A DO-IT-YOURSELF (DIY) VALUATION OF TESLA

Investment Regrets and Disagreement

Tesla Again?

- I was hoping to move on to my data update posts but my last post on Tesla drew some attention, in good and bad ways, partly because of its timing.
- Right after I sold my shares for $640, based upon my valuation of the stock at about $430, the stock took off, climbing to more than $900/share in the matter of days.
  - There were people on both sides of the great Tesla divide on my valuation, with bears accusing me of wearing rose-colored glasses and making unrealistically optimistic assumptions and bulls pointing to inputs that they felt under-estimated the company's potential
  - I thought I would revisit the valuation and present it in a different format, one in which you (as the reader) can choose your story for Tesla and estimate the value for yourself.

Tesla

Silence is golden!

With the wind behind its back, Tesla has consolidated its hold on the electric car market and will continue to grow that market, at the expense of conventional car makers. Pushing its production towards 2 million cars by 2030, it will also be able to deliver higher margins than conventional auto companies in steady state. The rise in its market capitalization has reduced its cost of capital and the chance of failure. Wgile Tesla will be able to invest less than other auto companies to add to capacity, its need to ramp up production will require more capital, creating negative cash flows in the near years. While other revenue sources (green energy, driverless cars in ride sharing) will supplement revenues, it will remain at its core an electric car company.

The Assumptions

	Base year	*Years 1-5*	*Years 6-10*		*After year 10*	*Link to story*
Revenues (a)	$ 24,578	25.00% →	1.75%		1.75%	Growth in EV market & Tesla's early mover advantage work in its favor.
Operating margin (b)	1.60%	1.60% →	12.00%		12.00%	Continued economies of scale & brand
Tax rate	25.00%	25.00% →	25.00%		25.00%	Global tax rate
Reinvestment (c)		Sales to capital ratio	3.00	RIR =	17.50%	Capacity build up allows for less reinvestment in the near years.
Return on capital	1.59%	Marginal ROIC =	34.86%		10.00%	Cost of entry will limit competition.
Cost of capital (d)		7.00% →	7.40%		7.40%	Moves to median company cost of capital

The Cash Flows

	Revenues	*Operating Margin*	*EBIT*	*EBIT (1-t)*	*Reinvestment*	*FCFF*
1	$ 30,723	3.68%	$ 1,132	$ 849	$ 2,048	$ (1,199)
2	$ 38,403	5.76%	$ 2,213	$ 1,660	$ 2,560	$ (900)
3	$ 48,004	7.84%	$ 3,764	$ 2,823	$ 3,200	$ (377)
4	$ 60,005	9.92%	$ 5,953	$ 4,465	$ 4,000	$ 464
5	$ 75,006	12.00%	$ 9,001	$ 6,751	$ 5,000	$ 1,750
6	$ 90,270	12.00%	$ 10,832	$ 8,124	$ 7,632	$ 492
7	$ 104,442	12.00%	$ 12,533	$ 9,400	$ 7,086	$ 2,314
8	$ 115,983	12.00%	$ 13,918	$ 10,438	$ 5,770	$ 4,668
9	$ 123,406	12.00%	$ 14,809	$ 11,107	$ 3,711	$ 7,395
10	$ 125,566	12.00%	$ 15,068	$ 11,301	$ 1,080	$ 10,221
Terminal year	$ 127,763	12.00%	$ 15,332	$ 11,499	$ 2,012	$ 9,486

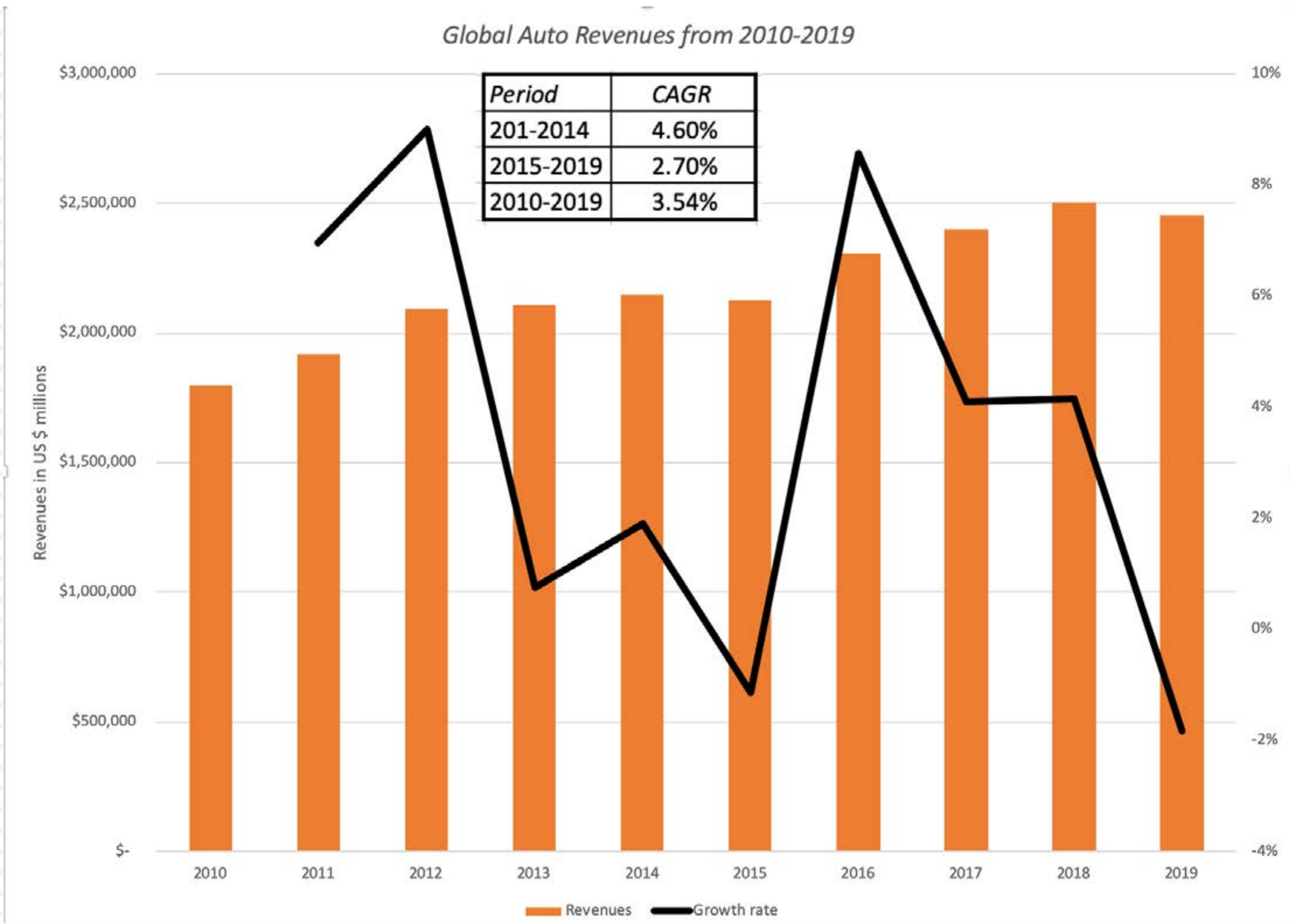
The Value

Terminal value	$ 167,901		
PV(Terminal value)	$ 84,402		
PV (CF over next 10 years)	$ 12,988		
Value of operating assets =	$ 97,390		
Adjustment for distress	$ 4,869	Probability of failure =	10.00%
- Debt & Mnority Interests	$ 14,708		
+ Cash & Other Non-operating assets	$ 6,514		
Value of equity	$ 84,326		
- Value of equity options	$ 8,822		
Number of shares	177.00		
Value per share	$ 426.58	Stock was trading at =	$581.00

The drivers of value

- <u>The Growth Lever</u>: The **revenue growth rate** controls how much and how quickly the firm will be able to grow its revenues from autos, software, solar panels and anything else that you believe the company. *In my Tesla story (valuation), I have estimated revenues of $125 billion in 2030, a five-fold increase over the 2019 revenues.*
- <u>The Profitability Lever</u>: The **target (pre-tax) operating margin** determines how profitable you think the company will be, once its growth days start to scale down. *In keeping with my view that R&D is really a capital expense, I capitalize R&D, which improves Tesla's profitability and target an operating margin of 12% by 2025.*
- <u>The Investment Efficiency Lever</u>: To grow, companies have to invest in capacity and the **sales to invested capital** drives how efficiently investment is done, with higher sales to capital ratios reflecting more efficiency. *With Tesla, I assume that every dollar of investment (in new factories, technology and new R&D) in the first 5 years generates $3 in revenue.*
- <u>The Risk lever</u>: The first is the **cost of capital** that I start the valuation with, a reflection of risk as seen through the eyes of a diversified investor in the company. The second is the **likelihood of failure** (or distress). *With Tesla, I set this cost of capital at 7% and assume that given its marginal profitability and significant debt load, the chance of failure is 10%.*

The Growth Lever



The Biggest Auto Companies

Company Name	Revenues in 2019 (LTM)	CAGR: 2010-19	Operating Income in 2019 (LTM)	Operating Margin
Toyota Motor Corporation (TSE:7203)	$285,284.60	1.83%	$24,146.20	8.46%
Volkswagen AG (XTRA:VOW3)	$270,296.60	5.72%	$22,447.90	8.30%
Daimler AG (XTRA:DAI)	$187,796.30	4.54%	$5,167.40	2.75%
Ford Motor Company (NYSE:F)	$155,900.00	2.13%	$574.00	0.37%
Honda Motor Co., Ltd. (TSE:7267)	$145,690.50	3.24%	$6,968.20	4.78%
General Motors Company (NYSE:GM)	$137,237.00	0.13%	$5,481.00	3.99%
Fiat Chrysler Automobiles N.V. (BIT:FCA)	$117,565.20	16.08%	$6,174.90	5.25%
SAIC Motor Corporation (SHSE:600104)	$111,839.00	12.03%	$2,303.10	2.06%
BMW (XTRA:BMW)	$108,985.90	3.63%	$7,459.40	6.84%
Nissan Motor Co., Ltd. (TSE:7201)	$102,176.80	0.11%	$1,290.50	1.26%
Hyundai Motor (KOSE:A005380)	$86,053.20	1.03%	$2,454.50	2.85%
Peugeot S.A. (ENXTPA:UG)	$83,946.30	2.24%	$6,841.10	8.15%
AUDI AG (XTRA:NSU)	$64,663.20	5.37%	$5,034.10	7.79%
Renault SA (ENXTPA:RNO)	$63,168.00	3.61%	$3,801.80	6.02%
Kia Motors Corporation (KOSE:A000270)	$46,311.20	6.97%	$1,502.70	3.24%
Tata Motors Limited (BSE:500570)	$40,131.40	4.91%	$914.60	2.28%
Suzuki Motor Corporation (TSE:7269)	$34,206.70	1.03%	$2,259.30	6.60%
Mazda Motor Corporation (TSE:7261)	$32,769.80	1.80%	$721.20	2.20%
Subaru Corporation (TSE:7270)	$30,338.50	5.27%	$2,165.10	7.14%
Tesla, Inc. (NasdaqGS:TSLA)	$24,578.00	81.20%	$80.00	0.33%

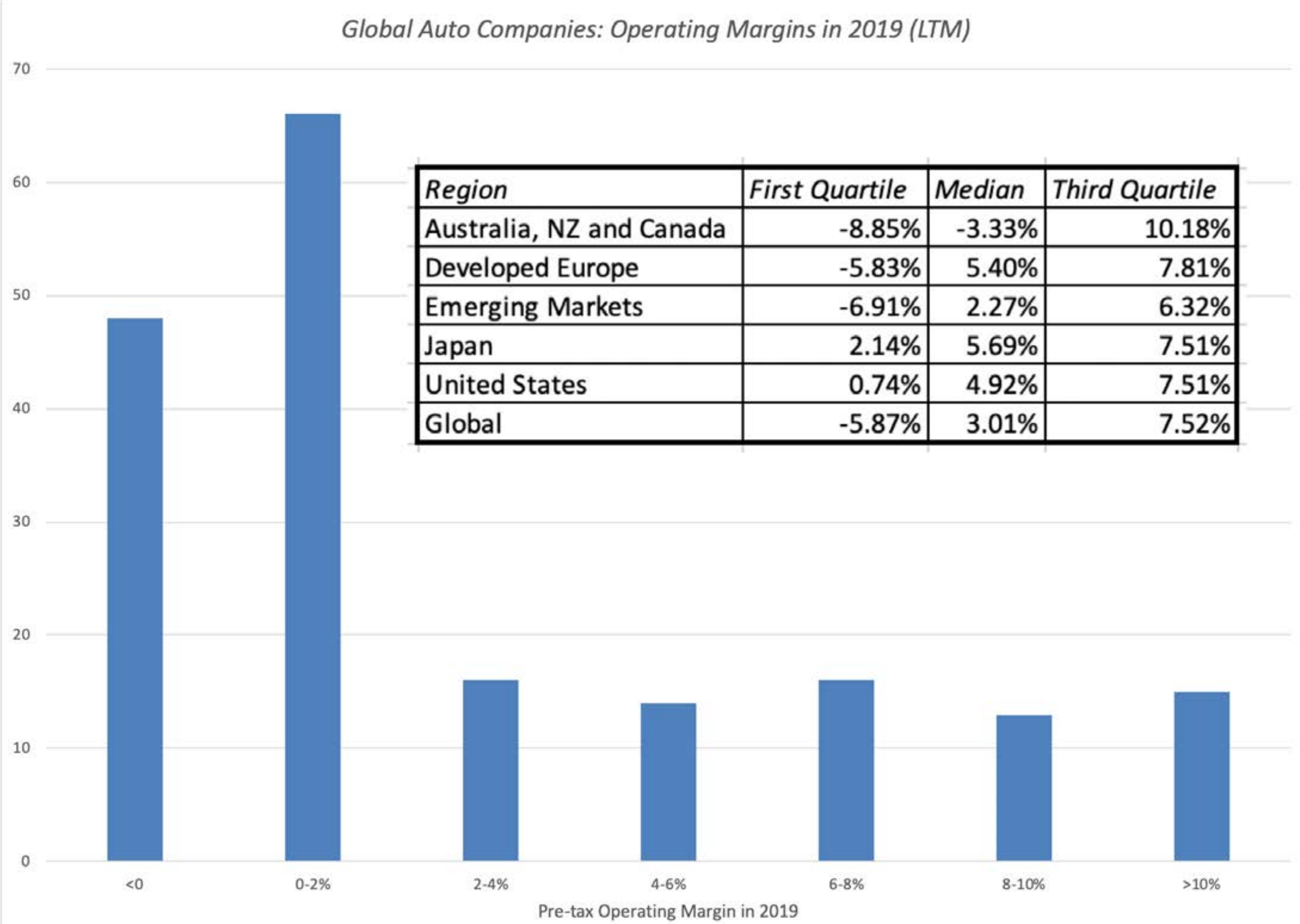
A tech company twist?

Company	*Revenues in 2019*	*Operating Income in 2019*	*Operating Margin*
Apple	$ 260,174.00	$ 63,333	24.34%
Microsoft	$ 129,814.00	$ 45,799	35.28%
Alphabet Inc.	$ 155,058.00	$ 32,650	21.06%
Amazon.com	$ 265,469.00	$ 12,795	4.82%
Facebook	$ 66,529.00	$ 21,167	31.82%
Netflix	$ 18,875.90	$ 2,269	12.02%
FAANG+M	$ 895,919.90	$ 178,012.16	19.87%

Your growth choice

Expected Revenues in 2030 (in $ millions)	*CAGR (next 5 years)*
A1: $65 billion (Renault-lie)	15.00%
A2: $100 billion (BMW-like)	21.00%
A3: $150 billion (Ford & Honda-like)	28.00%
A4: $200 billion (Daimler-like)	33.00%
A5: $300 billion (Toyota & VW-like)	40.00%
A6: Direct Input (Enter % growth rate)	25.00%

The Profitability Lever



Region	*First Quartile*	*Median*	*Third Quartile*
Australia, NZ and Canada	-8.85%	-3.33%	10.18%
Developed Europe	-5.83%	5.40%	7.81%
Emerging Markets	-6.91%	2.27%	6.32%
Japan	2.14%	5.69%	7.51%
United States	0.74%	4.92%	7.51%
Global	-5.87%	3.01%	7.52%

A tech twist?

- The median operating margin for tech companies (including both software & hardware is 10.25%).
- The picture is brighter for the FAANG stocks, where the aggregate operating margin across all five stocks is 19.87%, well above auto industry averages. That margin, though, is delivered on smaller revenues and with business models where production costs are a small fraction of selling prices.
- The operating margin for just software companies is even higher at 21.24%, because the marginal unit of software is close to costless to produce.

Your choice on profitability

Operating Margin in 2025	*Target Operating Margin*
B1: Auto Industry First Quartile	-5.87%
B2: Auto Industry Median	3.01%
B3: Auto Industry Third Quartile	7.52%
B4: Technology Median	10.25%
B5: Software	21.24%
B6: FAANG Aggregate	19.87%
B7: Direct Input	12.00%

3. The Investment Efficiency Lever

Region	*First Quartile*	*Median*	*Third Quartile*
Australia, NZ and Canada	0.06	0.75	2.33
Developed Europe	0.81	1.58	2.93
Emerging Markets	0.70	1.29	2.41
Japan	1.17	2.13	3.00
United States	0.62	0.95	2.39
Global	0.75	1.37	2.42

More on investment efficiency

- Looking across global auto companies, the median company generates $1.37 in sales for every dollar of capital invested, and at the 75th percentile, the more capital-efficient auto companies generate $2.42 in revenues for every dollar of capital invested.
- My estimate of $3 in revenues for every dollar of capital invested reflects an optimistic view of Tesla's capacity to bring technological innovation to its production processes, and reduce the capital needed to fund those processes.
- Since Tesla, in 2019, generates $1.32 in revenue for every dollar of capital invested, my estimate is more aspirational than based on observable efficiencies, right now.

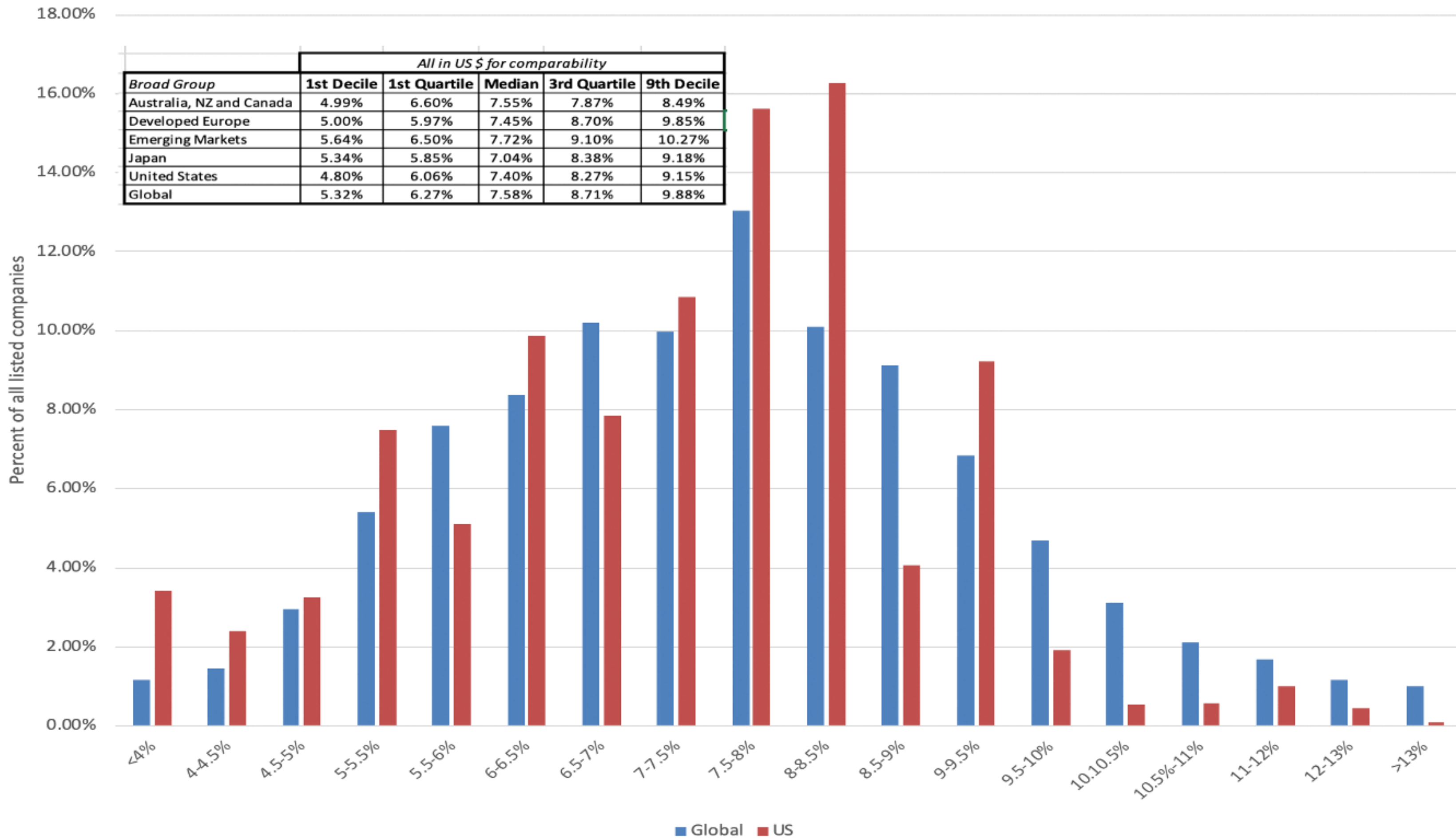
Your choice on investment efficiency

Sales to Invested Capital	*Sales to Capital (1st 5 years)*
C1: Auto Industry First Quartile	0.75
C2: Auto Industry Median	1.37
C3: Auto Industry Third Quartile	2.42
C4: Technology Median	1.51
C5: Software	2.30
C6: FAANG Aggregate	1.27
C7: Direct Input	3.00

4. Risk: The Cost of Capital - Global

Cost of Capital in January 2020: All Listed Non-financial Service Companies

	All in US $ for comparability				
Broad Group	**1st Decile**	**1st Quartile**	**Median**	**3rd Quartile**	**9th Decile**
Australia, NZ and Canada	4.99%	6.60%	7.55%	7.87%	8.49%
Developed Europe	5.00%	5.97%	7.45%	8.70%	9.85%
Emerging Markets	5.64%	6.50%	7.72%	9.10%	10.27%
Japan	5.34%	5.85%	7.04%	8.38%	9.18%
United States	4.80%	6.06%	7.40%	8.27%	9.15%
Global	5.32%	6.27%	7.58%	8.71%	9.88%



Your choice on cost of capital & the failure rate

Cost of Capital	*Initial cost of capital*
D1: Automobile Median	6.94%
D2: Technology Median	8.86%
D3: All companies - First Quartile	6.27%
D4: All companies - Median	7.58%
D5: All companies - Third Quartile	8.71%
D6: Direct Input	7.00%

Failure Likelihood	*Probability of failure*
E1: No chance	0%
E2: 10% (Marginal profitability, High Debt)	10%
E3: 20% (Money loser, High Debt)	20%
E4: 50% (Low Growth, Money loser, High De	50%

Valuation Stories

Story	Revenues	Operating Margins	Reinvestment Efficiency	Risk	Value/Share	Equity Value
The Big Auto	BMW-like ($100 billion)	Auto 75th percentile	Auto 75th percentile	Auto median	$ 105.79	$ 27,547
	Daimler-like ($200 billion)	Auto 75th percentile	Auto 75th percentile	Auto median	$ 227.42	$ 49,076
	VW/Toyota-like ($300 billion)	Auto 75th percentile	Auto 75th percentile	Auto median	$ 332.82	$ 67,731
Auto+ Tech	BMW-like ($100 billion)	Tech median	Tech median	Tech median	$ 110.96	$ 28,461
	Daimler-like ($200 billion)	Tech median	Tech median	Tech median	$ 211.84	$ 46,317
	VW/Toyota-like ($300 billion)	Tech median	Tech median	Tech median	$ 297.86	$ 61,544
An Auto FAANG	BMW-like ($100 billion)	FAANG aggregate	FAANG aggregate	Tech median	$ 458.37	$ 89,953
	Daimler-like ($200 billion)	FAANG aggregate	FAANG aggregate	Tech median	$ 854.64	$ 160,094
	VW/Toyota-like ($300 billion)	FAANG aggregate	FAANG aggregate	Tech median	$ 1,204.62	$ 222,040
FAANG	VW/Toyota-like ($300 billion)	Software median	Revolutionary Manufacturing	Auto median	$ 2,105.55	$ 381,504

The Stories

- The Big Auto Story: If your story is that Tesla will emerge from its growth period as one of the largest auto companies in the world (revenues of $100- $300 billion in year 10), with top-tier auto company margins (7.42%), investment efficiency (2.42) and cost of capital (6.94%), the value per share ranges from $106/share (with BMW like revenues) to $227/share (with Daimler-like revenues) to $333/share (with VW/Toyota like revenues).
- The Techy Auto Company Story: Tesla is an auto/software/services company with tech company characteristics, giving it higher margins (10.25%) and a higher cost of capital (8.86%). With this story, the value per share ranges from $111/share (with BMW like revenues) to $212/share (with Daimler-like revenues) to $298/share (with VW/Toyota like revenues). Put simply, the higher risk nullifies the benefits of higher profitability.
- The FAANGy Auto Company: Tesla not only develops a tech twist, but becomes as successful as the most successful tech companies (I use the FAANG stocks + Microsoft). In this story, the margins approach 18.97% and with a tech cost of capital, the value per share ranges from $459/share (with BMW like revenues) to $855/share (with Daimler-like revenues) to $2,106/share (with VW/Toyota like revenues).
- The Make-your-best Company: I give Tesla the best possible outcomes on each variable, revenues like VW/Toyota, margins like pure software companies (21.24%), a sales to capital ratio that is higher than any of the sector averages (4.00) and a cost of capital of an auto company (6.94%), and arrive at a value per share of $2106.

Possible? Plausible? Probable?

- With the big auto stories, the key question will be whether Tesla can climb to the very top of the heap in terms of revenues, generally reserved for mass market companies, while earning operating margins that are usually reserved for smaller luxury auto companies?
- With the techy auto stories, the key question becomes whether a company that derives the bulk of its revenues from selling cars be profitable and reinvest like a tech company?
- With the FAANGy stories, the investment question becomes whether you should up front for a company on the expectation that it will be an exceptional company. It very well might make it to the top of the heap, but if it does not, you are set up for disappointment.
- With the MYB story, you are approaching the most dangerous place in valuation, where you pick and choose each assumption, without considering the ones you have already made. Put simply, is it even possible to build a company that generates revenues like Toyota, earns margins like Microsoft and invests more efficiently than any manufacturing company in history has ever done, while still preserving the low cost of capital of an auto company?

It's only an investment!

- Money on the table, but no regrets: In the week since I sold Tesla at $640, the stock has gone on a wild ride, rising above $900 in two trading days. I. I made my decision to buy, based on my story and valuation for Tesla, and my decision to sell, for the same reason. If I abandon that philosophy to play the momentum game, a game that I am not good at and don't really play well, I may make a bit more money, but at what cost?
- Why the vitriol? In a world where we face unbridgeable divides on politics, religion and culture, do we need to add investing to the mix? If you stayed with your Tesla investment, I wish you the best, and I hope that you are holding on for the right reasons. If you sold short and lost money, I get no joy out of your losses and no inclination to do a celebratory dance.
- Not worth losing sleep over: As far as I am concerned, Tesla is a fascinating company, but it is just an investment, not a matter of life or death, and definitely not worth losing sleep and friends over.