can see that the US troops were withdrawn from Iraq only at the end of 2011.



**U.S. troops in Iraq**

President Barack Obama has ordered all U.S. troops out of Iraq by Dec. 31. Troop levels and deaths by month since the U.S. invasion in March

Source: Congressional Research Service, U.S. Defense Department, iCasualties
Graphic: Judy Treible
© 2011 MCT
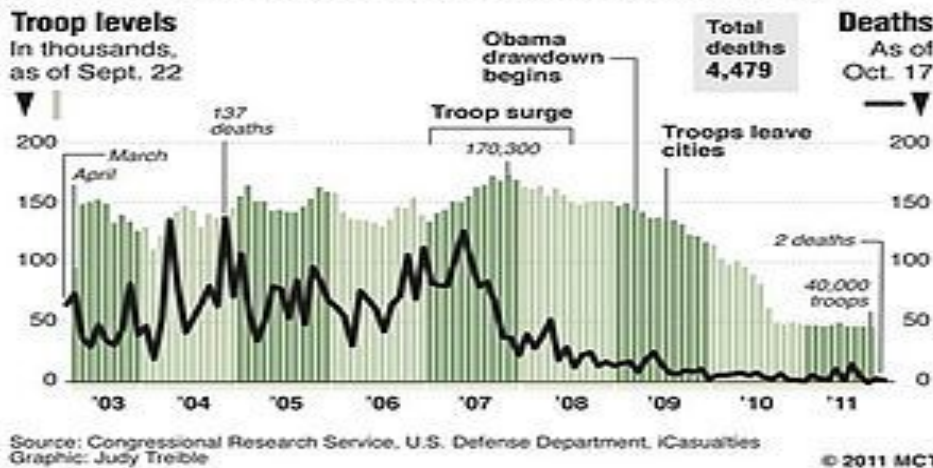
At this point you would expect that Bush would have accepted his mistake in invading Iraq. But he didn't. Instead, Bush was more convinced that the decisions he made are the right decisions. **He fell for the commitment-and-consistency bias. He made a lot of commitment in the form of time, money, promise, effort, and several deaths. And he would look bad if he accepted his mistake in public. So he stayed consistent with his commitment by justifying it to himself and others.**

> *The conservative columnist George Will and the liberal columnist Paul Krugman both called for Bush to admit he had been wrong, but the president remained intransigent. In 2006, with Iraq sliding into civil war and sixteen American intelligence agencies having issued a report that the occupation of Iraq had increased Islamic radicalism and the risk of terrorism,* ***Bush said to a delegation of conservative columnists, "I've never been more convinced that the decisions I made are the right decisions."*** *Of course, Bush had to justify the war his administration pursued in Iraq; he had too much invested in that course of action to do otherwise— thousands of deaths and, according to a conservative estimate from the American Enterprise Institute in 2006, at least a trillion dollars. Accordingly, when he was proved wrong in his original reasons for the war, he found new ones: getting rid of a "very bad guy," fighting terrorists, promoting peace in the Middle East, bringing democracy to Iraq, increasing the security of the United States, and finishing "the task [our troops] gave their lives for." In other words, we must continue the war because we began the war. -* [Mistakes Were Made (But Not by Me)](#)

## Arthur Conan Doyle and his Confirmation Bias

Sir Arthur Conan Doyle was the author and creator of Sherlock Holmes; the most rational and intelligent detective of all time. In one of his books Conan Doyle wrote, "It is a capital mistake to theorize before one has data. Insensibly one begins to twist facts to suit theories, instead of theories to suit facts."

Elsie Wright, aged 16 and Frances Griffiths, aged 10 were two young English cousins who lived in Cottingley, a village outside Bradford in Yorkshire. In 1917 they claimed that they took photographs with the fairies. During that time photography was still a new thing and everyone believed that the fairies were real. In the picture given below you can see that Elsie is playing with the fairy. Was the fairy in the picture real or faked?



The fairy in the picture was faked. Elsie and Frances stuck doggedly to their story for years. Not until March 1983, when she was 76 years old, did Frances finally confess that the fairies in four of the five pictures had been cutouts traced from Princess Mary's Gift Book and secured by hatpins. I am not surprised by the fact that average Joe's of the world believed in the fairy. What surprised me was that Conan Doyle believed in the story. Why did Conan Doyle not look for disconfirming evidence to dismiss the story?

> Word of the Cottingley fairies soon spread. Sir Arthur Conan Doyle, famous as the Edinburgh-born creator of Sherlock Holmes, heard about the pictures from a friend at a time when he was preparing an article about fairy sightings for The Strand magazine. By then he had virtually given up writing fiction to devote himself to promoting the Spiritualist

*cause around the world. On June 30, 1920, Conan Doyle wrote separate registered letters to Elsie and her father. His letter to Arthur Wright was entirely businesslike:* **'Dear Mr Wright, I have seen the very interesting photos which your little girl took. They are certainly amazing. I was writing a little article for The Strand upon the evidence for the existence of fairies, so that I was very much interested.'**

*In truth, it could fairly be said that Conan Doyle was almost genetically programmed to believe in fairies. His family originated in Ireland and his Celtic heritage was populated by many stories about the 'little people'. His unhappy father, Charles Altamont Doyle, an alcoholic committed to a lunatic asylum, filled page after page of a sketchbook with fantastical drawings of fairies, elves, goblins and sprites. His uncle, the artist Richard Doyle, made his reputation with fairy paintings. 'Dicky' Doyle designed the famous cover of Punch magazine, which featured swarms of 'little people' in various poses. Conan Doyle's spiritualism was inspired in part by the death of his son, Kingsley, in 1918 from pneumonia while recovering from his injuries in the Battle of the Somme. - [DailyMail](#)*

**Conan Doyle fell for the confirmation bias. Since childhood Conan Doyle believed in the fairies and throughout his life he was searching for evidences to prove the existence of fairies. The moment he heard about the photograph he used it as a confirming evidence. He never bothered to look for disconfirming evidences to dismiss the fairy story.**

## Multi-storey Building Collapse and First Conclusion Bias

In 2014 a multi-storey building with 11 floors collapsed in Chennai, India. You can read about the news [here](#). Imagine that you read this news, watched it in the news channels several times, and also discussed about this with your friends. What will your conclusion be? Most likely you will conclude that multi-storey buildings are dangerous and if you were planning to buy a new apartment, then you will prefer the ones with fewer floors.

When this incident happened, I was in Chennai and most of my friends were thinking this way. If I tell this to Charlie Munger what would he tell? He would tell that my friends judgment got distorted because of their first conclusion bias — "Human mind is a lot like the human egg, and the human egg has a shutoff device. When one sperm gets in, it shuts down so the next one can't get in. The human mind has a big tendency of the same sort".

Let us analyze this situation rationally like Charlie Munger. How do we do that? The only way to do that is to look at the situation from the lens of multiple disciplines. The first discipline I will use is probability and ask what is the **base rate (prior probabilities)** for these kinds of incidents? I know that it is very low. Then why are people hesitant to buy apartments in multi-storey buildings?
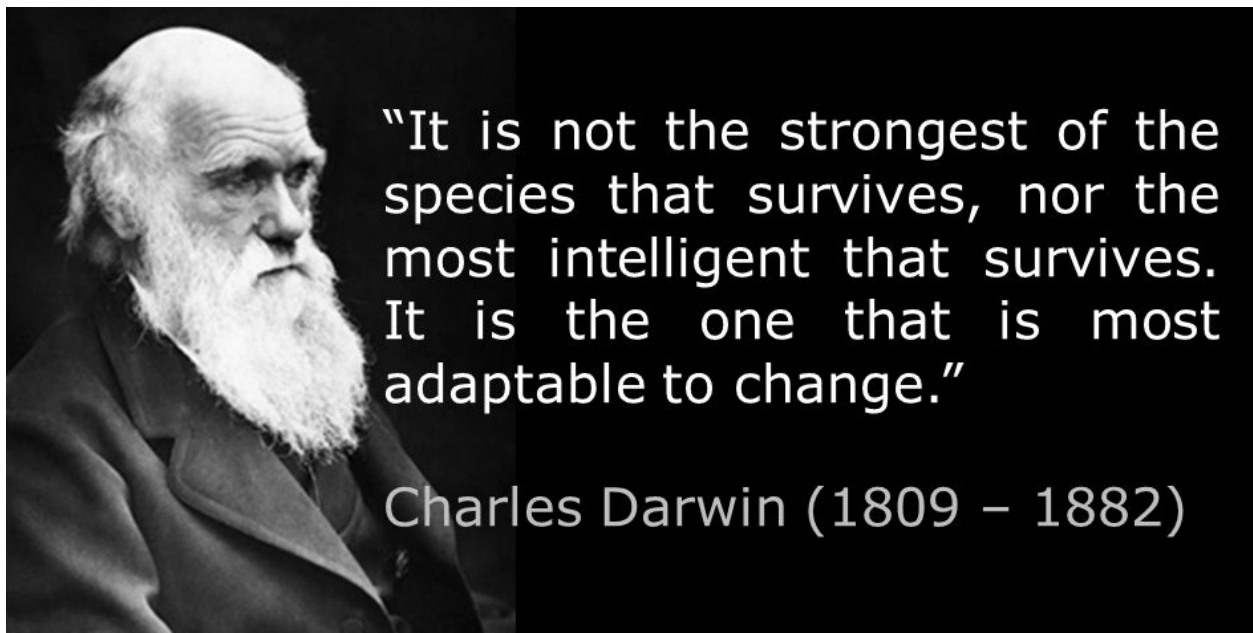
To answer this question I will jump from probability to psychology. Clearly there is a **recency effect**. Things that happened recently was over weighted and base rates are ignored. What else can I come up with? The news channels made this very **vivid** and this prevents people from thinking rationally. Also, everyone is thinking along the same lines and so a strong **social proof** is at play here.

The next question one should ask is why did the building collapse? The builder operated under **incentive caused bias** and compromised on quality. By allowing my mind to wander, in a controlled fashion, from one discipline to another I am able to explain the building collapse in a rational way. Sanjay Bakshi analyzed another news article related to the construction of a nuclear plant in a place called Kudankulam in Tamil Nadu, India. You can find his post here and this is my all time favorite. Read, reread, and reflect on what he wrote.

## Learning From Charles Darwin

Using Munger's framework we looked into several cases in which people behaved irrationally. In the next section we will jump into the domain of finance to look at some more irrational behaviors. Before doing that, let me introduce you to Charles Darwin, who is one of the greatest rational thinkers in the world. Every time I read the book Seeking Wisdom I learn something new. This time I came across the paragraph given below which refers to the autobiography of

Charles Darwin. From this paragraph we can learn a lot about Darwin's thinking habits. There are five things that I learned which I marked it as [1]…[5].



"It is not the strongest of the species that survives, nor the most intelligent that survives. It is the one that is most adaptable to change."

Charles Darwin (1809 – 1882)

*I think that I am superior to the common run of men in noticing things which easily escape attention, and in observing them carefully[1]. My industry has been nearly as great as it could have been in the observation and collection of facts. What is far more important, my love of natural science has been steady and ardent… From my early youth I have had the strongest desire to understand or explain what I observed, that is, to group all facts under some general laws[2]. These causes combined have given me the patience to reflect or ponder for any number of years over any unexplained problem[3]. As far as I can judge, I am not apt to follow blindly the lead of other men[4]. I have steadily endeavored to keep my mind free so as to give up any hypothesis, however much beloved (and I cannot resist forming one on every subject), as soon as facts are shown to be opposed to it[5]. - [Seeking Wisdom](#)*

**[1]** Human brain jumps to conclusions based on vividness and recency of events. It ignores things that cannot be easily recalled however important that fact may be. Darwin understood this and avoided availability bias.

**[2]** You can't really know anything if you just remember isolated facts and try and bang 'em back. If the facts don't hang together on a latticework of theory, you don't have them in a usable form. Darwin understood this and organized his body of knowledge so that it was available to him when needed.

**[3]** Darwin is assiduous and he does not give up on things very easily.

[4] You can't come up with theory of evolution by following the wisdom of crowds. Darwin avoided social proof and instead relied on his own thinking faculties.

[5] He does not fall in love with his own ideas. He pays special attention to evidence that disconfirms his belief. This is one of the greatest qualities to have. I have not seen many people (including myself) with this quality. It is really hard.

**The takeaway lesson that we all can learn from Charles Darwin is that even people who aren't geniuses can outthink the rest of mankind if they develop Darwin's thinking habits. If you want to be a successful stock picker then you need to follow the thinking habits of Charles Darwin.**

## Financial Crisis – United States (2008) – A Lollapalooza Event

Following the dot com crash in 2000 the US economy went into recession. To combat this, Alan Greenspan, chairman of the Federal Reserve at that time, kept the short term interest rates very low at 1 percent. Due to this more money was available in the system and buying homes became very easy. Lots of people with good credit were buying homes. House prices went up. On the other end there were investors with lots of money to invest. Since the interest rates were very low they were not satisfied with the yields that were available to them.

Banks had an idea. They bundled these mortgages and sold it to the investors. These investors received, the mortgage payments made by the homeowners as a yield for their investment. Banks got their commissions for underwriting these loans. The trios [banks, investors, homeowners] were happy. Why is that? Banks made more money on commissions. Investors got a decent yield and house prices were going up which made the homeowners happy.

There were not many people with good credit. This is a problem for the banks as they do not have more people to underwrite loans. Banks had another idea. What if you issue loans to people with bad credit. The loans issued to people with FICO score less than 620 is called as subprime loans. Banks started issuing subprime loans.

> *At age 61, after 13 years of uninterrupted unemployment and at least as many years of living on welfare, she got a mortgage. She got it even though at one time she had 23 people living in the house (576 square feet, one bath) and some ramshackle outbuildings. She got it for $103,000, an amount that far exceeded the value of the house. The place has since been condemned… Halterman's house was never exactly a showcase – the city had since cited her for all the junk (clothes, tires, etc.) on her lawn. Nonetheless, a local financial institution with the cover-your-wallet name of Integrity Funding LLC gave her a mortgage, valuing the house at about twice what a nearby and comparable property sold for… Integrity Funding then sold the loan to Wells Fargo & Co., which sold it to HSBC Holdings PLC, which then packaged it with thousands of*

*other risky mortgages and offered the indigestible porridge to investors. Standard and Poor's and Moody's Investors Service took a look at it all, as they are supposed to do, and pronounced it "triple-A." -* [Foreword from the book The Great Crash 1929](#)

At some point every speculation had to burst. House prices stopped to go up before the financial crisis showed its ugly face. The borrowers did not have enough inflow to pay their mortgage. This should not be surprising as they never had a job in first place. So they defaulted. The investors who purchased these securities did not receive any more payments.

These losses soon spread to other asset classes, fueling a crisis of confidence in the health of the world's largest banks. Lehman Brothers went bankrupt in September 2008, which resulted in a credit freeze that brought the global financial system to the verge of complete collapse. The central banks had to step in to resolve this crisis. Take a look at the S&P 500 chart given below. The index went down by 56 percent from 2007 to 2009.
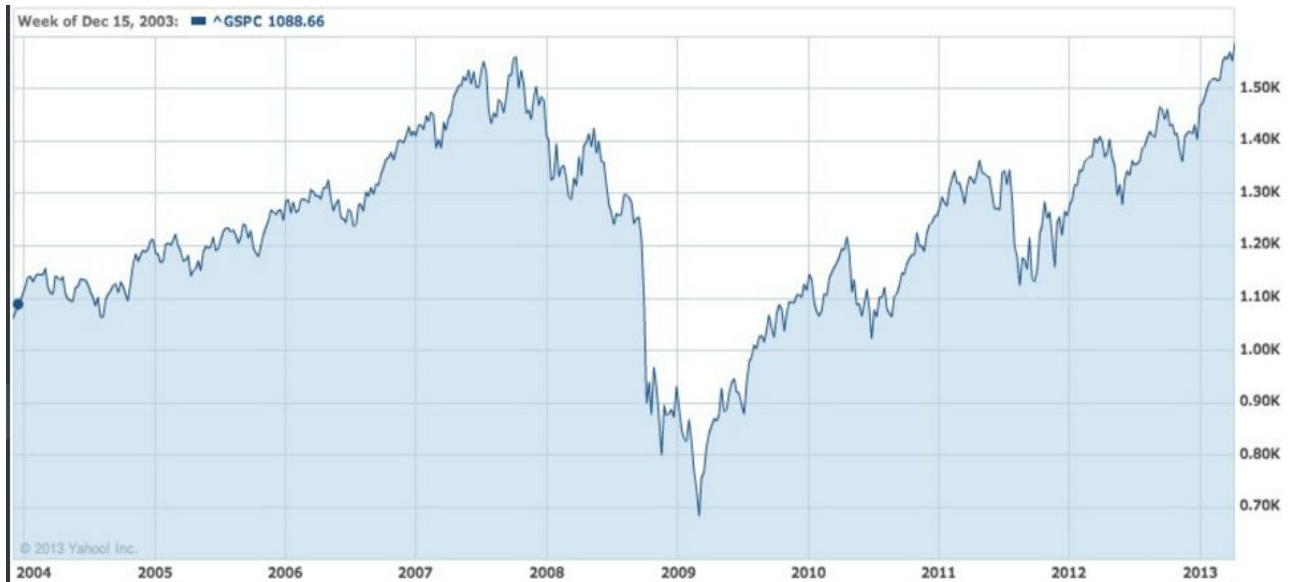


In 2009 Wesco's shareholders meeting, Charlie Munger analyzed the financial crisis through the lens of multiple disciplines. I have reproduced his response as it is. **The response he gave clearly shows the breadth and depth of his multidisciplinary mind. Read, reread, and reflect on Munger's response. They are golden nuggets.**

**What caused the economic mess?**

It was a lollapalooza event – a confluence of causes, that is how complex systems work. All of the following helped:

1) Abusive practices in consumer credit. People who couldn't handle credit were deliberately seduced. People who did it justified it by saying competitors would do it if they didn't. That is not proper. Sometimes you should let others proceed and not copy them. It is

abusive folly. I talked to a plastic surgeon last night who used to let people write checks against a line of credit on their house. Now his clients are finding those credit lines harder to get. A multiple credit card borrower is dangerous. He can look great right up until he goes bankrupt. Banks have abused their prerogatives and have stuck it in too hard. I have a fundamental theory that in some way the world is just, and if you do something immoral or stupid there will likely be a whirlwind someday where you get clobbered.

2) Mortgage brokers – often these are scum of the earth rejoicing in "rooking" the borrowers with flim-flam tricks, which often can happen with minorities in poor neighborhoods. On first and second mortgages – they built a huge balloon bound to create horrible mess, and the mess finally happened.

3) Wall Street went crazy. Any way of earning money short of armed robbery was ok. The last mortgage broker Merrill Lynch bought were a bunch of sleazy crooks even on the face of it. When people behave like that you get a tremendous mess.

4) Regulatory apparatus that allowed all this was also foolish. The regulators and legislators were in two categories. Legislators wanted poor people to have houses, but this is a bad idea since you want credit practices to be sound just like you want your engineering practices to be sound. People making money just rationalized what they did. Accounting systems spit it out as okay, even though in substance it wasn't right. It was ghastly and there was huge envy in the thing. If Joe made $3m, I'm better than Joe and so I deserve $3.5m.

5) Credit system was the repo system, one of best ways to grant unlimited credit ever invented. Then banks offered access to the repo system to hedge funds. It went to enormous excess. Some of it was due to democratic legislators hoping to help the poor, and some also was due to Republicans who overdosed on Ayn Rand. For Republicans, it was like legalizing armed robbery for anyone under 25. It was like letting the financial class prey on the poor. If it was unreasonable for the buyer, you got 9% for selling it. Ethos was of the "buyer beware". The vendors in America should care about selling good stuff to the customer.

6) Then the other issue was in terms of dizzy leverage on stock indices and CDS – where anyone could bet someone would go broke, even if they had no economic interest in the outcome. Then you could help that person along to ruin. We prohibited this in life insurance. I can't buy insurance if I don't have economic interest in the person (spouse, etc). These wise rules were thrown out in CDS markets. Then the people who did the accounting used mark to model. Both sides would allow profits. Anyone with engineering cast of mind will feel like throwing up into the aisle. Well go ahead, it will be a memorable moment if you do.

7) Accounting was phony because all the customers wanted it phony. Commissions were awesomely large, and it influenced people. And Greenspan was saying it was all for the best in the best of all possible worlds. To allow predatory class of people to do whatever they want to others is not like free enterprise at restaurants. The whole thing could go... back in September it was as if every bank deposit became unavailable – it looked like whole system would come crashing down last fall, and it accelerated downwards.

8) Luckily the government was awake, and was sensible enough to try to fix the situation. To fix it, we have to save the banks. That doesn't bother me, if you want perfections you don't live in this world. We had to save people who didn't deserve it, but it was important. It was smart government, taking over Fannie and Freddie and reducing mortgage costs. It was a correct decision.

9) Bank situation is much more complicated issue. The traditional way is you don't hear anything about the regulatory process, then you hear about the results after. There was no bake off – and that is a good system. The announced contest [ed: the stress test] makes me dubious, but it is better than nothing. Some banks should get more financing. Averaged out I would give Treasury Dept good marks, though I don't look forward to what they likely will do to WFC, since we own a lot. Their credit costs them so much less. Treasury are using a one size fits all. I would give WFC a flaming pass. But if it is a little unjust, maybe their duty is to take their medicine. When we have this much trouble, everyone shouldn't be screaming for the last iota. I think everything is working out fairly well. Much of what has been done has been done beautifully.

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## Unforced Errors Of Superinvestors

**Charlie Munger - Are you looking at normalized earnings?**

In February 2000, Charlie Munger purchased 100 percent of Cort Business Services for Wesco. Cort is the leader in rentals of furniture that lessees have no intention of buying. In 1999, Cort had total revenues of $354 million and it had a pre-tax earnings of $46 million. Munger did an all cash deal and he acquired Cort by paying $384 million.

The deal appeared to be a steal as **(1)** Cort was riding on a fundamental shift in the American economy with several companies preferring to lease furniture instead of buying them **(2)** Munger purchased the business at 12 percent pre-tax earnings yield and he got all the future growth of Cort for free **(3)** Cort has long been headed by Paul Arnold who is a star executive. The table given below shows the sales and pre-tax earnings of Cort from [1999 - 2003]. What do you see?

| (in millions) | Cort Business Services | | | | |
| --- | --- | --- | --- | --- | --- |
|  | 1999 | 2000 | 2001 | 2002 | 2003 |
| Sales | $354 | $361 | $395 | $389 | $360 |
| Pre-tax earnings | $46 | $29 | $13.10 | $2.40 | -$6.30 |

After Munger acquired the company in early 2000, its pre-tax earnings started to decline. Why did this happen? During the peak of the dot-com bubble a lot of startup companies were leasing furniture from Cort. This resulted in increasing its sales and pre-tax earnings. When the dot-com

bubble burst many of Cort's lessees went bust. Along with that the earning power of Cort went down to zero.

> CORT has been clobbered by the big dot-com decline. **The whole temporary office business in the country had a huge boom. Law firms, accounting firms, venture capital firms, etc. all expanded. When they went bust, rental firms went bust. In that business, we caught a big recession.** We're having a similar recession in NetJets in that used jets have gone down in price. CORT and NetJets are losing a lot of money. Do I think CORT is going to fail? No. NetJets? No. There are vicissitudes in life. In fact, we're buying other furniture rental companies. Some people vote with their feet; we vote with our wallets. Was our timing great in buying CORT? No, it was terrible. - Munger

But how can anyone know that the dot-com bubble is going to burst? An average person like me would not have seen this coming. Munger knew about the dot-com bubble beforehand. But he failed to see how dependent Cort was on the bubble. According to Mohnish Pabrai, Charlie Munger failed to ask the question - "Are you looking at normalized earnings or are you looking at boom earnings?"

**Warren Buffett - Is the moat sustainable?**

In 1993, Warren Buffett acquired Dexter Shoe of Dexter, Maine, which manufactures men's and women's shoes. He acquired the company by paying $443 million in Berkshire stock. At the time of acquisition Buffett was aware that the domestic shoe industry is finding it hard to compete with imports from low-wage countries. But he thought that the ingenious management of Dexter would be able to fend off foreign competition. Take a look at what Buffett wrote in 1993.

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Dexter, I can assure you, needs no fixing: It is one of the best-managed companies Charlie and I have seen in our business lifetimes.

Harold Alfond, who started working in a shoe factory at 25 cents an hour when he was 20, founded Dexter in 1956 with $10,000 of capital. He was joined in 1958 by Peter Lunder, his nephew. The two of them have since built a business that now produces over 7.5 million pairs of shoes annually, most of them made in Maine and the balance in Puerto Rico. As you probably know, the domestic shoe industry is generally thought to be unable to compete with imports from low-wage countries. But someone forgot to tell this to the ingenious managements of Dexter and H. H. Brown and to their skilled labor forces, which together make the U.S. plants of both companies highly competitive against all comers.

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Within a few years the durable competitive advantage of Dexter disappeared as it was unable to compete with cheap imports. Had Buffett paid $443 million in cash, then the cost of his mistake would have been limited to $443 million. By giving away 1.6 percent of a wonderful business – one now valued at $328 billion – to buy a worthless business the acquisition cost to Berkshire

shareholders is not $443 million, but rather $5.25 billion. According to Mohnish Pabrai, Warren Buffett failed to ask the question - "Is the moat sustainable?"

> *Finally, I made an even worse mistake when I said "yes" to Dexter, a shoe business I bought in 1993 for $433 million in Berkshire stock (25,203 shares of A). **What I had assessed as durable competitive advantage vanished within a few years.** But that's just the beginning: By using Berkshire stock, I compounded this error hugely. That move made the cost to Berkshire shareholders not $400 million, but rather $3.5 billion. In essence, I gave away 1.6% of a wonderful business – one now valued at $220 billion – to buy a worthless business. To date, Dexter is the worst deal that I've made. But I'll make more mistakes in the future – you can bet on that. - Buffett [2007]*

**Guy Spier - Are the company's revenues leveraged to the credit markets?**

CarMax is the Wal-Mart or Costco of second hand cars. It has sold over 4 million cars since opening its first store in Virginia in 1993. It is a highly efficient operation with a narrow spread between what it pays for cars and the price at which it sells them. Customers prefer CarMax because it sells the cars at a very low price. Also, the company has a huge selection of cars on display. The table given below shows the sales and pre-tax earnings of CarMax.

| (in millions) | CarMax 2003 | 2005 | 2007 | 2009 |
|---|---|---|---|---|
| Sales | $3,969 | $5,260 | $7,465 | $6,974 |
| Pre-tax earnings | $149 | $165 | $323 | $96 |

Guy Spier is a Zurich based investor and author of the fantastic book The Education of a Value Investor. He invested in CarMax before the 2008 financial crisis. One of the key aspect of the CarMax business model is that it provides customers with access to financing. In the United States, a significant portion of cars are leased. Without financing, many of its customers would not be able to buy its cars. CarMax was providing the financing by borrowing money from the debt markets. Its business model fell apart during the 2008 financial crisis as it was unable to raise funds from the debt markets. Sales plummeted and the stock price crashed.

> *Sales plummeted because CarMax and its customers could no longer obtain credit amid the global financial crisis. As a result, the stock price crashed. Once again, I discovered the importance of understanding a company's entire value chain. I hadn't given sufficient thought to just how dependent CarMax was on the credit markets, and how vulnerable this made the business. I might well have made the purchase anyway. After all, I could never have predicted the severity of the credit crisis. But this situation taught me how critical it is to discern whether a business is overly exposed to parts of the value chain*

*that it can't control. If this is the case (as it often is), I need to be compensated for that heightened risk with a lower purchase price. **In response to this experience, I developed a checklist item that allows me to get a deeper sense of the quality of the business. One way to word this item might be: "Are the company's revenues leveraged to the credit markets?"** - [The Education of a Value Investor](#)*



In the table given below I have summarized the unforced errors of three superinvestors. What you need to do is to study the mistakes of several other investors (including yourself) and keep adding it to the table. How do I find out the mistakes of other superinvestors? You can start with the book [The Billion Dollar Mistake](#).

| Investor | Company | Unforced Error |
|----------|---------|----------------|
| Charlie Munger | Cort Business Services | Are you looking at normalized earnings or are you looking at boom earnings? |
| Warren Buffett | Dexter Shoes | Is the durable competitive advantage (moat) sustainable? |
| Guy Spier | CarMax | Are the company's revenues leveraged to the credit markets? |
| ... | ... | ... |

Why did I ask you to study the failures of other investors and create a checklist for it? In order to answer that question you need to know that there are two types of failures — Ignorance and Ineptitude. We don't have much control over ignorance as the knowledge for handling that situation doesn't even exist. In case of ineptitude the knowledge exists, yet we fail to apply it correctly.

*The first is ignorance — we may err because science has given us only a partial understanding of the world and how it works. There are skyscrapers we do not yet know how to build, snowstorms we cannot predict, heart attacks we still haven't learned how to stop. The second type of failure the philosophers call ineptitude — because in these instances the knowledge exists, yet we fail to apply it correctly. This is the skyscraper that is built wrong and collapses, the snowstorm whose signs the meteorologist just plain missed, the stab wound from a weapon the doctors forgot to ask about.*

*Here, then, is our situation at the start of the twenty-first century: We have accumulated stupendous know-how. We have put it in the hands of some of the most highly trained, highly skilled, and hardworking people in our society. And, with it, they have indeed accomplished extraordinary things. Nonetheless, that know-how is often unmanageable. Avoidable failures are common and persistent, not to mention demoralizing and frustrating, across many fields — from medicine to finance, business to government. And the reason is increasingly evident: the volume and complexity of what we know has exceeded our individual ability to deliver its benefits correctly, safely, or reliably. Knowledge has both saved us and burdened us.*

***That means we need a different strategy for overcoming failure, one that builds on experience and takes advantage of the knowledge people have but somehow also makes up for our inevitable human inadequacies. And there is such a strategy — though it will seem almost ridiculous in its simplicity, maybe even crazy to those of us who have spent years carefully developing ever more advanced skills and technologies. It is a checklist.*** *- [The Checklist Manifesto](#)*

The unforced errors committed by the superinvestors could have been easily avoided if they had applied what they already knew. They failed because of their ineptitude. By creating a checklist and going through them before buying a stock, we can learn vicariously from others mistakes, reduce failures due to ineptitude, and avoid permanent loss of capital. This is what Mohnish Pabrai did when he came up with a checklist that had about 80 items in it. To find out why Pabrai believes in checklists click [here](#), [here](#), and [here](#).

## Few Items To Read

1. Terribly smart people make totally bonkers mistakes by not knowing basic human psychology. Without a basic understanding of human psychology, we will fail in our life. Read the books [Thinking Fast and Slow](#), [Predictably Irrational](#), and [Influence](#).
2. What book has the most page-for-page wisdom? Without doubt I would recommend reading [Poor Charlie's Almanack](#) and [Seeking Wisdom](#).

3.  Learning happens in two ways — Direct and Vicarious. If you want to avoid permanent loss of capital then you need to take the vicarious route and learn from others failures. Read the book [The Billion Dollar Mistake](#).
4.  Read the book [The Checklist Manifesto](#) and minimize failures due to ineptitude by creating checklists.

# It's Not Easy

Jeff Bezos, founder and CEO of Amazon, tells that a dreamy business has four characteristics. They are **(1)** customers love it **(2)** it can grow to very large size **(3)** it has strong returns on capital **(4)** it's durable in time with the potential to endure for decades. When you find such a business he tells, "Don't just swipe right, get married." Clearly Amazon has all the four characteristics of a dreamy business. Can we go ahead and buy the stock? Not so fast. Take a look at the table given below. What do you see?

| Company | Earning per share | Share price | Price/Earnings |
|---|---|---|---|
| 2015 Estimates | | | |
| Amazon | $12.19 | $650 | 53 |
| Walmart | $4.50 | $59 | 13 |

Amazon doesn't have any accounting profits. I am assuming 7 percent of its sales comes from AWS at 25 percent pretax margin. 93 percent of sales at 7 percent pretax margin. Tax rate of 35 percent.

After baking in a lot of assumptions, Amazon's price-to-earnings ratio comes to 53. On the other hand, its competitor Walmart is selling only at a price-to-earnings ratio of 13. Investors are paying 4 times more for Amazon's earnings. From this, can we conclude that Mr. Market is crazy and invest our money in Walmart stock as it appears cheap? Not so fast. Take a look at the chart given below. In the last 10 years Amazon compounded its sales at 26 percent compared to Walmart's 4 percent.



Sales growth year-over-year
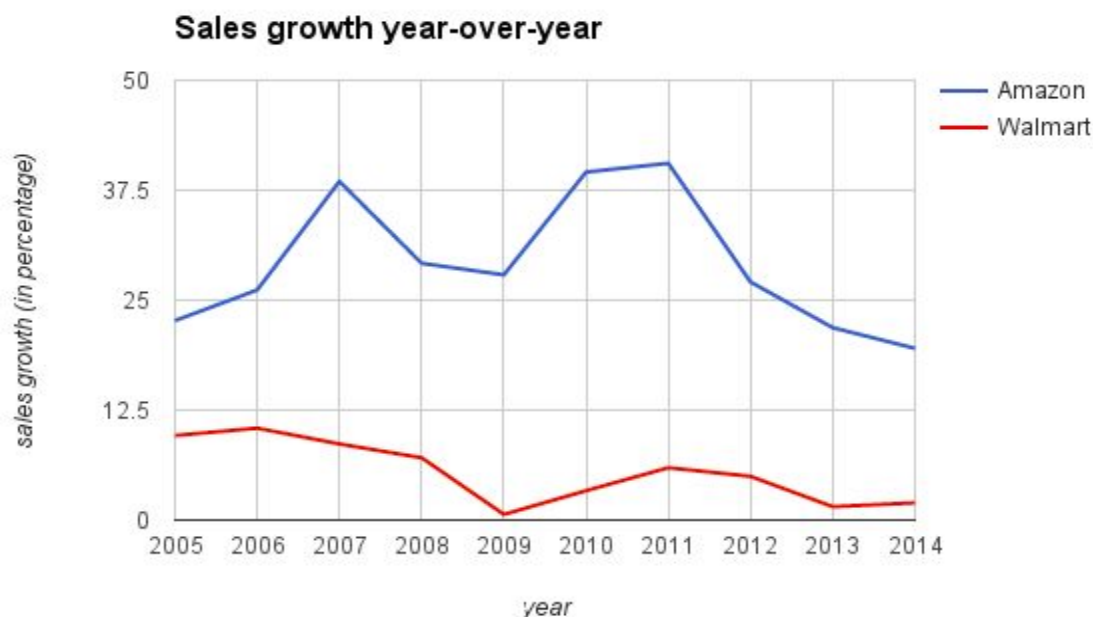
From the beginning Amazon's business model is built to take advantage of online commerce. It is enjoying a lot of tailwind as a lot of offline sales is migrating to the internet. Also cloning an online platform internationally is much easier for Amazon. Walmart is a king of offline retail and it was late to enter online commerce. It is facing a lot of headwinds as its year-over-year same store sales is decreasing. Also, its operating margins are under pressure as it increased the hourly wages of the store associates. And it is making a lot of investments in eCommerce to catch up with Amazon.

If I ask you to buy either Amazon or Walmart, which one would you buy? If you analyze the situation from the vantage point of business, then Amazon would be the obvious choice. But from the vantage point of price Walmart appears to be the winner. But a shrewd investor should analyze it from the vantage point of both business and price. When you do that it is not clear which one should you pick. The situation appears to be a Gordian Knot. Picking winning stocks is similar to picking a winning horse at the racetrack. And it's hard to pick winners consistently.



*The model I like—to sort of simplify the notion of what goes on in a market for common stocks—is the pari-mutuel system at the racetrack. If you stop to think about it, a pari-mutuel system is a market. Everybody goes there and bets and the odds change based on what's bet. That's what happens in the stock market.* **Any damn fool can see that a horse carrying a light weight with a wonderful win rate and a good post position etc., etc. is way more likely to win than a horse with a terrible record and extra weight and so on and so on. But if you look at the odds, the bad horse pays 100 to 1, whereas the good horse pays 3 to 2. Then it's not clear which is statistically the best bet using the mathematics of Fermat and Pascal. The prices have changed in such a way that it's very hard to beat the system.** *-* [Charlie Munger](#)

Don't feel dejected that you are unable to decide between Amazon and Walmart. Picking a winning stock is not easy. This is the reason why Charlie Munger said that investing is not supposed to be easy. Anyone who finds it easy is stupid. Another famous economist named John Kenneth Galbraith told the same thing using different words — **"There is nothing reliable to be learned about making money. If there were, study would be intense and everyone with a positive IQ would be rich."**

Markets are meeting places where people come together, both physically and virtually, to exchange goods and services. One of the primary functions of any market is to eliminate the opportunity for excess returns. This is also applicable to the stock market. And this is the reason why we call the **stock market as almost efficient**. This means that most of the times the price of any stock will be equal to its intrinsic value.

The word "almost efficient" is misunderstood by a lot of investors. Proponents of the efficient market theory (passive investors) read "almost efficient" as "always efficient". This made them to theorize that nobody can beat the market without taking excess risk. On the other hand, most of those who don't believe in the efficient market theory (active investors) read "almost efficient" as "never efficient". This makes them to feverishly jump in and out of stocks. This is the reason why a lot of investors after adjusting for transaction costs fail to beat the market.

Earning above average returns consistently is not easy. In order to generate above average returns, you need to **(1)** Bet rarely, but heavily when the world offers you the opportunity **(2)** Be a second level thinker **(3)** Have an edge over the wisdom of the crowds. Let's look at each one of the points in detail.

## Bet Rarely, But Heavily

Big opportunities come infrequently in the stock market. It would be stupid to assume that you can find them every day. When it comes then you need to act and bet heavily. As Buffett says, **"When it's raining gold, reach for a bucket, not a thimble."** Take a look at the table given below. What do you see?

| (in billions) | Amazon | | | | | |
| --- | --- | --- | --- | --- | --- | --- |
| | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 |
| Market Capitalization | $38.54 | $21.99 | $59.73 | $81.18 | $78.72 | $113.90 |
| Sales | $14.83 | $19.16 | $24.40 | $34.20 | $48.07 | $61.09 |
| Operating cash flows | $1.40 | $1.60 | $3.29 | $3.49 | $3.90 | $4.18 |
| Cash flow yield | 3.63% | 7.28% | 5.51% | 4.30% | 4.95% | 3.67% |

In 2008 and 2009 you could have bought Amazon stock at an operating cash flow yield of 5.5 percent or above. At this cash flow yield you are getting all of Amazon's growth for free. In hindsight the deal is an absolute steal. In one speech Charlie Munger gave the secret of successful bettors. I have reproduced it here as is. Read, reread, and reflect on what he wrote.

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How do you get to be one of those who is a winner — in a relative sense — instead of a loser? Here again, look at the pari-mutuel system. I had dinner last night by absolute accident with the president of Santa Anita. He says that there are two or three betters who have a credit arrangement with them, now that they have off-track betting, who are actually beating the house.

They're sending money out net after the full handle—a lot of it to Las Vegas, by the way—to people who are actually winning slightly, net, after paying the full handle. They're that shrewd about something with as much unpredictability as horse racing. And the one thing that all those winning betters in the whole history of people who've beaten the pari-mutuel system have is quite simple. They bet very seldom.

**It's not given to human beings to have such talent that they can just know everything about everything all the time. But it is given to human beings who work hard at it—who look and sift the world for a mispriced be—that they can occasionally find one. And the wise ones bet heavily when the world offers them that opportunity. They bet big when they have the odds. And the rest of the time, they don't. It's just that simple. That is a very simple concept. [Emphasis mine]**

And to me it's obviously right—based on experience not only from the pari-mutuel system, but everywhere else. And yet, in investment management, practically nobody operates that way. We operate that way—I'm talking about Buffett and Munger. And we're not alone in the world. But a huge majority of people have some other crazy construct in their heads. And instead of waiting for a near cinch and loading up, they apparently ascribe to the theory that if they work a little harder or hire more business school students, they'll come to know everything about everything all the time. To me, that's totally insane.

The way to win is to work, work, work, work and hope to have a few insights. How many insights do you need? Well, I'd argue: that you don't need many in a lifetime. If you look at Berkshire Hathaway and all of its accumulated billions, the top ten insights account for most of it. And that's with a very brilliant man—Warren's a lot more able than I am and very disciplined—devoting his lifetime to it. I don't mean to say that he's only had ten insights. I'm just saying, that most of the money came from ten insights.

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## Second Level Thinking

In the fantastic book [100-to-1-in-the-stock-market](#) Thomas Phelps writes -— "Most of us want pretty much the same material things in life – good food, good clothes, a home on the right side of the railroad tracks, good schools for our children. To get more than the average we must be

able to do more than the average, or do what we do better than the average. If all we can do is take in washing there will always be someone down the street ready to take it for two cents a pound less than our price." The same philosophy applies in the stock market also. If you want to beat the market, then you need to do better than the average. **Howard Marks, a renowned distressed debt investor, says that if you want to be above average then you need to be a second level thinker.**

> *The first-level thinker simply looks for the highest-quality company, the best product, the fastest earnings growth or the lowest p/e ratio. He's ignorant of the very existence of a second level at which to think, and of the need to pursue it.*
>
> *The second-level thinker goes through a much more complex process when thinking about buying an asset. Is it good? Do others think it's as good as I think it is? Is it really as good as I think it is? Is it as good as others think it is? Is it as good as others think others think it is? How will it change? How do others think it will change? How is it priced given: its current condition; how I think its condition will change; how others think it will change; and how others think others think it will change? And that's just the beginning. No, this isn't easy. -* [*Howard Marks*](#)

In the table given below you can find how a first and second level thinker would analyze the current situation of Amazon and Walmart. Also, I have added another row for Nestle India. In the month of June the stock price of Nestle India went down by around 25 percent in a few days. Why did that happen? Nestle's Maggi noodles got banned in India due to concerns about lead contaminations. And Maggi represented 25 percent of its sales.

| Company | First Level Thinking | Second Level Thinking |
|---------|---------------------|----------------------|
| Amazon | A great company run by an intelligent fanatic. The company makes a lot of little bets and it frequently comes out with blockbuster hits like Kindle, Prime, AWS, etc. It has a long runway as it's just scratching the surface in the emerging markets like India. No price is too high to pay. The stock is a buy. | It's a great company. But everyone knows this and the current stock price already reflects a lot of future growth. If everyone likes it, then there is a huge downside risk if the crowd changes their opinion. If the future falls short of high expectations then it would result in permanent loss of capital. |
| Walmart | In less than one year the stock went down from $90 to $59. The stock price got corrected by over 35 percent. The stock price of Walmart can't go any lower as it is a great company. The stock is a | The company is facing a lot of headwinds currently. Is this a temporary problem? Is the earning power of the company intact? I don't know the answer for sure. Let me dig further and find out if the earning |

| | | |
|---|---|---|
| | buy. | power of Walmart is intact. As Howard Marks tells, **"An asset may have a low absolute dollar price, a low price compared to the past, or a low p/e ratio, but usually the price has to be low relative to the asset's intrinsic value for the investment to be attractive and for the risk to be low. It's easy for investors to get into trouble if they fail to understand the difference between cheapness and value."** |
| Nestle India | The stock price of the great compounding machine got corrected by 25 percent. Mr. Market is stupid and this is a no brainer decision. The stock is a buy. | Around the same time Sanjay Bakshi shared a note that he wrote to himself. What he wrote is a great example of second level thinking. This is what he wrote, **"Buying the stock just because it has fallen post the news about alleged leaded Maggi, without any consideration for the potential impairment of earnings (and more importantly the company's reputation and moat) would be faulty process, even if it results in a good outcome. One needs to wait to find the truth. If Maggi is found to be contaminated, then one has to evaluate the impact on the company's long-term earnings and reputation. The stock may have fallen but it's P/E (based on normal earning power in the future) may have risen."** |

## Three Edges to Beat Mr. Market

Around 93 percent of the U.S. students estimated to be "above average" drivers. And 68 percent of the faculty at the University of Nebraska rated themselves in the top 25 percent for their teaching abilities. The majority of the students and faculties sincerely believe that they are better than the average. But the iron law of mathematics is that everyone can't be above average. The reason for this belief is their overconfidence.

Most of the investors, including myself, believe that the odds of them beating the market indices over the long term is greater than 90%. But the truth is that 90 percent of them will fail. What should one do to beat the market? Last year I attended a value investing course at Stanford. You can read about it here. In it, I learnt that to beat the market one needs to have an edge. There are three ways by which an edge can be created. They are informational, analytical, and behavioral.

**(1) Informational Edge**

Informational edge gets created when you know about a company better than anybody else. Regulation Fair Disclosure mandates that all publicly traded companies must disclose material information to all investors at the same time. In that case how can one create an informational edge? There are couple of ways by which informational edge gets created. The first method is to trade the stock by using insider information. Since this is not legal let's not bother about it.

The second method is to study businesses that are not covered by any analysts. This is the case for microcaps, smallcaps, and spinoffs. For these companies you won't find a lot of information in their annual reports. And to gain informational edge you need to do grassroots research, also known as scuttlebutt or kicking the tires. If you follow the advice of Buffett given below then you will gain informational edge.

> *If I were looking at an insurance company or a paper company, I would put myself in the frame of mind that I had just inherited that company, and it was the only asset my family was ever going to own. What would I do with it? What am I thinking about? What am I worried about? Who are my competitors? Who are my customers? Go out and talk to them. Find out the strengths and weakness of this particular company versus other ones. If you've done that you may understand the business better than the management.*

Take a look at the table given below for Kitex Garments. This is a publicly traded company in India which is engaged in manufacturing and exporting kids garments. From 2010 to 2014 the company compounded its sales and operating profits by 16 percent and 24 percent. It reduced its debt and compounded its earnings per share by 33 percent.

But the market didn't rerate the stock and it was selling at 7 times earnings. Why is that? There was no institutional ownership and none of the analysts were following the company. So not a lot of information was available about the company. The only way to get an information advantage is to do grassroots research. Did someone do it?

| | FY2010 | FY2012 | FY2014 |
|---|---|---|---|
| Sales (in crores) | 247.42 | 312 | 442.21 |
| Operating Profit (in crores) | 43.01 | 58.87 | 100.51 |
| Operating margin | 17.38% | 18.87% | 22.73% |
| Debt-to-Equity | 1.26 | 1.04 | 0.77 |
| Return on capital employed | 28.56% | 30.90% | 37.80% |
| Earnings per share | 3.9 | 5.71 | 12.08 |
| Price-to-Earnings | 6.33 | 8.24 | 7.38 |

You can find the telltale signs of grassroots research here and here. Spend some time to go through the research and you'll learn a lot from it. The price chart given below shows the advantages of having an informational edge.



**(2) Analytical Edge**

Analytical edge gets created when the same information is processed differently by someone to gain unique insights. This is similar to a commander who was able to sense that the house is about to collapse due to fire beneath the basement.

> The psychologist Gary Klein tells the story of a team of firefighters that entered a house in which the kitchen was on fire. Soon after they started housing down the kitchen, the commander heard himself shout, "Let's get out of here!" without realizing why. The floor collapsed almost immediately after the firefighters escaped. Only after the fact did the

*commander realized that the fire had been unusually quiet and his ears had been unusually hot. Together, these impressions prompted what he called a "sixth sense of danger." He had no idea what was wrong, but he knew something was wrong. It turned out that the heart of the fire had not been in the kitchen but in the basement beneath where the man had stood. - Thinking Fast and Slow*

Take a look at the table given below for Google. From 2010 to 2014 the company compounded its sales at a healthy rate of 22 percent. But operating income and earnings per share compounded only at 12 percent. A person with an analytical edge would question why did the operating margin go down from 35 to 25 percent. Upon analysis he would find that the company has been spending heavily on R&D non-related to core advertising. And it doesn't add anything to sales for now. So he would look at the normalized expense instead of looking at a single year expense.

| (in millions) | 2010 | 2011 | 2012 | 2013 | 2014 |
|---|---|---|---|---|---|
| | | | | | |
| Sales | $29,321.00 | $37,905.00 | $46,039.00 | $55,519.00 | $66,001.00 |
| Operating Income | $10,381.00 | $12,242.00 | $13,834.00 | $15,403.00 | $16,496.00 |
| Operating Margin | 35.40% | 32.30% | 30.05% | 27.74% | 24.99% |
| Reported EPS | 13.36 | 15.1 | 16.42 | 19.43 | 21.37 |

At a normalized operating margin of 30 percent the intrinsic value of Google with zero growth is $445. At one point the stock was selling for $500. This means that anyone could have bought the stock by paying very little for growth. This is cheap for a company growing it sales at 20 percent.
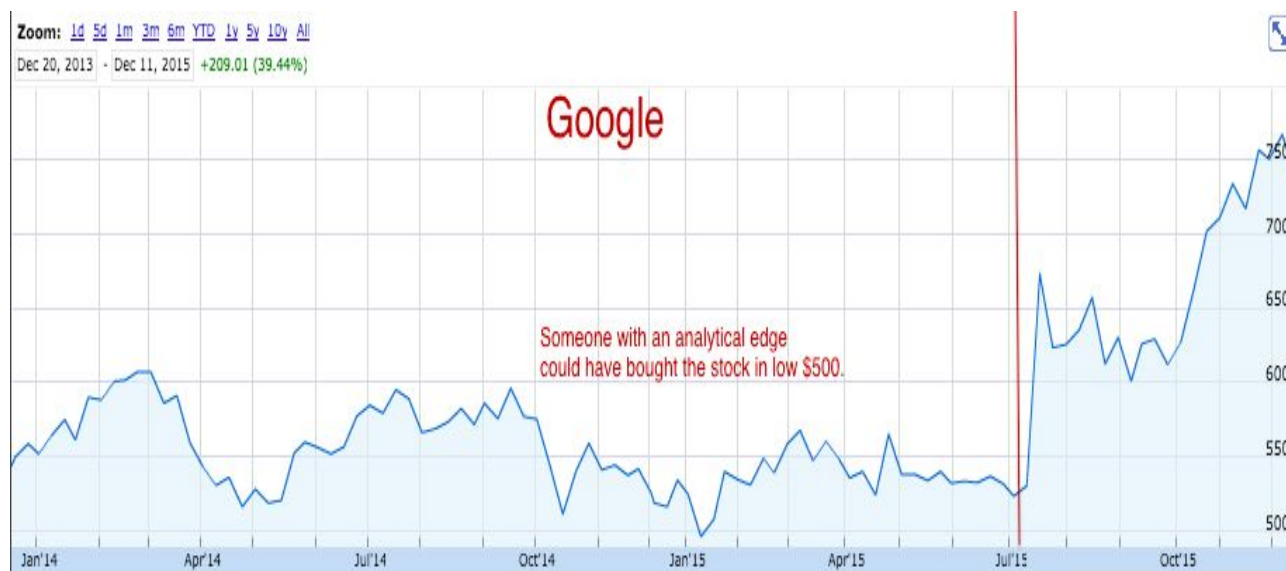
**(3) Behavioral Edge**

Behavioral edge is the most important edge you need. Its ok to not have informational and analytical edge. But if you don't have behavioral edge then you're doomed to fail. In the video given below watch from 00:00 to 1:00 minutes to see Munger talk about behavioral edge.



*I think its in the nature of long term shareholding that the normal vicissitudes in worldly outcomes and in markets the long term holder has his quoted value of his stocks go down by fifty percent. **If you're not willing to react with equanimity to a market price decline of fifty percent two or three times a century then you are not fit to be a common shareholder.** And you deserve mediocre results you're going to get compared to people who do have the temperament. – Munger*

Behavioral edge can be obtained by following a process and sticking to it through thick and thin. Each one of us are different and there is no one process that would apply to everyone. The key is to have a process. The one that I follow to obtain behavioral edge are **(1)** identify 50 high quality compounding machines that I would be proud to own for a long time **(2)** study them thoroughly **(3)** sit patiently and wait for the right pitch.

Given below is the price-to-earnings chart of MasterCard (compounding machine). From 2011 to 2014 this excellent franchise compounded its sales and earnings per share by 14 percent and 22 percent. During the entire 2011 the stock was available at a bargain price of 17 times earnings. Anyone with a behavioral edge would have identified this opportunity and loaded up on this franchisee.

For advanced charting, view our full-featured Fundamental Chart

MasterCard

High quality franchise could
have been bought for around
17 times earnings.

## If you can't beat the market, then be the market

I was very fortunate to attend Munger's DJCO annual meeting earlier this year. One of the attendees asked the following question to Munger, "I am curious why, despite a large Asian population in the US only a few end up at the top?". It was an excellent question and I was at the edge of my seat expecting Munger to give a lengthy response.

But Munger answered the question succinctly by using his mental models. He said, **"Arithmetic plays against you. And 99 percent of the population is going to end up in the bottom 99 percent, and 1 percent of the population will end up at the top 1 percent."** The response which Charlie Munger gave is very much applicable to the world of stock picking. Over the very long term (20+ years) not many active investors would be able to beat the market indices like S&P 500. Being average in schools, colleges, and offices might not be considered as a good thing.

Don't let your Pavlovian association to assume that being average in the stock market is bad. If you remain average by buying and holding market indices like S&P 500 for longer periods of time, then your chances of ending up in the top 10-20 percent is very high. This is what Buffett meant when he wrote, "when dumb money acknowledges its limitations, it ceases to be dumb.**"** Buffett clearly wrote about this in his 2013 shareholder letters. I have reproduced it here as it is. **Read the next two pages and that is all you need to know to be a passive investor.**

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When Charlie and I buy stocks – which we think of as small portions of businesses – our analysis is very similar to that which we use in buying entire businesses. We first have to decide whether we can sensibly estimate an earnings range for five years out, or more. If the answer is yes, we will buy the stock (or business) if it sells at a reasonable price in relation to the bottom boundary of our estimate. If, however, we lack the ability to estimate future earnings – which is usually the case – we simply move on to other prospects. In the 54 years we have worked together, we have *never* foregone an attractive purchase because

of the macro or political environment, or the views of other people. In fact, these subjects never come up when we make decisions.

It's vital, however, that we recognize the perimeter of our "circle of competence" and stay well inside of it. Even then, we will make some mistakes, both with stocks and businesses. But they will not be the disasters that occur, for example, when a long-rising market induces purchases that are based on anticipated price behavior and a desire to be where the action is.

Most investors, of course, have not made the study of business prospects a priority in their lives. If wise, they will conclude that they do not know enough about specific businesses to predict their future earning power.

I have good news for these non-professionals: The typical investor doesn't need this skill. In aggregate, American business has done wonderfully over time and will continue to do so (though, most assuredly, in *unpredictable* fits and starts). In the 20th Century, the Dow Jones Industrials index advanced from 66 to 11,497, paying a rising stream of dividends to boot. The 21st Century will witness further gains, almost certain to be substantial. **The goal of the non-professional should not be to pick winners – neither he nor his "helpers" can do that – but should rather be to own a cross-section of businesses that in aggregate are bound to do well. A low-cost S&P 500 index fund will achieve this goal. [Emphasis Mine]**

That's the "what" of investing for the non-professional. The "when" is also important. The main danger is that the timid or beginning investor will enter the market at a time of extreme exuberance and then become disillusioned when paper losses occur. (Remember the late Barton Biggs' observation: "A bull market is like sex. It feels best just before it ends.") **The antidote to that kind of mistiming is for an investor to accumulate shares over a long period and never to sell when the news is bad and stocks are well off their highs. Following those rules, the "know-nothing" investor who both diversifies and *keeps his costs minimal* is virtually certain to get satisfactory results. Indeed, the unsophisticated investor who is realistic about his shortcomings is likely to obtain better long- term results than the knowledgeable professional who is blind to even a single weakness. [Emphasis Mine]**

If "investors" frenetically bought and sold farmland to each other, neither the yields nor prices of their crops would be increased. The only consequence of such behavior would be decreases in the overall earnings realized by the farm-owning population because of the substantial costs it would incur as it sought advice and switched properties.

Nevertheless, both individuals and institutions will constantly be urged to be active by those who profit from giving advice or effecting transactions. The resulting frictional costs can be huge and, for investors in aggregate, devoid of benefit. So ignore the chatter, keep your costs minimal, and invest in stocks as you would in a farm.

My money, I should add, is where my mouth is: What I advise here is essentially identical to certain instructions I've laid out in my will. One bequest provides that cash will be delivered to a trustee for my wife's benefit. (I have to use cash for individual bequests, because *all* of

my Berkshire shares will be fully distributed to certain philanthropic organizations over the ten years following the closing of my estate.) **My advice to the trustee could not be more simple: Put 10% of the cash in short-term government bonds and 90% in a very low-cost S&P 500 index fund. (I suggest Vanguard's.) I believe the trust's long-term results from this policy will be superior to those attained by most investors – whether pension funds, institutions or individuals – who employ high-fee managers. [Emphasis Mine]**

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## Closing Thoughts

In the month of March, I was very lucky to attend the talk given by Mohnish Pabrai and Guy Spier at Stanford Business school. **The core theme of the talk was centered around the concept of giving without expecting anything in return.** Guy drew a chart on the board which I redraw below with my own annotations. He told us to be a giver without expecting anything in turn. In the first few years one won't see much happening to their goodwill account. But as years progress, goodwill snowballs and starts to grow exponentially. Buffett's goodwill account is at its peak and still growing at alarming rates.
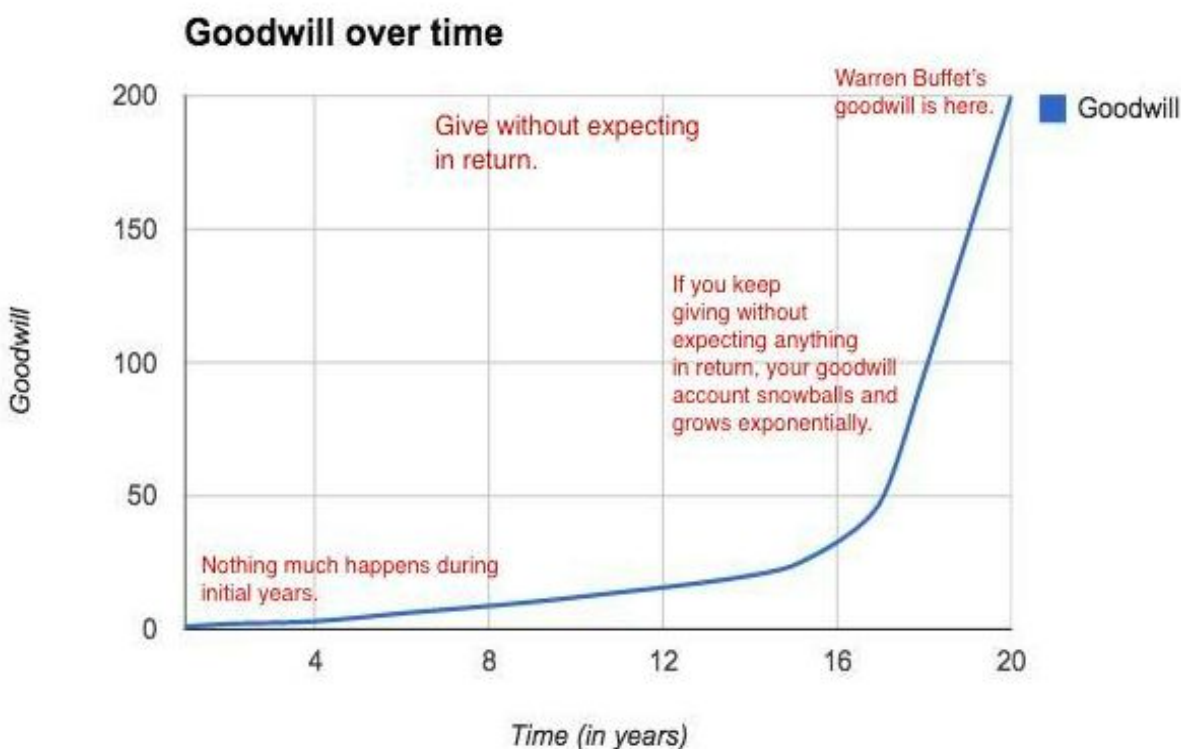


Stock picking is a narrow art. To be successful one needs to synthesize ideas from several disciplines. And it requires lifelong learning. In order to learn this art deeply I am teaching value

investing for free. Charlie Munger says that, **"The best thing a human being can do is to help another human being know more."**.

I am following the advice of Guy Spier and Charlie Munger by sharing my knowledge for free through the lecture notes without expecting anything in return. Don't let your associative brain jump to conclusions that free notes are of low quality. I spent 2.5 months to compile the lecture notes. And it contains all the investing knowledge I accumulated over the last decade. **If you really find the lecture notes useful then share it with those who are entering the world of value investing. Sharing is caring.**

## Few Items To Read And Watch

1. Read the excellent book [The Most Important Thing](#) by Howard Marks. Do you need a nudge to read? This is what Warren Buffett wrote as a blurb on the book cover, **"This is that rarity, a useful book."** If you don't have time to read, then watch Howard Marks [presentation](#) at Google.
2. Warren Buffett never talks publicly about the stock market. But he did talk about it a couple of times in 1999 and 2001. You can find it [here](#) and [here](#). In it, he answers what returns one can expect from the stock markets over the very long term.
3. A small number of black swans explain almost everything in our world, from the success of ideas and religions, to the dynamics of historical events, to elements of our own personal lives. But these are predictable only in hindsight and luck plays a huge role in all these outcomes. Read the book [The Success Equation](#), [The Black Swan](#), and [Fooled By Randomness](#).
4. If you want to learn more about passive investing (index funds) then read the book [Winning the Loser's Game](#) and [The Little Book of Common Sense Investing](#).
5. I was extremely lucky to spend two months in India seeking wisdom from a lot of smart value investors. Click [here](#) to know more about what I learnt from them.