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Tesla, Inc. (\$302)

Before we delve into our investment thesis on Tesla, Inc., a little background may be helpful. We are value investors. You know, the backward looking, head in the sand, numbers focused relics that have no business discussing the future. We simply “don’t get it (the vision)”. We miss every Google, Apple, Cisco Systems, etc. It is a wonder we have any clients.

My personal background is that I have a degree in Mechanical Engineering, *Tau Beta Pi*, from the UW - Madison, an MBA in Finance and Economics, quaint and old fashioned as those are, from the University of Chicago, and a CFA. I have been in the investment business since 1993, running both equity and fixed income strategies. The two mutual funds I managed grew from \$5 million and \$13 million, respectively, in 1993 to multi-billion dollar funds each due to performance that attracted significant attention. I started a mortgage insurance company in 2009 that is now public (NMI Holdings, Inc), formed an investment partnership called The Vilas Fund, LP in 2010, and started a mortgage banking company in 2012 that is profitable and growing nicely. I understand and enjoy business, especially growing them. More on my background at the end, if interested. Enough about me.

Summary

Tesla, Inc. is an over-hyped, lousy company, from a financial perspective, that is destined to go bankrupt. There, I said it. Bring on the critics. Contrary to the likely barbs and pitchforks we will receive, I do wish that global warming was not occurring and that the polar bears and penguins could live undisturbed in their former environments.

Tesla Background

Tesla is a new(er) entrant into the automobile, solar and battery storage businesses. Since Tesla’s current revenue is roughly 99% automobile related and, due to the Model 3 introduction and projected sales, this ratio will likely remain similar for quite some time. Thus, Tesla is an auto manufacturer, plain and simple. Panasonic supplies Tesla (and any other company willing to submit a purchase order) with batteries. Other companies provide Tesla with electric motors, tires, wheels, etc. Thus, with a few extraneous business lines, Tesla designs and assembles cars. For comparison, Honda makes jet airplanes, ATV’s and boat motors. Still, Honda is considered an auto company as the majority of its revenue is derived in that business. Until Tesla’s battery storage business and solar equipment business become majority contributors, it will remain viewed as an auto company.

Unfortunately for Tesla, none of those businesses are currently profitable, nor do we see any possibility of them becoming materially profitable over any visible time horizon. Tesla has had a ton going for it: extremely cheap equity and debt capital, government loans, huge government subsidies (federal and state), a manufacturing plant that was purchased for nearly nothing (NUMMI, \$42 million in relation to a multi-billion dollar replacement cost), a marketing oriented CEO who has an eye for beautiful cars (with the possible exception of the Model X), and a great idea to put a really big battery in a high end electric car so that it can go over 200 miles before needing to be recharged. However, with all of these positives, the company has not made an annual profit despite catching the auto giants asleep at the

wheel. Now, to help raise capital, they have shown large demand for electric cars (373,000 Model 3 reservations at last disclosure) and, therefore, have placed a large bullseye on their back. The executives inside of the top 10 auto manufacturers now all need an electric car strategy. Surely, their Boards of Directors are demanding it. What was once a market niche that Tesla could dominate will become far more competitive with time. There is, and can be, no doubt or argument about this.

Microeconomics 101

Due to their desire to be vertically integrated, Tesla has stated that it, and Panasonic, who owns and controls the battery IP, must construct a large factory to manufacture enough batteries to supply their cars. In fact, Elon Musk said that this factory would roughly double the amount of production of lithium ion batteries worldwide and that for each 500,000 cars manufactured, another battery factory must be built. Now, due to my quaint economics training, I was under the impression that when the demand for a product or commodity rises, the price of those items in demand must rise to incentivize more production. If it requires the tripling of lithium ion battery production to simply make 1 million electric cars per year, out of a ~90 million worldwide car market, will that not affect the price of the raw materials that go into battery production? And since raw materials make up roughly 85% of a batteries cost of goods sold (per Bob Lutz in an interview on CNBC), would that not overwhelm the potential economies of scale of building a really big battery plant? When the US mandated Ethanol and used roughly 30% of corn production to make it, the price of corn rose roughly three or four fold for a significant period of time. We are talking about increasing the production of lithium ion batteries by 200% to get to 1 million cars per year (roughly 1% worldwide market share). Will this not cause the cost of those batteries to rise, not fall as the market is expecting? Will this battery cost inflation not hurt the economics for electric vehicles? Of course it will.

Valuation and Returns

The stock market is assuming that Tesla will become a very large manufacturer of cars, battery backup systems, and solar equipment. Further, the market seems to be thinking that Tesla, to quote Will Ferrell from the “trust tree” scene of the movie *Old School*, will come up with “something really cool that I don’t even know about”. They better.

Tesla has a significantly larger enterprise value today than Ford Motor Company. I will use Ford as it is the only domestic auto company to avoid bankruptcy and is, therefore, selling at a premium to the rest of the industry. Tesla has roughly 176 million shares outstanding, up from the 163 million they report, as GAAP requires that all options are assumed to not be exercised when the company is losing money. If it earned a profit, Tesla would show 176 million shares fully diluted. Tesla has nearly \$7 billion in debt post the recent convertible bond issue. Thus, at \$302 per share, Tesla has an enterprise value of roughly \$60 billion. Ford has 3.9 billion shares outstanding with roughly \$15 billion in excess cash, held for a rainy day. Thus, at its current price of \$11.34, Ford has an enterprise value of roughly \$29.2 billion. Simplistically, enterprise value is the amount of money it would take to buy a company and leave it with no net debt or cash on its balance sheet. On an enterprise value to revenue basis, Ford is selling at a ratio of roughly 0.2 given the revenue of \$152 billion in 2016 and the enterprise value of \$29.2 billion.

As a growth company with large capital expenditure and working capital needs, the odds of Tesla paying a material dividend or conducting a share repurchase program over the next ten years are, for all practical purposes, zero. Therefore, the stock must rise to provide the market like returns, say 10% annually, that shareholders clearly expect and deserve. We could use a higher expected return for Tesla's stock, as I am sure few shareholders believe their future returns will be this low, but it will make the following problem much worse. Thus, our 10% is conservative. For Tesla to provide shareholder returns of 10% per year the next 10 years, Tesla will need to have its stock increase to \$785 per share from its current level of \$302. Assuming shares outstanding rise to 180 million from the current 176 million, due to future stock option grants, this implies an equity market valuation of \$140 billion in 2026. Importantly, this does not include any dilution from future stock offerings, an extremely favorable assumption for Tesla bulls.

Ford, on the other hand, may not grow at all but could use its profits to continue paying the 5% dividend that it is paying today while also buying back roughly \$2 billion of its shares per year, creating a 10% return for shareholders. Thus, in 10 years, Ford would continue to have \$152 billion in revenue and a \$45 billion equity value but would have far fewer shares outstanding, leading to a higher stock price.

Capital Efficiency

Ford is far more efficient with its capital investments than Tesla currently is. Ford generated \$152 billion in revenue in 2016 while employing \$60 billion in gross property, plant and equipment (PPE). We believe that the gross number is the best number to use as it reflects historical cost of land, buildings and equipment. For Ford, land and buildings are vastly understated in a replacement cost scenario as many of these plants were acquired many decades ago, when land was cheaper, and also were constructed when labor and steel costs were lower than they are today. However, for a new entrant, new land must be purchased and new buildings must be erected at today's cost. Big disadvantage. Thus, to replace Ford's PPE, we estimate that it would cost far more than the \$60 billion reflected on the balance sheet. However, to be conservative, we will use \$60 billion.

Tesla produced \$7 billion in revenue in 2016 with \$7 billion in gross PPE. Tesla, it could be argued, is "ramping up" and will see vast improvements in time. We do agree that Tesla should see improved asset efficiency in time and will rise from \$1 of revenue to \$1 of PPE today to a Ford like \$2.5 of revenue to \$1 of PPE in a decade's time. However, Tesla's current asset turnover is being helped, immensely, from the bargain purchase of the NUMMI plant in Fremont California. Further, Tesla is vertically integrating by owning their battery production facility, their dealers, and their refueling stations, which, combined, cost a tremendous amount of money. Thus, we believe that our assumption that Tesla reaches Ford's fixed asset turnover ratio in 10 years is quite favorable to Tesla bulls.

Assuming Tesla will be a relatively mature company in 2026 with similar profit margins to those Ford enjoys today (a big, big gift to the bulls as Tesla has never made an annual profit), it stands to reason that Tesla will have a similar valuation to a mature auto company. Thus, we assume that the enterprise value to revenue ratio of 0.2, identical to Ford's today, would be a great starting point. This implies that Tesla will need to have revenue of \$735 billion in 2026 ($(\$140 \text{ billion equity} + 7 \text{ billion debt}) / 0.2$), assuming they roll over their \$7 billion in debt and do not take on any additional debt.

Quandary

The issue is, how is Tesla going to pay for the capital expenditures to manufacture \$735 billion per year of stuff? Cars, solar gear and batteries are not software. They require plants and equipment to be erected and purchased. Ford, who, again, is not aiming to be as vertically integrated as Tesla (who owns its own battery factory, dealerships, and fueling stations), has roughly \$60 billion of gross property, plant and equipment today. If Tesla has similar fixed asset turnover (revenue divided by gross PPE) in the future as Ford has today, despite the Tesla's vertical integration and Tesla's far lower asset turnover today, it would mean that they would need \$294 billion of gross property, plant and equipment to produce revenue of \$735 billion. Today, Tesla has \$7 billion of gross property, plant and equipment. Given that Tesla is losing money today and will be likely losing money for the foreseeable future, where is the additional \$287 billion of capital to invest in property, plant and equipment going to come from? And, further, this ignores the very real need for working capital to fund raw material purchases and salaries for workers prior to the sale of the cars. Thus, our capital needs calculation is ignoring a massive line item that will consume billions of additional funds.

It is clear that Tesla cannot sell \$287 billion of equity over the next 10 years. Tesla will not earn \$287 billion and they will not be able to borrow \$287 billion. Since none of these can occur, it is clear that Tesla will not be able to grow to \$735 billion in revenue in 2026 from \$7 billion in 2016 as they will not have the plant and equipment to do so. Therefore, Tesla cannot return 10% per year or anywhere close to that number. Even keeping the stock flat would be a herculean effort: Tesla would have to increase their revenue over 40-fold from 2016 to 2026 (from \$7 billion to roughly \$300 billion) to simply grow into their current enterprise value in ten years' time, ignoring the effects of additional dilution from capital expenditures financed by equity sales or taking debt into account. Even this, however, would require roughly \$110 billion of additional property, plant and equipment. Where is this \$110 billion going to come from? Not Mars. [Either Tesla has to miss estimated growth rates badly or they have to raise an insurmountable amount of money.](#)

History Lesson

Now, there are those who will say that we are "crazy" for this "low" estimate of enterprise value to revenue multiple. However, if we look at the past crop of very exciting, high growth, glamour companies such as Cisco Systems, Sun Microsystems, EMC, Yahoo, AOL, Microsoft, etc, as they matured, they all fell to very low, mundane multiples a decade after their rapid growth phase. In fact, these companies, who once collectively traded at roughly 5-10x the multiples of stodgy IBM and HP, dramatically underperformed IBM and HP from 2000-2002. Each glamour company witnessed extreme multiple contraction, if they even had earnings and/or remained independent, and eventually sold at roughly 10-12 times earnings a decade later, similar to IBM and HP. Thus, the glamour companies lost their entire valuation premium over the decade from 1999-2009. We believe that there is a parallel situation today: Tesla, though unprofitable, is the new Cisco Systems or EMC and Ford and GM are the new IBM and HP. The only question is whether we are in 1999, as the bubble was accelerating, or in early 2000, when it was nearly popping.

Outlook

We believe that due to the fact that Tesla has not made money on its high end, highly optioned and highly priced cars, the odds of them making money on the Model 3 are slim. The profit margins on high end cars are far higher than mass market cars. This is an indisputable fact. Due to the Model 3 needing a similarly large battery to their higher end cars, it is unlikely that the costs of this car will be proportionately lower to its sale price. In fact, we could make a very strong argument that the costs of producing the Model 3 will fall far less than the sale price when compared to the Model S. Also, additional competition is coming and coming fast. Contrary to common wisdom, an electric car is vastly easier to design and build than a standard internal combustion car. The majors just didn't think that people would buy an all-electric car that took a long time to recharge and, therefore, focused on hybrids. It was a short-term marketing error, not a capability differential. The simplicity of design and manufacturing will make it quite easy for the big car companies to bring on new electric cars. And for those who believe Tesla has a huge technology lead, remember that Elon Musk gave away all their patents to the world for free (which indicated to us that these were not valuable patents). Therefore, despite the higher volume, Tesla is highly, highly unlikely to make a profit on the Model 3. Further, for those who will focus on the remaining 1% of the business, the battery storage business is a low margin business and the solar equipment business is very, very difficult.

Tesla has over \$6 billion in debt that will be coming due over the next 5 years. The CEO even said that they are running the company "near the razor's edge" financially, at least recently. Where is the money going to come from for that debt to be repaid? Again, not Mars. Tesla is a poorly capitalized company, compared to the competition, operating in a low margin and highly capital intensive, cyclical business. Nothing could be worse for shareholders. Tesla depends upon historically fickle Wall Street financing to stay in business. What if a recession were to occur and Wall Street capital is no longer available? By the way, it is not an "if" question, but a "when".

When the market figures out that Tesla is extremely capital intensive, low margin, cyclical, and unable to grow into its valuation, the stock will fall dramatically. This will make it nearly impossible to raise equity capital. With a credit rating of B- from S&P and a depressed stock, we believe that the debt markets will close for Tesla. Given their capital expenditure needs, working capital needs, debts to be repaid, purchase commitments and residual value guarantees, which total nearly \$17 billion, it is highly likely that Tesla will, at some future point, struggle to remain current on all of their obligations. Thus, we believe that over the next 5 years, the odds of a standalone Tesla becoming insolvent and requiring the filing of a bankruptcy petition are over 90%. The only salvation would be to find a "Time Warner". However, given how the "old economy" Time Warner's shareholders suffered after the merger with "new economy" AOL, it will likely be difficult to pull something like that off.

Conclusion

It has paid massive, negative dividends to study financial statements, conduct competitive strategy reviews, and to worry about valuations over the last 5-8 years. Tesla is merely one of a huge crop of companies who sell "the future" to the markets, both private and public, and rely on the "there is a pot of gold at the end of the rainbow" storyline. There is a reason for GAAP; there is a reason for valuation and cash flow analysis; there is a reason for competitive strategy analysis; there is a reason for consistent profits; there is a reason for conservatively managing a company's balance sheet. The



investment industry cannot be, and is not, as simple as “electric cars are the future” plus “Tesla currently leads in electric cars” equals “a great investment”. Even though, as we understand it, Tesla buys its batteries from Panasonic and most other components from other suppliers, thus not creating a technology but using widely available parts in a somewhat novel way, how did true innovators, Wilbur and Orville Wright, and their company do? Let’s just say that there was a little airplane company in Seattle (now Chicago) that did somewhat better.

Tesla is mainly owned by growth investors with little experience or understanding of the capital intensity, or cyclicity, of the auto business. People defer purchases of cars in recessions, especially expensive cars. A hard lesson will be learned by the “trees can grow to the sky” crowd. We are short Tesla and expect to make a substantial profit over the next few years.

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Biography

I hold a degree in Mechanical Engineering from the UW-Madison, *Tau Beta Pi*, an MBA from the University of Chicago in Finance and Economics, and a CFA. My father has been in the investment business since 1973; our vacations were centered around going to the Dain Bosworth (now RBC) stock conference in Vail, CO and the Raymond James growth conference at the Don CeSar hotel in St. Petersburg, FL. I used to attend the functions at the Dain Bosworth conference in the mid-1980's when I was in high school, throwing a sport coat on and listening to Dick Kovacevich talk about tiny Norwest Bank (now Wells Fargo), and the CEO's of Boeing and Medtronic, among others, try and sell the crowd on their businesses. My father used to bring home the old William O'Neil books that had data on nearly all public companies. I studied them. He used to show me how the best stocks, historically speaking, had large profits, good ROE's and steady earnings growth, i.e. Medtronic, Sysco Foods, etc. After college and working for a few years at an engineering firm in Chicago, I returned to Madison, Wisconsin in 1993 to help the family investment business as a research analyst. Quite quickly, I became the main analyst on the firm's equity and bond funds. Soon after, I would originate the ideas for and execute nearly all investment decisions in those funds.

The equity fund I managed started out at \$4.7 million in 1993. Because the fund performed very well in the 2000-2002 time frame, leading to a record that at one point topped its Morningstar category for 1, 3, 5 and 10 years, the Fund attracted over \$1.5 billion of capital. I was asked to be on Louis Rukeyser's show, *Wall Street Week*, and then was featured in *Barron's*, had a story in the *New York Times* and also had a feature in the *Wall Street Journal*, among others.

The bond fund that I managed started out at roughly \$13 million in 1993. It was a government/corporate fund that was sort of a "me too" fund until I discovered that we could both lose a lot on corporates as well as make a lot. I did both. Due to losing a lot on a few bonds in the early 2000's (Charter and Adelphia), I became quite conservative when credit spreads plummeted to record lows in the 2005-2006 time frame. I put nearly all assets in the fund into Government bonds during that period. When the financial crisis was first hitting the markets in 2008, I started slowly selling governments and buying corporates. Turns out I was too early and lost a lot of money on the first purchases. I persevered, however, and by February of 2009, the entire fund was in corporate bonds. These bonds were rated A+ by the ratings agencies, on average, yet were trading at roughly 15% yields to the seven year average maturity. The Fund became the best performing bond fund in its Morningstar category for the 1, 3, 5 and 10 years ended 6/30/2009 as the bonds I purchased recovered. Because of this, the fund subsequently attracted over \$3 billion of capital.

In 2009, I started a mortgage insurance company, which was later merged with NMI Holdings, Inc., went public and now is trading on the Nasdaq under NMIH. I started an investment partnership on August 9, 2010 called The Vilas Fund, LP. It is a value fund that buys very inexpensive stocks and sells short glamour stocks (we cannot discuss performance of the partnership publicly but we would be happy to share our performance with accredited investors who contact us). And finally, I co-founded a mortgage banking company in 2012 that is doing well. I like to build businesses.



Disclosures:

The Vilas Fund, LP is short Tesla, Inc. shares and call options and owns long dated puts. The Vilas Fund owns common stock of Honda Motor Co Ltd and Ford Motor Company.

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