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General Motors and the electric car revolution: Boom or bust?[[1]](#endnote-1)

Daniel Doiron and John Higgins wrote this case solely to provide material for class discussion. The authors do not intend to illustrate either effective or ineffective handling of a managerial situation. The authors may have disguised certain names and other identifying information to protect confidentiality.

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In February 2019, Mary Barra, the chief executive officer (CEO) of General Motors Company (GM), confirmed yet again her commitment to an aggressive “all-electric future” for the US automaker. This decision could potentially position GM as a leader in the new era of automobile manufacturing.[[2]](#endnote-2) The announcement came soon after Barra’s November 2017 announcement of 20 new models of electric vehicles by 2023.[[3]](#endnote-3) Under Barra’s leadership, GM was changing at a fast pace. In an industry that was historically characterized by slow, steady, and conservative growth, change represented a major risk factor for the company.

Internal combustion engine (ICE) vehicles had not changed considerably in almost a century, and neither had the nature of the competition. It was true that cars had become much more advanced than they were in the first half of the 20th century, when GM president and visionary Alfred Sloan released the steel body design of the basic automobile. However, automobiles were still fundamentally based on the same, standardized overall design.

Structurally, electric cars were a radical change in automobile design. More importantly, these vehicles would fundamentally change the business and profit models for all automakers. The competitive nature of the industry was expected to shift drastically with mass introduction of electric cars and trucks. In addition, many new North American niche competitors were entering a market that—other than Tesla, Inc. (Tesla), with its 2010 initial public offering—no company had managed to successfully enter since the founding of Chrysler in 1925.[[4]](#endnote-4) Electric cars would be much simpler to design, build, sell, and maintain. Economies of scale would be easier to achieve, given the simple nature of these vehicles. Outsourced manufacturing was available through large global parts manufacturers. More significantly, original equipment manufacturer (OEM) components would make up an increasingly smaller percentage of the overall parts required in these new electric vehicles.[[5]](#endnote-5) These factors, coupled with the minimal maintenance requirements of electric cars, were creating an exhilarating but daunting new environment for traditional manufacturers like GM.

Electric vehicles would change the nature of almost everything associated with how profit would be made in the automobile industry. Most service-related businesses would become obsolete, changing forever the dealership profit model. Change was coming and moving faster than most experts had anticipated. Recent research conducted by UBS Global Research on electric vehicle production had predicted dramatic growth of 500 per cent over the previous year’s forecast. The industry was truly entering the steeper part of the adoption curve.[[6]](#endnote-6) GM was posed to either flourish or fail in this new world. GM’s struggles in the 2008–09 Great Recession had highlighted the precarious nature of its profit model, with many of the underlying components of that model still evident in 2018.

Barra’s assertion that GM’s electric vehicles would not make money until “early next decade” was indicative of the challenges that large traditional automakers faced in this new world.[[7]](#endnote-7) GM had to find a way to survive in the face of fundamental changes coming to the automotive industry.

THE AUTOmobile MANUFACTURING INDUSTRY: A STANDARDIZED MODEL OF COMPETING

The rise of automobile manufacturing in North America began in the early 20th century, with the introduction of the Model T by The Ford Motor Company (Ford), which made the automobile affordable for the masses, among other achievements. However, it was GM’s Sloan who was credited with growing the auto industry in significant and innovative ways. Sloan introduced different car models for various classes of customers, effectively segmenting the market. He also created consumer credit, allowing consumers to purchase, over time, their Chevrolet or Pontiac, which they could otherwise not afford. Sloan also accelerated the product introduction cycles to launch a new model of each brand annually, which substantially grew the automobile replacement market. Notably, Sloan and GM led the industry through a consolidation phase, driven by a period of market saturation and technological stagnation, during the 1920s and 1930s.

The fundamental elements of the standard automobile were all in place by the 1930s. These features included a closed all-steel body, a high compression engine, hydraulic brakes, synchromesh transmission (with automatic transmission soon to follow), a self-starter, low-pressure balloon tires, and a drop-frame construction. This standardization ultimately saw the industry go from a peak of 253 automobile manufacturers in 1908 to 44 in 1929, where approximately 80 per cent of the industry’s output came from Ford, GM, and Chrysler. The remaining independent automakers failed through the Great Depression, with several companies surviving through World War II only to collapse (or be purchased) in the early post-war period. Like most mature industries, the North American automobile industry consolidated around a standardized product, with subsequent innovation energies focused on incremental product change and significant manufacturing process improvements.[[8]](#endnote-8)

In the United States, automakers and their suppliers represented the largest manufacturing sector, responsible for 3.0 to 3.5 per cent of America’s gross domestic product. This sector generated the most jobs of any other sector in the country to become the largest exporter of goods and services. The automobile industry purchased hundreds of billions of dollars in parts and services each year, representing the third-largest global investor in research and development (R&D). Ford, GM, and Chrysler (later becoming Fiat Chrysler Automobiles) were known as “the big three,” employing two out of three US autoworkers and operating 60 per cent of US auto assembly plants. According to the American Automotive Policy Council, in 2016, these three companies produced 6.6 million vehicles in the United States and employed over 245,000 employees at more than 220 assembly plants, manufacturing facilities, research labs, and distribution centres across 32 states. More important for the US economy, each auto assembly job supported an estimated seven other jobs at suppliers and in surrounding communities. Each ICE vehicle contained 8,000 to 12,000 different components provided by more than 5,600 suppliers in the United States, who employed more than 871,000 workers.[[9]](#endnote-9)

These automobile manufacturers also had more than 10,150 dealerships, which employed 609,000 additional US workers. In 2016, 17.5 million vehicles were sold through these US dealerships.[[10]](#endnote-10) This was a vital industry for the country’s economy, which explains why former US President Barack Obama and his government invested US$49.5[[11]](#endnote-11) billion to save GM during the Great Recession of 2009.[[12]](#endnote-12) Obama’s statement in March of 2009 exemplified the importance of this industry to the United States:

We cannot, and must not, and we will not let our auto industry simply vanish. This industry is like no other—it’s an emblem of the American spirit; a once and future symbol of America’s success. It’s what helped build the middle class and sustained it throughout the 20th century. It’s a source of deep pride for the generations of American workers whose hard work and imagination led to some of the finest cars the world has ever known. It’s a pillar of our economy that has held up the dreams of millions of our people.[[13]](#endnote-13)

Mature industries such as the US automobile manufacturing industry, with only a few large competitors of relatively equal size and breadth, tended to be very competitive. Globalization contributed to an acceleration in the intensity of competition. Gross margins averaged 12.65 per cent over the period 2009–2016. Net margins were also much lower than expected, with an average of 4.87 per cent.[[14]](#endnote-14) These low margins, tied to competitively driven R&D and capital investment requirements, forced companies to use an economy of scale model to survive in that industry. Economies of scale significantly influenced revenue measures in respect to reducing unit costs, building marketing clout, and extending distribution reach. This shift created substantial entry and exit barriers, making it difficult for a new manufacturer to enter the market. In fact, American Motors Corporation was the last large independent ICE-based US automobile manufacturer to exist outside of the big three, until it was purchased by Chrysler Corporation for $1.5 billion in 1987.[[15]](#endnote-15)

The competitive business model was simple in concept, yet complex in its implementation. The first phase required OEMs to build scale in manufacturing and distribution to fund the R&D, marketing, regulatory processes, and capital requirements of the business. OEMs needed a complex global supply chain that effectively outsourced much of the parts production (and increasingly, R&D) with attention to cost efficiency. OEMs were only responsible for 20 per cent of a car’s content, with 68 per cent coming from tier 1 suppliers.[[16]](#endnote-16) The distribution costs and related risks were then pushed out to a large number of franchised dealerships, who relied heavily on service, parts, and body shop sales as a source of their gross profit margins. In fact, despite only accounting for 12.1 per cent of a typical dealership’s sales, parts and service amounted to 49 per cent of its total gross profit margins in 2017.[[17]](#endnote-17) And this was during a time when annual new vehicle sales per dealership reached an all-time high of 928.[[18]](#endnote-18) This revenue realization was not surprising, given reports of a 57 per cent gross margin for service and parts for the Penske Automotive Group in 2012, which operated 326 dealerships in the United States and the United Kingdom. In comparison, gross margins on new vehicle sales were only 8 per cent.[[19]](#endnote-19)

Automobile manufacturers also relied on financing cars and light trucks to consumers through company owned finance divisions, whose profit per car was up to three times that of vehicle manufacturing. Finally, OEMs created and cultivated a market for after-sale parts and accessories as a key profit driver, even though they increasingly manufactured a small percentage of the parts that went into their vehicles. In January 2017, GM boasted that it expected profits from parts and from two of the company’s divisions, OnStar Corporation and GM Financial, to grow by about $2 billion from 2015 to 2019.[[20]](#endnote-20)

All of these sources managed to produce net profit margins of only 1–4 per cent annually.[[21]](#endnote-21) Automobile manufacturing was clearly a risky and precarious business, given the competitive pressures evident in the market. Significant changes to any of the core elements that drove profitability represented a potentially fatal blow to many of these manufacturers.

**GM’S COLLAPSE IN 2009**

On June 1, 2009, GM filed for Chapter 11 in the US Federal Bankruptcy Court in Manhattan. Until 2008, GM was the world’s largest automaker, producing over 9 million cars and trucks each year in 34 different countries. It owned 463 subsidiary companies that supplied production around the world and employed 234,500 workers, of which 91,000 were in North America. By 2009, GM had dropped from a 44 per cent market share in North America to just over 20 per cent.[[22]](#endnote-22)

Was the company downfall caused by its size? Was GM too big and too slow to change and adapt to new competitive pressures? Was its cost structure out of control? After the bankruptcy threat was overcome, various fundamental reasons for GM’s failures started to surface.

Retired Employees

At the time of the bankruptcy, GM was supporting 493,000 retired employees in North America. These employees enjoyed generous pension and health benefits, which had been negotiated with the United Auto Workers Union in much better and less competitive times.[[23]](#endnote-23) These liabilities had placed tremendous pressure on GM to generate cash though increased sales volumes.

Discount Incentives

In the early 2000s, GM was starting to change the pricing game in North America. The first big move was to offer consumers no interest (0 per cent) financing on vehicle loans up to five years. When that incentive began to lose traction, the company started offering $3,000 rebates on the purchase of a car. When the competition began offering rebates of their own, GM raised the rebate stakes to $6,000 and $8,000, with even longer financing terms. What GM failed to realize was that the need to keep vehicle prices high to support the rebates created a consumer perception of a more expensive product, relative to the competition. This resulted in many consumers not considering GM in their buying decisions due to its high price reputation. GM’s marketing and pricing strategy emphasized price and incentives, rather than product quality. According to Jesse Toprak, founder and CEO of CarHub, “If you're constantly advertising the deal, and the car is in the background, that's not a viable strategy.”[[24]](#endnote-24)

Reliance of Pickup Trucks and Sport Utility Vehicles

When gasoline (gas) prices were low, GM and other North American automakers relied heavily on selling high-margin pickup trucks and sport utility vehicles (SUV). As US gas prices rose steadily to over $4 per gallon ($1 per litre) in 2008, and as the Great Recession was beginning, GM’s “reliance on pickups and SUVs turned deadly.”[[25]](#endnote-25) North American light vehicle sales fell by 21 per cent in 2009,[[26]](#endnote-26) with GM taking the brunt of that decline. *The Economist* summarized the escalating problems in a June 2009 article titled “A giant falls”:

With a gallon costing $4, demand for the big pickups and SUVs that provided most of Detroit’s profits evaporated. In the scramble to swap gas-guzzlers for smaller vehicles, residual values collapsed, leaving GM’s finance arm with huge losses on cars returned after lease. After Lehman failed, car markets were clobbered around the world, but America’s was hardest hit. Sales of cars and light trucks in December 2008 were 35.5 percent lower than the year before. After four years of restructuring efforts during which it had lost more than $80 billion, GM was too enfeebled to stagger on.[[27]](#endnote-27)

Even more recently, GM continued to rely heavily on SUV and truck sales in North America. In 2017, cars only represented 23.6 per cent of vehicle sales (see Exhibit 1). Pickup trucks continued to be protected by a 25 per cent so-called “chicken tariff,” which was instituted in 1963 in retaliation to European imported chicken tariffs.[[28]](#endnote-28)

Killing the EV1 Electric Car Program

Former GM CEO Rick Wagoner admitted that his biggest mistake was killing the 1990s EV1, the company’s first electric vehicle program.[[29]](#endnote-29) In 2002, GM had to repossess and destroy all EV1s, which became a controversial move and a major embarrassment for the company, ultimately causing its exit from the hybrid and electric vehicle market.[[30]](#endnote-30) Toyota seized the opportunity to assume control of the electric vehicle market and subsequently surpassed GM in design and performance with its Prius and Corolla hybrid models.

Tough Competition Driving Low Margins

GM was plagued with low margins across its car fleet, primarily due to competitive pressures from Asian-based competitors such as Hyundai Motor Company (Hyundai), which built good quality cars at very low prices. Hyundai grew its US sales in 2009 by 9 per cent to 675,000 vehicles, while GM and the rest of the industry saw their sales shrink by 21 per cent.[[31]](#endnote-31) At that time, Hyundai boasted gross margins of 22.3 per cent,[[32]](#endnote-32) compared to GM’s average gross margins of 12 per cent.[[33]](#endnote-33)

GM’s leadership and culture had become too comfortable in its success and failed to react to industry changes and threats.[[34]](#endnote-34) Along with many misguided decisions, poor product strategy, failed pricing strategies, and poorly executed growth plans, GM seemed to have developed a growing culture of failure.

**THE ELECTRIC VEHICLE**

Battery electric vehicles (BEV), were widely viewed as a major saviour to the world’s current climate change challenges. BEVs produced less than half of the global warming emissions of comparable ICE vehicles, when all factors were taken into consideration.[[35]](#endnote-35) Most countries across the globe understood this relationship and continued to build and execute policy to limit emissions and support the growth of the electric car industry.[[36]](#endnote-36)

Two main challenges delayed the mass introduction of BEVs. The first was related to the batteries required to power these vehicles. Lithium ion batteries, the electric vehicle batteries of choice, were heavy, costly to manufacture, and had limited storage capacity. This contributed to pricier cars with driving ranges per charge of 60–370 miles (100–600 kilometres).[[37]](#endnote-37) Most consumers had been trained to expect a car to travel at least 300 miles (500 kilometres) on a tank of fuel, and expected BEVs to support this same range on a single battery charge.[[38]](#endnote-38) In a BEV, this distance could only be accomplished with a 95–100 kilowatt-hour (kWh) battery pack. With an average battery cost of $227 per kWh in 2016, down from approximately $1,000 per kWh in 2010,[[39]](#endnote-39) the cost to produce these battery packs made the price of electric vehicles prohibitive to most consumers. In fact, Tesla’s high-end sports BEV, the Roadster, entered the market priced at around $110,000.[[40]](#endnote-40) This affordability problem had to be solved before BEV adoption could grow substantially, and there was some promise of progress in this area. In November 2017, Tesla implied that 2019 battery pack pricing would range $75–$90 per kWh[[41]](#endnote-41) for its soon-to-be-released BEV semi-truck. This prediction supported most estimates, which suggested that the cost to produce lithium-ion batteries had to be less than $100 per kWh to bring the overall cost of electric cars on par with their ICE competitors.[[42]](#endnote-42)

The second inhibiting factor to the growth of the electric car market was the absence of charging stations or networks. Drivers of ICE vehicles came to enjoy the fact that filling stations were always nearby, with over 156,000 gas stations scattered across the United States.[[43]](#endnote-43) Tesla took matters into its own hands by building a network of 1,000 supercharger stations, with a total of 6,934 supercharger stalls worldwide,[[44]](#endnote-44) which were free to use for Tesla owners. This was part of an industry and nation-wide government effort to install 45,000 charging outlets and 16,000 electric stations for electric vehicle owners.[[45]](#endnote-45)

Led in part by Tesla, the electric car industry began to build a foundation for tremendous growth. In a 2017 groundbreaking study, UBS Global Research estimated that BEVs would represent 30 per cent of the European market, 15 per cent of the Chinese market, and 5 per cent of the North American market by 2025.[[46]](#endnote-46) Between 2020 and 2025, electric vehicle sales would see a compounded annual growth rate of an astounding 46 per cent to reach 14 million units annually.[[47]](#endnote-47) This was a 500 per cent increase over predictions from the previous year.[[48]](#endnote-48) The market was finally entering the steep part of the BEV adoption curve.

Many countries and companies were jumping on board. China announced its new *Made in China 2025* policy that it would provide a $15,000 subsidy per BEV purchased, among other incentives.[[49]](#endnote-49) China already had 171,000 charging stations in place and planned to invest ¥25 billion ($3.98 billion)[[50]](#endnote-50) by 2020 to expand this network. The industry boomed in response to these measures. BEV and hybrid vehicle sales in China were up 53 per cent in 2016 to 507,000, which represented 45 per cent of all such vehicles sold worldwide. Importantly, more than 200 companies announced intentions to produce and sell BEVs in China, most of which were new to the industry. In fact, France and Britain announced that they would ban traditional ICE vehicles by 2040, while Germany called for a ban by 2030.[[51]](#endnote-51)

Traditional automobile manufacturers were also following suit as the market heated up. Volvo, a Chinese-owned Swedish automaker, announced that its entire vehicle line would be electric by 2019, with five all-electric models set to roll out from 2019 to 2021.[[52]](#endnote-52) GM announced its plans to phase out ICE vehicles for an “all-electric future,” including efforts to have 20 all-electric vehicles on a new modular BEV production platform by 2023 that would be flexible enough to accommodate nine different body styles in multiple sizes, segments, and brands. GM also planned to cut the cost of lithium-ion batteries to under $100 per kWh by 2021, from the current cost of $145. As such, GM expected these efforts to drive BEV vehicle sales to over 1 million units per year by 2026, representing 10 per cent of the company’s global vehicle sales.[[53]](#endnote-53)

BEVs represented many other interesting, and possibly fatal, changes to traditional stalwarts in the automobile industry. For example, BEV powertrains only had 35 moving and wearable parts, whereas an equivalent ICE powertrain hosted 167 moving and wearable parts.[[54]](#endnote-54) This would ultimately make BEVs less expensive to manufacture and maintain. The electric motor itself was less complex, with only three moving parts that were brushless, and thus virtually maintenance-free.[[55]](#endnote-55) UBS Global Research estimated the maintenance cost for GM’s current BEV model, the Chevrolet Bolt EV (the Chevrolet BEV), at $255 per year, compared to $610 for an equivalent ICE model, such as the Volkswagen Golf. The Chevrolet BEV was almost maintenance free, with significantly fewer parts to replace over the car’s life. It did not require a regular change of fluids such as engine oil, because it had none. With the exception of rotating tires and changing the cabin filter, the Chevrolet BEV required little to no maintenance for the first 150,000 miles (240,000 kilometres).[[56]](#endnote-56) This efficiency translated to an after-sales revenue expense for the consumer of approximately $400 per year, 60 per cent less than an equivalent ICE vehicle.[[57]](#endnote-57) Also, the Chevrolet BEV was a relatively unsophisticated electric vehicle, compared to a Tesla, Jaguar, or future envisioned models, which suggested that maintenance costs (and associated dealership revenue) would only continue to decline.[[58]](#endnote-58)

For the first time since 1925, new, qualified competitors were entering the market, and this trend would begin to accelerate as niche-marketing opportunities emerged. For example, Workhorse Group Incorporated (Workhorse), a relatively young company that provided BEVs for the package delivery industry, had built an important and growing relationship with the parcel courier United Parcel Service. Workhorse also announced the launch of an electric pickup truck (with extended range), targeted directly at the construction industry. This truck, dubbed the W-15, came equipped with an external 7.2-kilowatt power outlet that provided up to 30 amps directly from the vehicle battery pack, which could remotely power arc welders and other tools[[59]](#endnote-59) (see Exhibit 2).

New BEV models emerged with a skateboard-like powertrain and chassis, such as the new Jaguar I-Pace concept car, which essentially consisted of a massive battery pack with two electric motors at each end[[60]](#endnote-60) (see Exhibit 3). At the same time, manufacturing costs began to rapidly decrease, ultimately making production for BEVs far less costly than for ICE vehicles. The combination of numerous new upstart competitors sporting a simplified vehicle design began to prove challenging for the business model of traditional automobile manufacturers, driving down both sales and margins.[[61]](#endnote-61)

In 2017, the average sale price for a new ICE vehicle was $33,464.[[62]](#endnote-62) The average cost to produce the vehicle was $29,175 (based on a gross margin of 12.65 per cent), but was expected to continue to drop closer to the $20,000 range, thanks to a relatively simple design, lower battery costs, and growing competition. This trend would undoubtedly lower gross margins for ICE manufacturers even below the current 12.65 per cent,[[63]](#endnote-63) and GM’s gross margins were directly tied to a cost structure that was supported by higher volumes and higher margins (see Exhibits 1 and 4). This new scenario implied a new threat for GM that could prove more serious than the company’s bankruptcy protection situation in 2009.

**ELECTRIC VEHICLE BUSINESS MODEL**

Independent electric vehicle OEMs had yet to build a profitable business model, although they were emerging everywhere based on a promising future.[[64]](#endnote-64) Profitability was hampered by the high cost of producing batteries and developing economy of scale in manufacturing, as well as the requirement to invest in and develop charging networks, showrooms, and a service capacity. OEMs, however, had defined their business model fairly succinctly and were busy attempting to address any impediments to future profitability.

Tesla represented one of these emerging business models. Its business model started with the unique value proposition of a safe, eco-friendly, high-end vehicle that just happened to be electric, accompanied with a membership scheme that provided the owner with access to cheap battery charges at over 11,000 supercharging connectors worldwide.[[65]](#endnote-65) Tesla had four consumer car models: the Model S sedan, the Model X SUV, the Model 3 midsize car (more affordably priced), and the revitalized Roadster supercar.[[66]](#endnote-66) Tesla sold most of its vehicles online, supported by a relatively small number of company owned stores and service locations, which acted mainly as small showrooms. Interestingly, many US states had protectionist laws that limited or banned auto manufacturers from selling directly to consumers, which required Tesla to open these small sales outlets. By the end of the third quarter of 2018, Tesla had 351 stores and service locations around the world. Service was provided through service locations and a unique mobile service fleet that expanded the number of service locations to 373.[[67]](#endnote-67) Notably, 80 per cent of a Tesla vehicle’s servicing could be performed without lifting the vehicle, making remote servicing through a mobile service fleet very productive.[[68]](#endnote-68)

Battery production was supported through the Tesla Gigafactory in Nevada. By mid-2018 the factory reached an annualized battery production capacity of 20 gigawatt-hours, making it the highest-volume battery plant in the world. It was considered the world’s largest building, with 4.9 million square feet (456,000 square metres) of operational space.[[69]](#endnote-69) Tesla’s multibillion-dollar investment in this battery factory was primarily focused on reducing the costs of battery cells through economies of scale and related R&D investments.[[70]](#endnote-70)

Tesla operated one of the world’s most advanced automotive manufacturing facilities in Fremont, California, a former GM and Toyota facility. The Fremont site offered 5.3 million square feet (500,000 square metres) of manufacturing and office space for Tesla, where the company made all Tesla models in one factory, focused on refining advanced automated manufacturing systems.[[71]](#endnote-71) The typical BEV’s relatively simple powertrain design allowed for multiple vehicle production across several platforms in a single factory,[[72]](#endnote-72) unlike the single or duo, multi-factory model typically associated with ICE automobile manufacturing.

Tesla was not yet at scale for profitability, and the company had plenty of problems to resolve. Although gross margins were a healthy 25.8 per cent in the third quarter of 2018, the company’s annual net income to date was a negative amount: –$1.12 billion. Service revenues represented only 10 per cent of sales, at slightly negative margins. Most cars were sold outright, with leasing representing less than 3 per cent of third quarter sales.[[73]](#endnote-73) Therefore, Tesla’s business model was based on profits mainly from margins on outright sales of the vehicles. Tesla’s results also included distribution and service revenues (and associated costs), unlike traditional automotive OEMs such as GM, who offloaded these revenues and related costs to their independent dealership network.[[74]](#endnote-74)

**AUTONOMOUS VEHICLES**

Autonomous vehicles represented an equally, or perhaps greater, revolutionary change for the automotive industry. OEMs like GM were lining up products to support this monumental market transformation. Autonomous vehicles were expected to have a considerable impact on related industries such as trucking, taxis, ride-share, and delivery companies. They were also expected to affect sales of all vehicles in general, including electric vehicles. GM agreed with experts who saw BEVs as the foundation of autonomous vehicles,[[75]](#endnote-75) representing a new multi-trillion-dollar addressable market for auto manufacturers that could potentially disrupt most related industries.

In a groundbreaking 2016 study, management consulting firm A.T. Kearney predicted that the market for autonomous driving would grow to $560 billion by 2035, including pay-per-use services outperforming equipment revenues from 2025 onward.[[76]](#endnote-76) The study went on to note that “autonomous driving threatens the very existence of mid-level automakers as the market develops along three segments: premium, low-cost, and drones.” The global financial services firm KPMG issued a 2018 study titled *Will This Be the End of Car Dealerships as We Know Them?* The study predicted that all new car sales would be autonomous vehicles by 2033.[[77]](#endnote-77)

Autonomous vehicles were expected to push the ride-share industry to tremendous growth. AlixPartners, a Southfield, Michigan-based consulting firm who had advised GM through its bankruptcy, estimated that car-share services had cost automakers 500,000 product sales since 2006. The firm went on to state: “Self-driving ‘autonomous’ cars will be the ‘killer app’ that enables car-sharing companies to blossom. By 2020, 4 million Americans will car-share, up from 1 million now.” AlixPartners also predicted that every vehicle sold into a car-sharing fleet would cost automakers 32 vehicle sales.[[78]](#endnote-78) If the firm’s predictions were accurate, a serious threat to traditional automakers and their dealerships was quickly approaching.

Fiat Chrysler CEO Sergio Marchionne, one of the longest serving CEOs in the automobile industry, stated at the 2018 North American International Auto Show in Detroit that “carmakers have less than a decade to reinvent themselves or risk being commoditized amid a seismic shift in how vehicles are powered, driven and purchased.” He went on to state that “auto companies need to quickly separate the stuff that will be swallowed by commodity from the brand stuff.”[[79]](#endnote-79) (Marchionne later died unexpectedly in July of that year.)

A.T. Kearney also reflected that the value share of an automobile would “undergo a tectonic shift” with the autonomous vehicle. The value of an average automobile was 90 per cent hardware and 10 per cent software. In the autonomous vehicle world, the value share would shift to 40 per cent hardware, with its related profit pool shrinking. The real value, and margin, would come from the software (40 per cent) and the content (20 per cent). The margins and related profit in the industry would shift from traditional hardware manufactures like GM to software and content providers. GM and traditional OEMs would have to undergo a strategic transformation into these types of businesses to access the higher margin opportunities that the future presented.[[80]](#endnote-80)

**MAKING MONEY IN THIS NEW WORLD**

In November 2017, GM’s CEO Barra told investors that GM would launch a new family of electric vehicles that would cost less to produce than current models and that would be sold at a profit,[[81]](#endnote-81) effectively positioning GM to challenge Tesla. Barra also told investors that GM was generating strong profits from selling trucks and SUVs in the United States, and reaffirmed her promise that GM’s core North American vehicle business would achieve 10 per cent pre-tax profit margins[[82]](#endnote-82) (see Exhibit 4).

Currently, GM’s five-year average gross margins stood at 11.74 per cent, compared to an industry average of 12.49 percent.[[83]](#endnote-83) Given the financial issues of 2009 and GM’s cost structure, it was clear that the company was not well positioned to effectively compete on price against major global competitors.

Barra did not address the evident significant threats to the company’s current business model and to its supplier and dealership networks. Many of GM’s dealerships showed little sign of remaining relevant—or even necessary—in a transformed industry dominated by electric vehicles.[[84]](#endnote-84) The automobile industry was undoubtedly expected to become a much more competitive marketplace, with many new competitors entering the industry.

How and who would make money in the world of electric vehicles? How would this change impact traditional business models for vehicle manufacturers, parts manufacturers, and dealer networks? How would the new entrants build and support new distribution models and make them profitable?

The journey of transformation that Barra’s company was embarking on was unlike any other experienced in the past. Change had been a burden for a large company like GM. This scale of the industry’s revolution was expected to be far more massive than ever before. How would GM cope?

EXHIBIT 1: GENERAL MOTORS Company (GM) 2017 GLOBAL SALES (in US$ thousand)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | **Year Ended December 31** | | | | | |
| **2018** | | | **2017** | | |
|  | **Industry** | **GM** | **Market Share** | **Industry** | **GM** | **Market Share** |
| **North America** |  |  |  |  |  |  |
| United States | 17,694 | 2,954 | 16.7% | 17,567 | 3,002 | 17.1% |
| Other | 3,835 | 536 | 14.0% | 3,981 | 574 | 14.4% |
| Total | 21,529 | 3,490 | 16.2% | 21,548 | 3,576 | 16.6% |
| **Asia/Pacific, Middle East and Africa** |  |  |  |  |  |  |
| China | 26,466 | 3,645 | 13.8% | 28,250 | 4,041 | 14.3% |
| Other | 22,252 | 555 | 2.5% | 21,067 | 629 | 3.0% |
| Total | 48,718 | 4,200 | 8.6% | 49,317 | 4,670 | 9.5% |
| **South America** |  |  |  |  |  |  |
| Brazil | 2,566 | 434 | 16.9% | 2,239 | 394 | 17.6% |
| Other | 1,919 | 256 | 13.3% | 1,927 | 275 | 14.3% |
| Total | 4,485 | 690 | 15.4% | 4,166 | 669 | 16.1% |
| **Total in GM Markets** | 74,732 | 8,380 | 11.2% | 75,031 | 8,915 | 11.9% |
| **Total in Europe** | 19,045 | 4 | 0.0% | 19,149 | 685 | 3.6% |
| **Total Worldwide** | 93,777 | 8,384 | 8.9% | 94,180 | 9,600 | 10.2% |
| **United States** |  |  |  |  |  |  |
| Cars | 5,361 | 560 | 10.4% | 6,145 | 709 | 11.5% |
| Trucks | 5,361 | 1,360 | 25.4% | 5,039 | 1,328 | 26.4% |
| Crossovers | 6,972 | 1,034 | 14.8% | 6,383 | 965 | 15.1% |
| **Total in United States** | 17,694 | 2,954 | 16.7% | 17,567 | 3,002 | 17.1% |
| China |  |  |  |  |  |  |
| SGMS |  | 1,749 |  |  | 1,906 |  |
| SGMW and FAW-GM |  | 1,896 |  |  | 2,135 |  |
| **Total in China** | 26,466 | 3,645 | 13.8% | 28,250 | 4,041 | 14.3% |

Note: SGMS = SAIC General Motors Sales Co. (a joint venture between GM and SAIC Motor that manufactures and sells Chevrolet, Buick, and Cadillac automobiles in China); SGMW = SAIC-GM-Wuling Automobile (a joint venture between SAIC Motor, GM, and Liuzhou Wuling Motors Co Ltd., based in Liuzhou, Guangxi Zhuang Autonomous Region, in southwest China); FAW-GM = Light Duty Commercial Vehicle (a commercial vehicle manufacturing company headquartered in Changchun, China and a 50:50 joint venture between FAW Group and GM).

Source: Created by the case authors with information from United States Securities and Exchange Commission, *Form 10K, General Motors Company*, December 31, 2017, accessed May 2, 2018, https://investor.gm.com/static-files/54070a3d-55d9-4a0c-9913-7ba9b4d366de, 2.

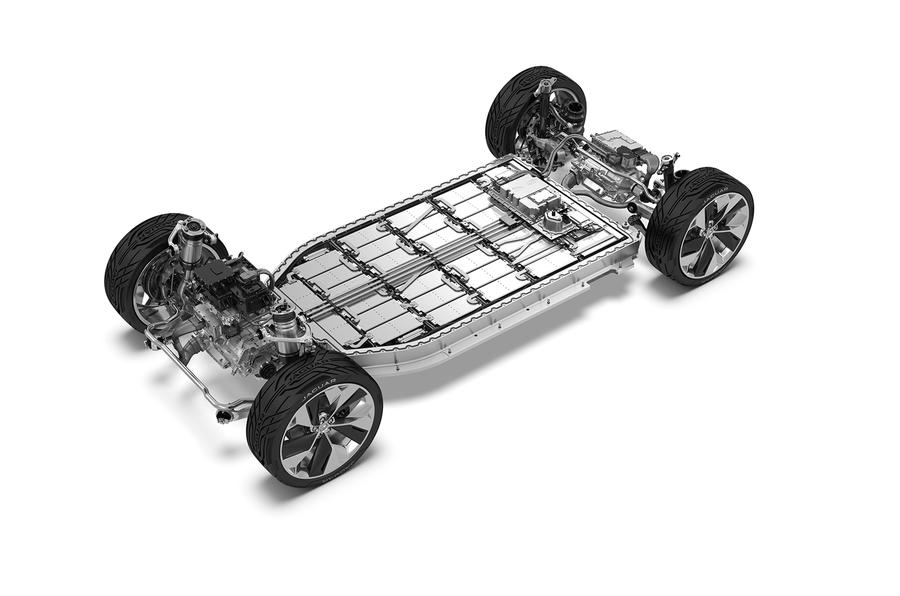
EXHIBIT 2: SAMPLE NEW ENTRANT IN the US Electric Vehicle MARKET

Workhorse W15



Source: “W15 Electric Pickup Truck with Extended Range,” Workhorse, accessed May 2, 2018, http://workhorse.com/pickup; image used with permission.

EXHIBIT 3: JAGUAR I-PACE BATTERY ELECTRIC VEHICLE DRIVETRAIN



Source: Matt Burt, “New Jaguar I-Pace’s Battery Electric Vehicle Technology at a Glance,” Autocar, November 16, 2016, accessed May 2, 2018, www.autocar.co.uk/car-news/motor-shows-la-motor-show/new-jaguar-i-pace%E2%80%99s-battery-electric-vehicle-technology-glance; image used with permission.

EXHIBIT 4: GENERAL MOTORS Company (GM) FINANCIAL RESULTS, 2015–2018   
(in US$ million)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Annual Income Statement (Year Ended December 31)** | | | | |
|  | **2018** | **2017** | **2016** | **2015** |
| Revenue | 147,049 | 145,588 | 149,184 | 135,725 |
| Cost of revenue | 132,954 | 125,997 | 128,868 | 118,299 |
| Gross profit | 14,095 | 19,591 | 20,316 | 17,426 |
|  | 9.6% | 13.5% | 13.6% | 12.8% |
| **Operating expenses** |  |  |  |  |
| Sales, general, and administrative | 9,650 | 9,575 | 10,354 | 11,888 |
| Operating income | 4,445 | 10,016 | 9,962 | 5,538 |
| Additional income/expense | 2,596 | 290 | 327 | 1,063 |
| EBIT | 9,204 | 12,438 | 12,571 | 8,794 |
| Interest expense | 655 | 575 | 563 | 423 |
| Earnings before tax | 8,549 | 11,863 | 12,008 | 8,371 |
| Income tax | 474 | 11,533 | 2,739 | (1,219) |
| Net income from continuing operations | 8,075 | 330 | 9,269 | 9,590 |
| Net income | 8,014 | (3,864) | 9,427 | 9,687 |
| EBITDA | 22,873 | 24,699 | 22,664 | 16,178 |
| **Statement of Cash Flow** | | | | |
| Net income | 8,014 | (3,864) | 9,427 | 9,687 |
| **Cash flow—Operating activities** |  |  |  |  |
| Depreciation | 13,669 | 12,261 | 9,819 | 7,487 |
| Net income adjustments | (3,434) | 8,230 | (1,781) | (2,889) |
| Other operating activities | (3,054) | (3,483) | (314) | (1,578) |
| Net cash flow—Operating activities | 15,256 | 17,328 | 16,607 | 11,769 |
| **Cash flows—Investing activities** |  |  |  |  |
| Capital expenditures | (8,761) | (8,453) | (8,384) | (6,813) |
| Investments | (12,207) | (15,756) | (25,121) | (18,483) |
| Other investing activities | 205 | (3,363) | (2,138) | (2,414) |
| Net cash flow—Investing | (20,763) | (27,572) | (35,643) | (27,710) |
| **Cash flows—Financing activities** |  |  |  |  |
| Sale and purchase of stock | 2,672 | (3,507) | (2,500) | (3,520) |
| Net borrowings | 11,664 | 18,455 | 21,027 | 18,017 |
| Other financing activities | (640) | (131) | 918 | 1,353 |
| Net cash flow—Financing | 11,454 | 12,584 | 17,077 | 13,608 |
| Effect of exchange rates | (299) | 348 | (213) | (1,524) |
| Net cash flow | 5,648 | 2,688 | (2,172) | (3,857) |

Exhibit 4 (continued)

**Balance Sheet**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Current assets** |  |  |  |  |
| Cash and cash equivalents | 20,844 | 15,512 | 12,574 | 15,238 |
| Short-Term investments | 5,966 | 8,313 | 11,841 | 8,163 |
| Net receivables | 33,399 | 28,685 | 24,827 | 26,388 |
| Inventory | 9,816 | 10,663 | 11,040 | 13,764 |
| Other current assets | 5,268 | 5,571 | 15,921 | 5,855 |
| Total current assets | 75,293 | 68,744 | 76,203 | 69,408 |
| **Long-Term assets** |  |  |  |  |
| Long-Term investments | 34,298 | 30,281 | 25,997 | 27,701 |
| Fixed assets | 82,317 | 79,135 | 76,320 | 51,401 |
| Intangible assets | 5,579 | 5,849 | 6,149 | 5,947 |
| Other assets | 5,770 | 4,929 | 3,849 | 3,021 |
| Deferred asset charges | 24,082 | 23,544 | 33,172 | 36,860 |
| Total assets | 227,339 | 212,482 | 221,690 | 194,338 |
| **Current liabilities** |  |  |  |  |
| Accounts payable | 50,346 | 49,925 | 49,226 | 51,655 |
| Short-Term debt | 31,891 | 26,965 | 23,797 | 19,562 |
| Other current liabilities | – | – | 12,158 | – |
| Total current liabilities | 82,237 | 76,890 | 85,181 | 71,217 |
| Long-Term debt | 73,060 | 67,254 | 51,326 | 43,549 |
| Other liabilities | 29,265 | 32,138 | 41,108 | 39,249 |
| Minority interest | 3,917 | 1,199 | 239 | 452 |
| Total liabilities | 188,479 | 177,481 | 177,854 | 154,467 |
| **Stockholders’ equity** |  |  |  |  |
| Common stock | 14 | 14 | 15 | 15 |
| Capital surplus | 25,563 | 25,371 | 26,983 | 27,607 |
| Retained earnings | 22,322 | 17,627 | 26,168 | 20,285 |
| Other equity | (9,039) | (8,011) | (9,330) | (8,036) |
| Total equity | 38,860 | 35,001 | 43,836 | 39,871 |
| Total liabilities and equity | 227,339 | 212,482 | 221,690 | 194,338 |

Note: For brevity, less important financial components are not included in Statement of Cash Flow; summary amounts reflect GM’s results as reported on the Nasdaq Stock Exchange.

Source: Created by the case authors with information from “GM Company Financials,” Nasdaq Stock Exchange, accessed February 8, 2019, www.nasdaq.com/symbol/gm/financials?query=cash-flow.

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