

A Work Project, presented as part of the requirements for the Award of a Master Degree in Economics / Finance / Management from the NOVA – School of Business and Economics.

“OPTIMIZATION AND
ELECTRIFICATION TO CAPITALIZE
THE POWER OF THE FORD BRAND”

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Abstract

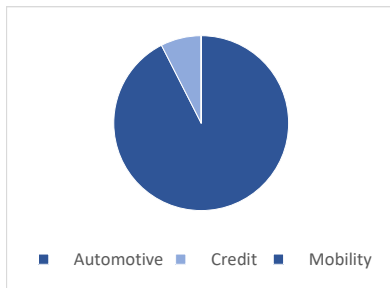
Automotive industry is on the path to recovery from a pandemic that blocked the market and from disruptions in the supply chain whose end does not seem to be near. The various markets across the globe are experiencing different recovery rhythms and ways of dealing with obstacles. At a time when the Electric Vehicles trend begins to gain serious weight in the market, the automotive industry is facing challenges and profound changes that promise to shake the automotive world and change the way we see mobility.

Keywords: Electrification, optimization

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1. COMPANY OVERVIEW

Figure 1: Ford revenues 2020 | source: ford.com



Ford Motor company (NYSE: F) was founded in 1903 by Henry Ford being headquartered in Dearborn, Michigan.

The company designs, manufactures and commercializes cars, SUVs, trucks, electrified and commercial vehicles under the Ford and Lincoln Brands. Lincoln was founded in 1917 by Henry M. Leland and was acquired by Ford in 1922, producing luxury cars, crossovers, SUVs, and Limousine's, accounting for 11% of the total revenues.

Ford is divided in three segments: **Automotive**, **Credit** and **Mobility** being the first one the most important and responsible for the production and selling of automotive, the second is responsible for providing credit and insurance to dealers and clients of the automotive segment, and the last one is related to investment in autonomous vehicles and other mobility solutions for customers and cities. The Mobility segment will be part of the automotive segment in 2021.

Globally Ford employs **182.000** people. The company has a global presence with 74 factories dedicated to assembly and to the specific production components as **Engine and transmission** and different production stages: **forging and stamping**.

SHAREHOLDERS STRUCTURE

Ford Has **Class A and Class B Shares**. The 71 million class B shares owned by the Ford family, are “super voting” shares, even representing less than 2% of the shares outstanding account for 40% of the voting rights, enabling the family to maintain a significant role in the company's future. Ford is one of best examples of family business. This peculiar type of company deals with crisis in unique ways. Family businesses tend to preserve a long-term vision instead of a short-term-profit oriented strategy. Ford stock (class A shares) investors are divided in two main types, **individual** and **institutional investors**. The 1460 institutional investors represent 53,08%, of the 3924 million shares outstanding with the top 5 investors account for 28,36%.

After the suspension of the payment of dividends in March 2020, when the pandemic broke out, Ford **resumed the distribution of dividends in November 2021**. After the encouraging and promising results of the 3Q, the company reinforced the commitment to shareholders (policy supported by the family Ford) with 10 cents quarterly dividend per share. A situation that contrasts with its peer GM, which since its suspension at the same time, has not resumed distribution.

MANAGEMENT

Jim Farley is the CEO of the company. With just one year in the job, he has given a **very positive image to investors**. In this short space of time, he has managed to reverse the long slide in the company's stock, something the two previous CEOs failed to do - Ford's share have **doubled** over the past year. Since taking charge, Farley has nearly **tripled** Ford's investment in Electric Vehicles, with vertical integrations at the supply chain level. Jim Farley is undoubtedly breathing **new life into the company**, he has come with a **plan**, a **vision** and with goals that the **market understands and embraces**. This materialized in changes in the go-to-market strategy, launching the **Ford +** to drive ford through the business model and electrification transformations that includes the creation of a new division that is especially design for the Ford's commercial customers, **the Ford Pro**, and a reduction of non-profitable operations.

In May 2020, in the midst of the pandemic, Jim Farley, then COO of the company, bought **\$1 million worth** in Ford stock. This unusual decision shows that the company's CEO is **100% committed** to the project and deeply believes in the company's value.

2. AUTOMOTIVE INDUSTRY

Consolidated industry facing great changes in the next ten years

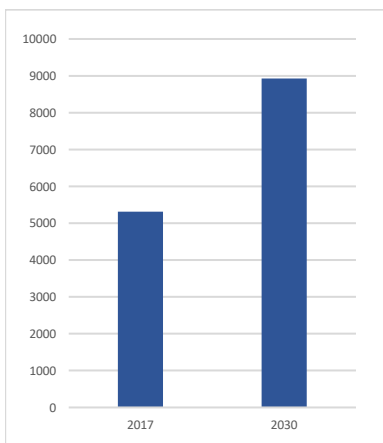
The automotive industry is one of the 10 biggest industries worldwide. In 2030, the expected revenue of the entire automobile sector is **\$8,930B**, which means an increase of 68% when compared to the same indicator in 2017. These numbers make it clear that there is considerable **potential for business and revenue scaling**, for the companies in the sector that manage to maintain or increase market share, adapting their business models to the ongoing and upcoming changes.

INDUSTRY VOLUME

In order to arrive at a more specific value and a more rigorous analysis of the industry volume, we measure it through its two drivers: the **Population and the Penetration Rate (PR)**. Based on past values and on factors that we consider relevant to the estimation, we made the forecasts for these two indicators.

- **Industry volume = Population able to drive × Penetration rate**

Fig 1: Automotive Industry volume | source: statista



Given the substantial differences in how these indicators vary from region to region, we have separated the analysis into four regions: North America, Europe, China and South America.

POPULATION ANALYSIS

Figure 2: Population able-to-drive forecasted (in millions) | source: populationpyramid.com

		2020	2025	2030
China	Total Population	1 439 323	1 457 908	1 464 340
	Total Population able to drive	1 047 827	1 058 441	1 055 789
	%growth rate		1,0%	-0,3%
Europe	Total Population	747 636	745 791	741 302
	Total Population able to drive	525 588	518 325	508 533
	%growth rate		-1,4%	-1,9%
North America	Total Population	368 869	379 851	390 598
	Total Population able to drive	251 200	257 919	262 091
	%growth rate		2,7%	1,6%
South America	Total Population	430 759	447 509	461 853
	Total Population able to drive	284 732	300 726	311 751
	%growth rate		5,6%	3,7%

Fig 3: North America population forecast (in millions) | source: populationpyramid.com

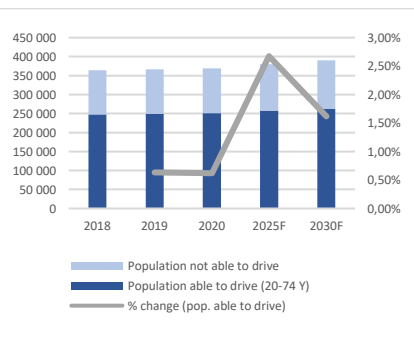


Fig 4: Europe population forecast (in millions) | source: populationpyramid.com

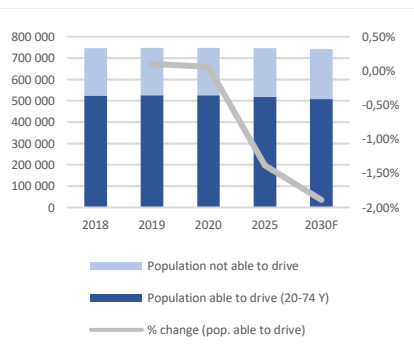
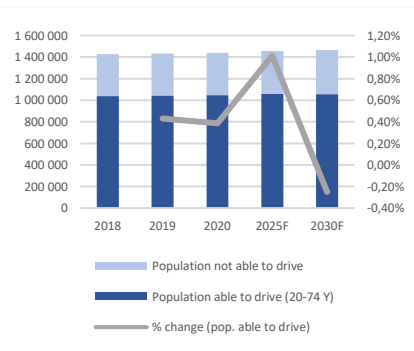


Fig 5: China population forecast (in millions) | source: populationpyramid.com



In North America, is predicted an increase of **3%** in the total population between 2020 and 2025 and of **2.8%** between 2025 and 2030. In this same period, is also expected a **growth in the population able-to-drive (between 20 and 74 years)**. In 2030 it is expected that there will be 10 million more than in 2020 able to drive – around 262 million. We conclude that in this geographic sector there is a **potential for growth in the industry volume derived by the expected increase in the target population.**

Europe is experiencing a demographic crisis that is resulting in an **annual decrease in population**. Between 2020 and 2030 the automotive market's target population (able-to-drive) is expected to reduce by **17 million**, a decline that will surely have a **significant impact** of approximately less **630.000 units** (4.45% of 2020 industry volume) on the automotive industry volume and, consequently, on the revenues of the car companies.

Forecasting China in terms of population evolution is always a very uncertain task, as this is dependent on the will of the government, which controls birth policies. Considering the development of the relevant population for the purpose of measuring the potential of the automotive industry (between 20 and 74 years old), is expected a **residual growth between 2020 and 2025** and a **marginal decrease between 2025 and 2030 of 0.3%**.

Of the four regions analyzed, South America is the one that can benefit the most from an **increase in industry volume due to the population growth**. Between 2020 and 2025, the population between 20 and 74 years old, is expected to increase **by 5.6%** (about 15 million in absolute value), reaching close to **300**

million in 2025. In the following five years, until 2030, it is forecasted to increase by around 11 million.

NORTH AMERICA

FORECASTED NORTH AMERICAN PENETRATION RATE

	2018	2019	2020	2025F	2030F
Penetration rate	8,78%	8,39%	6,28%	8,00%	8,00%
EV derived	0,18%	0,15%	0,13%	0,80%	1,60%
ICV derived	8,61%	8,24%	6,15%	7,20%	6,40%

• **2019 - 2020**

Coronavirus crippled auto sales and pushed the giants of the industry to the limit.

When analyzing the evolution of the PR, we notice that it significantly **reduced** in the pandemic year of 2020 with “frozen” consumer demand. In 2019 this rate was 8.39% and in 2020 it reduced to **6.28%**. In the lock-down exit phase, sales and consumer demand for new vehicles increased significantly. Indeed, the worst predictions did not come true as the economic recovery was more in a "V" than a "U" shape.

Looking at the case of the U.S, this becomes clearer, by April 2020, when stayed-home measures began taking effect new vehicles sales dived 47% in the United States, and fell by 38.7% in March. However, the overall drop for the first quarter of 2020, including the two previous months saw a more modest decline of 12.7%. Soon after that, sales began to snap back... By May sales were down by just 30% over the same month in the previous year and in June by just 26.7%. In December 2020 sales were actually higher on YoY comparison.

This situation led to a decrease in the PR that, although quite significant, was below many more pessimistic forecasts.

• **2020 - 2025**

Headwinds to overcome, market will react and fix

At a time when the economy was reopening and indicators were showing encouraging signs of recovery from the damage caused by the pandemic, in 2021 a massive **\$60 Billion global chip shortage hit the industry**. As semiconductor chips are an absolutely crucial part in the manufacture of modern vehicles, the **capacity of production was not there to fulfill the growing levels demand**.

Fig 6: Overall U.S sales in 2019 and 2020 | source: goodcarbadcar.net

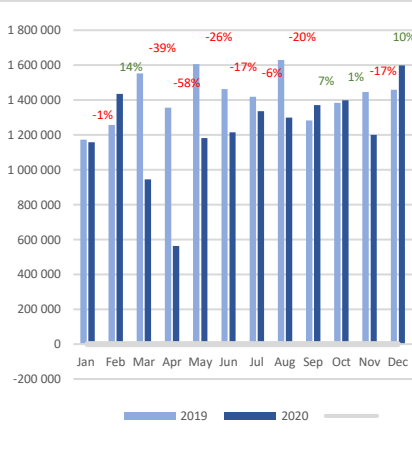
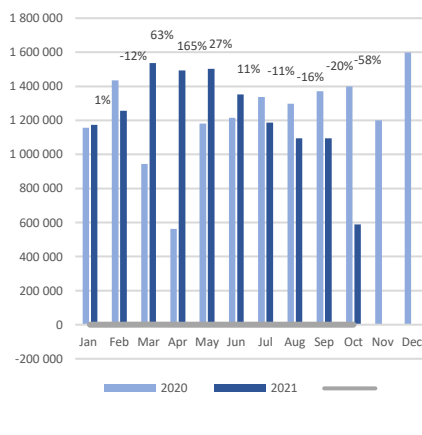


Fig 7: Overall U.S sales in 2020 and 2021 | source: goodcarbadcar.net



This particularly difficult context at the level of the supply chain, forced Ford, by the end of March 2021, to announce that it was going to slash vehicle production at six plants in North America, among those were included facilities that produced highly profitable pickup trucks – the company's best sellers. Upon the Q1 earnings release, Ford announced that they had approximately **22,000 vehicles** awaiting installment of chip related components and it is expected to have **impact of over \$1 billion on its earnings**.

Currently, China and some neighboring countries still hold the "monopoly" of semiconductor production, and this disruption problem appears to last at least until 2022. However, given the speed of reaction of the US economy to disruptions, we predict that the market will fix the flaws. In the US, **vertical integration projects** for factories of this type of chips are already underway.

By 2025, with the market already stabilized and supply chain shocks mostly solved, we anticipate **an increase in the PR**, which will be close to the levels of 2018 (at **8%**).

- **2025 - 2030**

Delayed Electric revolution

The five years between 2025 and 2030 will be decisive for the future potential of the automotive industry as they are years of more accentuated transition from **Internal Combustion Vehicles (ICV) to Electric Vehicles (EV)** and this will define the evolution of the PR between these years.

In North America, signs of change are becoming more visible. In terms of EV sales, in the U.S, the positive results stand out. 2020 Q4 surpassed the same period in the previous year by **36%** and when we compare Q2 2020 (where the BEV represented 3.6% of the vehicles sold in the US) with Q2 2021, the percentage variation approaches a **distinct 200%**.

Fig 8: U.S EVs sales | source: McKinsey

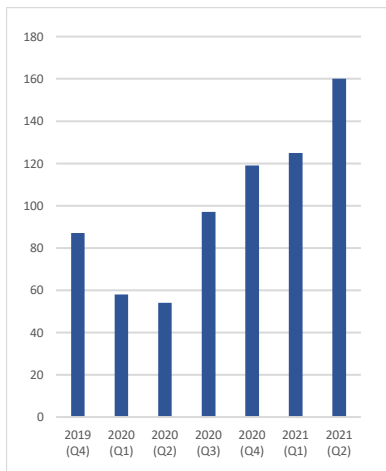
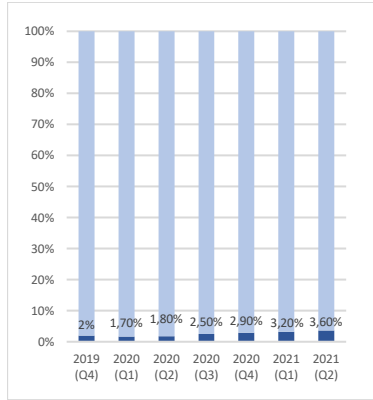


Fig 9: U.S EV sales as share of total vehicle sales | source: McKinsev



It is expected that this growth trend will continue, however there are some signs that this transition is **not being particularly effective and efficient in North America.**

High dependence on China at the supply chain level

Some factors contribute to this: the reluctance and distrust of the American consumer towards EVs; less support and tax incentives given to the purchase of EV; almost entirely reliance on a supply chain controlled by China that controls **90% of global capacity to process raw lithium**, about 70% of cobalt and 40% of nickel. China also has almost all the manganese- and graphite-refining capacity. It's hard to believe that in the near future the U.S will transition easily from a comfortable position in the production of ICV, whose supply chain dominates, to the still unknown and expensive world of EV. The rising price of electricity and the American ease of accessing oil do not promote this transition.

In recent months, General Motors, Stellantis and Toyota have each announced plans to build massive battery factories in North America. Ford said it and its South Korean partner will build three U.S. battery plants by 2025 with **enough capacity to equip one million EVs a year.** But it is still uncertain how the battery supply chain will come together and where they will obtain each of the necessary precursors, like cobalt and manganese.

The Biden administration, which released its National Blueprint for Lithium Batteries in June, signaled a readiness to **allocate \$174 billion to encourage Americans** to buy electric cars and trucks but **only \$7 billion** will go to the supply chain. The American priority is to get a reliable and solid battery supply in US soil, but it is certain that this implementation will take time.

The aforementioned challenges will delay this transition, and, consequently, the possibilities of market expansion and PR growth are turning more **unlikely.** Given these factors, we make a **moderate forecast** for the success and boost that the electric transaction will bring, so we expect the **PR in 2030 to remain close to 2025 levels at 8%.**

NORTH AMERICA INDUSTRY VOLUME

	2018	2019	2020	2025F	2030F
Total Population able to drive	248,085	249,655	251,200	257,919	262,091
Penetration rate	8.78%	8.39%	6.28%	8.00%	8.00%
Industry volume	21,791	20,947	15,765	20,634	20,967
<i>%growth rate</i>		<i>-3.90%</i>	<i>-24.70%</i>	<i>30.90%</i>	<i>1.60%</i>

Considering the trajectory estimated above, we foresee an increase in Industry Volume of around **30% between 2020 and 2025** in North America (the most

accentuated difference is due to a particularly negative 2020 starting point) and significantly more modest growth of **1.6%** over the following five years.

If we take a broader look at the evolution of this indicator, our estimate indicates that only in 2030 the North American automotive industry will reach the volume levels of 2019.

EUROPE

FORECASTED EUROPEAN PENETRATION RATE

	2018	2019	2020	2025F	2030F
Penetration rate	3,72%	3,63%	2,70%	3,70%	4,00%
EV derived	0,09%	0,12%	0,27%	0,74%	2,03%
ICV derived	3,63%	3,51%	2,43%	2,96%	2,48%

• **2019 – 2020**

Looking at full-year 2020 results, we conclude that it was particularly negative for Europe. Overall, the EU passenger car market **contracted by 23.7% to 14 million units** as a direct result of the COVID-19 pandemic. Indeed, full-scale lockdowns and other restrictions throughout the year had an unprecedented impact on car sales across the European Union.

With record drop in levels of demand, sales plunged **55% in March and dived 76.3% in April**. Towards the end of the year, signs of recovery began to be visible and in September sales were even marginally higher than in 2019.

This activity drop in the sector was reflected in a very significant reduction in PR of around **1%** between 2019 and 2020.

• **2020 – 2025**

Chip shortage barrier delaying progress, as strong consumer demand is back on track

After a year that saw the sharpest drop ever in Europe car sales, **2021 has brought more encouraging results** in the European automotive industry and signs of recovery are beginning to be noticed. By February onwards, relative annual growth was indeed very significant, but it is relevant not to forget that 2020 - the base year for comparison - was historically low. Indeed 2021 sales volume, when compared to 2019, shows that the **industry's performance is far from its maximum potential** and have been facing challenges and obstacles.

Fig 10: European Union passenger car registrations | source: acea.auto

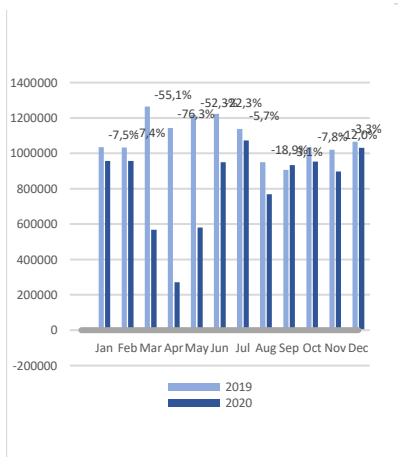
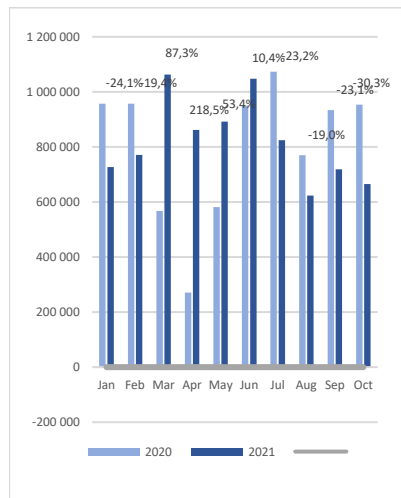


Fig 11: European Union passenger car registrations | source: acea.auto



The sales volume from May shows exactly that. Although that month sales rose by 53.4% compared to last year, totaling 891,665 units, this number is still considerably below the 1.2 million cars that were sold in May 2019. The main obstacle to the growth of the industry has been the **semi-conductor chip shortage**. This impediment to production, combined with a climate of uncertainty that is still experienced in some European countries, has made the recovery from a year of market stoppage, slower. Overall, the total sales volume for the first 10 months of 2021 was only **2.2%** higher when compared to the same period of the previous year, however still 25% below the first 10 months of 2019 sales.

The end of the shortage is not yet close, and certainly is going to last until at least the second half of '22.

However, the **demand side remains strong and order books are filled**, in this sense, with the situation normalized, we estimate that the sales volume of the automotive industry will approach pre-pandemic levels in 2023 onwards.

This indicator will be reflected in a PR that, in 2025, will return to levels similar to those registered in 2018/19, close to **3.7%**.

- **2025 – 2030**

Sales boost as Europe leads the Electric Revolution

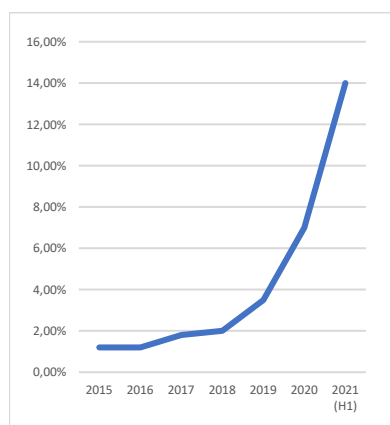
From 2025 onwards it is expected that the EU automotive sector will experience **massive structural changes**. We highlight the **electrical transition** and the initial emergence of **new mobility solutions**.

The current environmental regulations and incentives from governments makes Europe one of the most **promising markets** for the electric revolution on course.

Results already registered in 2021 show that this trend is growing stronger. In the first half of 2021, BEV sales in the top five European markets reached 336,000 units, **growing by 147%** in a YoY comparison. PHEV sales also thrived, up by **248% to 350,000 units**. Having doubled the EV market share to **14% from a year ago**, Europe is leading the way to a more electric future. This figure varies considerably from region to region. By 2020, Norway presented the larger EV share (57.3%) and Germany, with a 10.7% share was the larger market in absolute terms, having ended the year with over 394.000 new BEV (up 263% YoY). In a year in which electricity prices were particularly high, **these above-expected results** demonstrate a European trend that does not show reasons for slowing down.

We expect that from 2025 onwards, the EV technology will mature, leading to a **reduction in the cost of batteries**, which will be able to make BEV sales prices

Fig 12: Europe EV market share | source: <https://www.eea.europa.eu/>



competitive relative to ICVs. We expect that in 2025, the price of an EV will be on average 5% higher than an ICV. This development, allied to a greater and solid public charging infrastructure, will bring the segment closer to economic maturity, paving the way for an expansion of BEVs that are **less dependent on subsidies and policy**. In this sense, we expect that by the end of the present decade, the EV European market share will reach values **closer to 50%**.

Another trend we expect to see in Europe is the shift towards **new mobility solutions** such as car sharing and e-healing. We expect that it can be a **threat** to the automotive industry since its effectiveness can make the private car a **less essential and more superfluous good**, in this sense.

Overall, we estimate that the EV revolution will increase in the PR of automotive industry in the market, due to the greater attractiveness and efficiency of this new type of vehicle that year after year becomes more accessible to the general public. In this sense, we expect that the automotive industry **PR will end the decade around 4%**, increasing almost 1% in just five years (between 2025 and 2030).

FORECASTED EUROPEAN INDUSTRY VOLUME

	2018	2019	2020	2025F	2030F
Total Population able to drive	524,733	525,269	525,588	518,325	508,533
Penetration rate	3.72%	3.63%	2.70%	3.70%	4.00%
Industry volume	19,500	19,041	14,167	19,178	20,341
<i>%growth rate</i>		-2.40%	-25.60%	35.4%	6.1%

Considering these trends, we estimate an industry volume growth around **35.4% between 2020 and 2025** (the most accentuated difference is due to a particularly negative 2020 starting point) and significantly more moderate but not less **substantial growth** from 2025 to 2030 of **6.1%**.

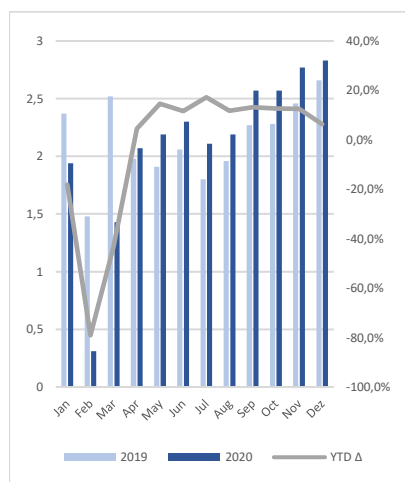
This forecasted growth in the industry volume will be driven by the increase in PR that we expect to be sufficient to offset the forecasted reduction in the able-to-drive population in Europe.

CHINA

FORECASTED CHINA PENETRATION RATE

	2018	2019	2020	2025F	2030F
Penetration rate	2.43%	2.47%	2.41%	3.00%	3.10%
EV derived	0.11%	0.12%	0.14%	0.6%	1.6%
ICV derived	2,32%	2,35%	2.28%	2.4%	1.6%

Fig 13: China automotive sales 2019 – 2020 | source: tradingeconomics.com



The economical stoppage caused by the epidemic in 2020 affected the country more at the beginning of the year and what was quickly brought under control. This context, allowed for a **reopening of the market in 2020** earlier than most Western countries and since April domestic auto sales had been witnessing positive **YoY growth**.

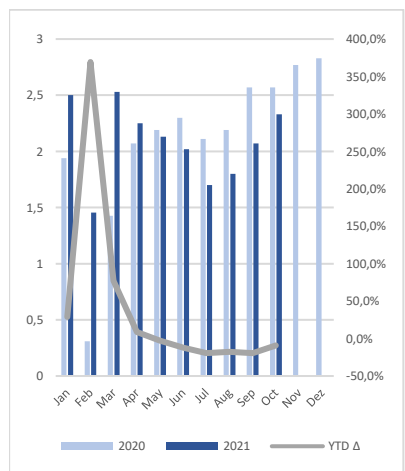
Escaping to the rule observed in the other markets, China ended 2020 with only slightly lower results. Sales in this giant market reduced only **1.8%** in 2020 when compared to 2019. This drop is reflected in the slight **decrease of the PR** that ended the year at **2.41%**.

- **2020 – 2025**

Comparing the performance of 2021 with 2020 one can see the effects of the shortage that are shaking the industry and creating an **obstacle to growth**. It is noticeable, interpreting Fig. 13, that the negative effects of this supply chain crisis began to be felt more strongly from April/May 2021 on. If in March of that year the performance was particularly positive, from then on, the decline is evident either month-to-month or YTD comparison with 2020.

As in the aforementioned markets, one of the biggest challenges for the Chinese auto market in these next five years seems to be **how it will deal with the chip shortage crisis**.

Fig 14: China automotive sales 2020 – 2021 | source: tradingeconomics.com



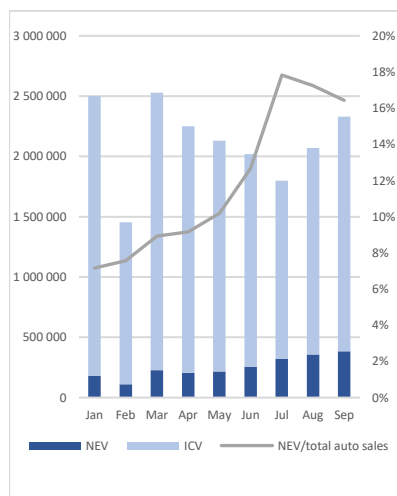
It is noticeable however that the worst phase seems to have passed. In the last four months sales are growing significantly, when compared to the same months of the previous year (2020) **the gap is getting shorter**. In October 2021, while in Europe and North America the drop in sales was very heavy (-30% YTD and -58% YTD, respectively), in China sales grew 12.6% when compared to November and were only 9.6% lower than those recorded in October 2020. Signs seem to indicate that the Chinese market is **reacting better than the rest to this demand shock**. This context makes us more confidently estimate a **market growth forecast** for the next five years and a consequent increase in the PR of the Chinese automotive industry, that will be **around 3% in 2025**.

- **2025 – 2030**

Between 2025-2030 we expect five years of EV revolution.

In China, **rigid legislation** is expected in terms of incentives to buy EV. Typically, in this region, given the political leadership of an authoritative nature, there is a higher correlation between the measures taken by the government and their

Fig 15: China automotive sales in 2021 (new energy vehicles in percentage of total sales) | source: tradingeconomics.com



implementation. In this sense, is expected greater **effectiveness in the electrical transaction.**

As we can see in Fig. 15 already in 2021, a year with significant setbacks, the evolution of NEV sales was striking, both in absolute terms and as a proportion of total sales (in January, NEV sales in the Chinese market represented around 7% of total sales and ended September at around 16%). Given this basis we estimate that in 2030 it will be **50/50 with ICV.**

If on the one hand the electrical transition brings with it a possible increase in the market, we estimate that the appearance of widespread **new mobility solutions will take away market space** from the automotive industry and impede its growth. In this sense, we forecast a slight growth of the PR from **3% in 2025 to 3.10% in 2030.**

FORECATED CHINA INDUSTRY VOLUME

	2018	2019	2020	2025F	2030F
Total Population able to drive	1,039,327	1,043,794	1,047,827	1,058,441	1,055,789
Penetration rate	2.43%	2.47%	2.41%	3.00%	3.10%
Industry volume	25,241	25,762	25,292	31,753	32,729
<i>%growth rate</i>		2.1%	-1.8%	25.5%	3.1%

Given this picture, we estimate increase in Industry Volume of around **25.5% between 2020 and 2025** (the most accentuated difference is due to a particularly negative 2020 starting point) and more moderate growth from 2025 to 2030, time when we expect the Chinese automobile market to establish and reach a steady state with marginal annual growth.

This forecasted growth in the industry volume will be mainly driven by the estimated increase in PR.

SOUTH AMERICA

FORECASTED SOUTH AMERICA PENETRATION RATE

	2018	2019	2020	2025F	2030F
Penetration rate	1.57%	1.45%	1.05%	1.50%	2.00%

The **PR is very reduced** when compared to western countries, not taking advantage of a market that would be able to scale and reach large proportions. In this region, most countries have low levels of development that make consumers have little purchasing power.

The **lack of an infrastructure** capable of supporting a massive electrical transaction and the **scarce incentives** given by most governments in the region illustrate the long delay in the development compared to the others presented. In this sense we estimate that the EV revolution and the consequent increase in the volume of the automotive industry is **still far from taking place**. The forecast in terms of PR for the market is that by 2025 it will reestablish itself to values close to those verified in the pre-pandemic period (close to 1.5%) from then on, we expect a gradual annual increase until it **settles at 2%** in 2030.

FORECASTED SOUTH AMERICA INDUSTRY VOLUME

	2018	2019	2020	2025F	2030F
Total Population able to drive	279,987	282,379	284,732	300,726	311,751
Penetration rate	1.57%	1.45%	1.05%	1.50%	2.00%
Industry volume	4,398	4,097	2,984	4,511	6,235
<i>%growth rate</i>		2.1%	-1.8%	25.5%	3.1%

Overall, we expect industry volume to post a positive evolution over the next ten years, mostly driven by an estimated increase in target population and a residual increase in PR. IN 2030, we estimate that the South American automotive industry will be **above 6 million cars**.

ratio between total debt and earnings generation than peers. So, the current Enterprise value does not translate what you would expect.

EV/sales indicates that the company is trading between the median and the maximum of the peers, however we expect that there will be a significant increase in sales in the coming years that justifies the current price.

“FORD MOTOR COMPANY”

“AUTOMOTIVE SECTOR”

COMPANY REPORT

14TH JANUARY 2021

STUDENTS: VASCO CORTES &
FRANCISCO BOLÉO TOMÉ

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Capitalize the power of the Ford brand

Optimization and Electrification

- Based on our target price \$23.20 we issue a BUY recommendation for Ford Motor Co.
- Ford revenues have decreased in the last three years, from **\$160B** in 2018 to **\$127B** in 2020, mostly driven by a significant **contraction** in industry volume due to the circumstance of Covid-19 and chip-shortage supply crisis. The company future performance is **highly dependent** on the evolution of this disadvantageous conjecture.
- We believe Ford has considerable opportunities to capitalize on growing demand for its vehicles, increasing its market share and, consequently, its sales, through increased **penetration in the Electric Vehicle market**. Furthermore, Ford can take advantage of the estimated automotive industry volume **growth**.
- Ford is in a transformation process. The focus on increasing online ordering has **tightened customer relationships**. The strategy has undergone a withdrawal from low-profit regions, reallocating **investments to mass electrification**.

Company description

Ford is an automotive company that designs, manufactures, markets and services a full line of Ford trucks, utility vehicles, cars as well as Lincoln luxury vehicles. The operation is divided in four main regions, North America, Europe, China, and International Markets group. It operates through three segments: Automotive, Mobility, and

Recommendation: **BUY**

Price Target FY21: **23.20 \$**

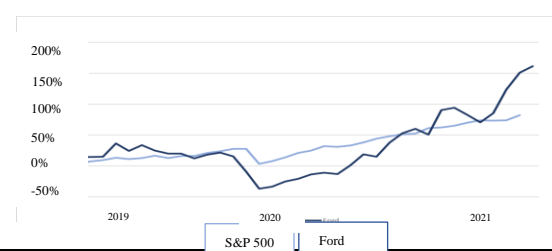
Price (as of 25-Feb-22) **20.45 \$**

52-week range (€) 8.43-21.49

Market Cap (€m) 85,720

Outstanding Shares (m) 3,973

Source:



Source: ford.com

(Values in USD M)	2019	2020	2021F
Revenues	155,900	127,144	151,121
EBIT	4926	1,633	7,964
Net Profit	84	1,633	1913
EPS	0	-0.33	2.39

Source:

THIS REPORT WAS PREPARED EXCLUSIVELY FOR ACADEMIC PURPOSES BY VASCO CORTES AND FRANCISCO TOMÉ, MASTER IN FINANCE STUDENTS OF THE NOVA SCHOOL OF BUSINESS AND ECONOMICS. THE REPORT WAS SUPERVISED BY A NOVA SBE FACULTY MEMBER, ACTING IN A MERE ACADEMIC CAPACITY, WHO REVIEWED THE VALUATION METHODOLOGY AND THE FINANCIAL MODEL. (PLEASE REFER TO THE DISCLOSURES AND DISCLAIMERS AT END OF THE DOCUMENT)

Ford Credit. Ford is a global company and the second largest U.S based automaker.

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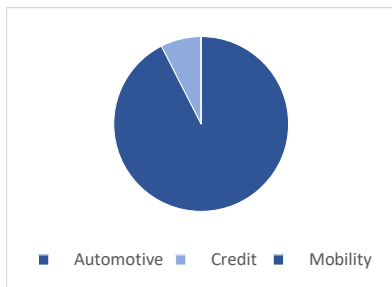
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1. COMPANY OVERVIEW

Figure 1: Ford revenues 2020 | source: ford.com



Ford Motor company (NYSE: F) was founded in 1903 by Henry Ford being headquartered in Dearborn, Michigan.

The company designs, manufactures and commercializes cars, SUVs, trucks, electrified and commercial vehicles under the Ford and Lincoln Brands. Lincoln was founded in 1917 by Henry M. Leland and was acquired by Ford in 1922, producing luxury cars, crossovers, SUVs, and Limousine's, accounting for 11% of the total revenues.

Ford is divided in three segments: **Automotive**, **Credit** and **Mobility** being the first one the most important and responsible for the production and selling of automotive, the second is responsible for providing credit and insurance to dealers and clients of the automotive segment, and the last one is related to investment in autonomous vehicles and other mobility solutions for customers and cities. The Mobility segment will be part of the automotive segment in 2021.

Globally Ford employs **182.000** people. The company has a global presence with 74 factories dedicated to assembly and to the specific production components as **Engine and transmission** and different production stages: **forging and stamping**.

SHAREHOLDERS STRUCTURE

Ford Has **Class A and Class B Shares**. The 71 million class B shares owned by the Ford family, are “super voting” shares, even representing less than 2% of the shares outstanding account for 40% of the voting rights, enabling the family to maintain a significant role in the company's future. Ford is one of best examples of family business. This peculiar type of company deals with crisis in unique ways. Family businesses tend to preserve a long-term vision instead of a short-term-profit oriented strategy. Ford stock (class A shares) investors are divided in two main types, **individual** and **institutional investors**. The 1460 institutional investors represent 53,08%, of the 3924 million shares outstanding with the top 5 investors account for 28,36%.

After the suspension of the payment of dividends in March 2020, when the pandemic broke out, Ford **resumed the distribution of dividends in November 2021**. After the encouraging and promising results of the 3Q, the company reinforced the commitment to shareholders (policy supported by the family Ford) with 10 cents quarterly dividend per share. A situation that contrasts with its peer GM, which since its suspension at the same time, has not resumed distribution.

MANAGEMENT

Jim Farley is the CEO of the company. With just one year in the job, he has given a **very positive image to investors**. In this short space of time, he has managed to reverse the long slide in the company's stock, something the two previous CEOs failed to do - Ford's share have **doubled** over the past year. Since taking charge, Farley has nearly **tripled** Ford's investment in Electric Vehicles, with vertical integrations at the supply chain level. Jim Farley is undoubtedly breathing **new life into the company**, he has come with a **plan**, a **vision** and with goals that the **market understands and embraces**. This materialized in changes in the go-to-market strategy, launching the **Ford +** to drive ford through the business model and electrification transformations that includes the creation of a new division that is especially design for the Ford's commercial customers, **the Ford Pro**, and a reduction of non-profitable operations.

In May 2020, in the midst of the pandemic, Jim Farley, then COO of the company, bought **\$1 million worth** in Ford stock. This unusual decision shows that the company's CEO is **100% committed** to the project and deeply believes in the company's value.

2. AUTOMOTIVE INDUSTRY

Consolidated industry facing great changes in the next ten years

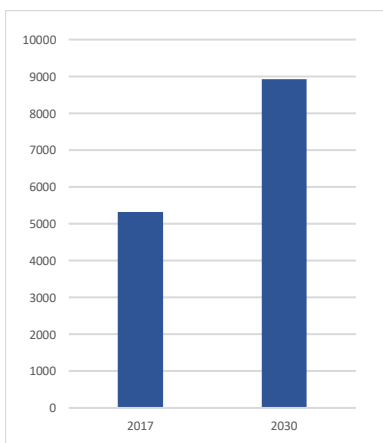
The automotive industry is one of the 10 biggest industries worldwide. In 2030, the expected revenue of the entire automobile sector is **\$8,930B**, which means an increase of 68% when compared to the same indicator in 2017. These numbers make it clear that there is considerable **potential for business and revenue scaling**, for the companies in the sector that manage to maintain or increase market share, adapting their business models to the ongoing and upcoming changes.

INDUSTRY VOLUME

In order to arrive at a more specific value and a more rigorous analysis of the industry volume, we measure it through its two drivers: the **Population and the Penetration Rate (PR)**. Based on past values and on factors that we consider relevant to the estimation, we made the forecasts for these two indicators.

- **Industry volume = Population able to drive × Penetration rate**

Fig 1: Automotive Industry volume | source: statista



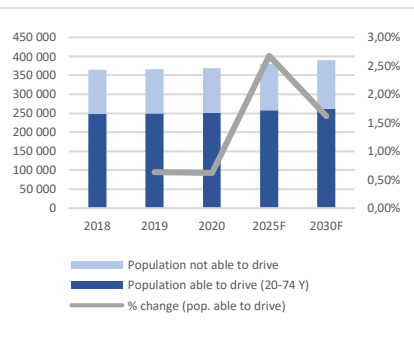
Given the substantial differences in how these indicators vary from region to region, we have separated the analysis into four regions: North America, Europe, China and South America.

POPULATION ANALYSIS

Figure 2: Population able-to-drive forecasted (in millions) | source: populationpyramid.com

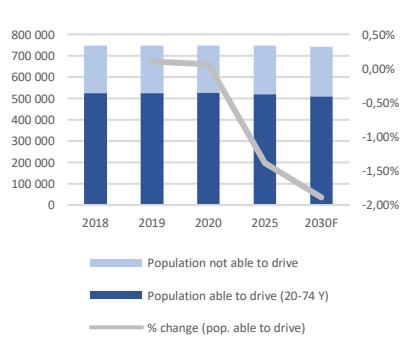
		2020	2025	2030
China	Total Population	1 439 323	1 457 908	1 464 340
	Total Population able to drive	1 047 827	1 058 441	1 055 789
	%growth rate		1,0%	-0,3%
Europe	Total Population	747 636	745 791	741 302
	Total Population able to drive	525 588	518 325	508 533
	%growth rate		-1,4%	-1,9%
North America	Total Population	368 869	379 851	390 598
	Total Population able to drive	251 200	257 919	262 091
	%growth rate		2,7%	1,6%
South America	Total Population	430 759	447 509	461 853
	Total Population able to drive	284 732	300 726	311 751
	%growth rate		5,6%	3,7%

Fig 3: North America population forecast (in millions) | source: populationpyramid.com



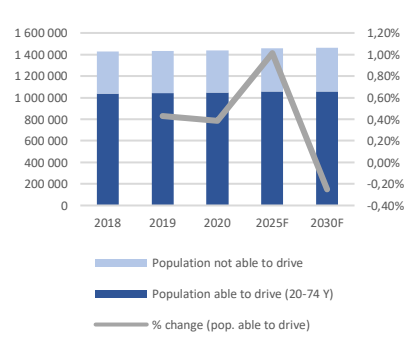
In North America, is predicted an increase of **3%** in the total population between 2020 and 2025 and of **2.8%** between 2025 and 2030. In this same period, is also expected a **growth in the population able-to-drive (between 20 and 74 years)**. In 2030 it is expected that there will be 10 million more than in 2020 able to drive – around 262 million. We conclude that in this geographic sector there is a **potential for growth in the industry volume derived by the expected increase in the target population**.

Fig 4: Europe population forecast (in millions) | source: populationpyramid.com



Europe is experiencing a demographic crisis that is resulting in an **annual decrease in population**. Between 2020 and 2030 the automotive market's target population (able-to-drive) is expected to reduce by **17 million**, a decline that will surely have a **significant impact** of approximately less **630.000 units** (4.45% of 2020 industry volume) on the automotive industry volume and, consequently, on the revenues of the car companies.

Fig 5: China population forecast (in millions) | source: populationpyramid.com



Forecasting China in terms of population evolution is always a very uncertain task, as this is dependent on the will of the government, which controls birth policies. Considering the development of the relevant population for the purpose of measuring the potential of the automotive industry (between 20 and 74 years old), is expected a **residual growth between 2020 and 2025** and a **marginal decrease between 2025 and 2030 of 0.3%**.

Of the four regions analyzed, South America is the one that can benefit the most from an **increase in industry volume due to the population growth**. Between 2020 and 2025, the population between 20 and 74 years old, is expected to increase **by 5.6%** (about 15 million in absolute value), reaching close to **300**

million in 2025. In the following five years, until 2030, it is forecasted to increase by around 11 million.

NORTH AMERICA

FORECASTED NORTH AMERICAN PENETRATION RATE

	2018	2019	2020	2025F	2030F
Penetration rate	8,78%	8,39%	6,28%	8,00%	8,00%
EV derived	0,18%	0,15%	0,13%	0,80%	1,60%
ICV derived	8,61%	8,24%	6,15%	7,20%	6,40%

• **2019 - 2020**

Coronavirus crippled auto sales and pushed the giants of the industry to the limit.

When analyzing the evolution of the PR, we notice that it significantly **reduced** in the pandemic year of 2020 with “frozen” consumer demand. In 2019 this rate was 8.39% and in 2020 it reduced to **6.28%**. In the lock-down exit phase, sales and consumer demand for new vehicles increased significantly. Indeed, the worst predictions did not come true as the economic recovery was more in a "V" than a "U" shape.

Looking at the case of the U.S, this becomes clearer, by April 2020, when stayed-home measures began taking effect new vehicles sales dived 47% in the United States, and fell by 38.7% in March. However, the overall drop for the first quarter of 2020, including the two previous months saw a more modest decline of 12.7%. Soon after that, sales began to snap back... By May sales were down by just 30% over the same month in the previous year and in June by just 26.7%. In December 2020 sales were actually higher on YoY comparison.

This situation led to a decrease in the PR that, although quite significant, was below many more pessimistic forecasts.

• **2020 - 2025**

Headwinds to overcome, market will react and fix

At a time when the economy was reopening and indicators were showing encouraging signs of recovery from the damage caused by the pandemic, in 2021 a massive **\$60 Billion global chip shortage hit the industry**. As semiconductor chips are an absolutely crucial part in the manufacture of modern vehicles, the **capacity of production was not there to fulfill the growing levels demand**.

Fig 6: Overall U.S sales in 2019 and 2020 | source: goodcarbadcar.net

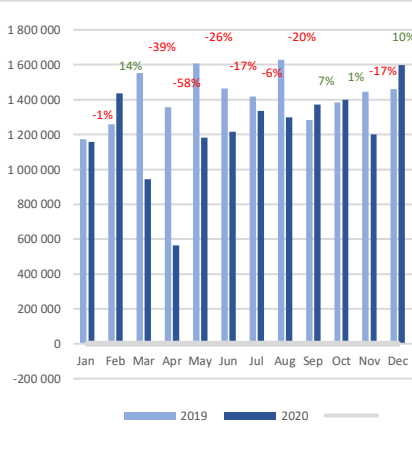
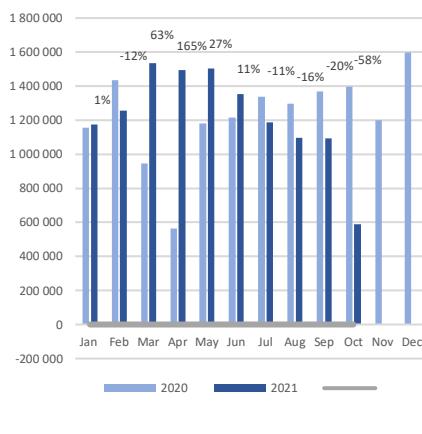


Fig 7: Overall U.S sales in 2020 and 2021 | source: goodcarbadcar.net



This particularly difficult context at the level of the supply chain, forced Ford, by the end of March 2021, to announce that it was going to slash vehicle production at six plants in North America, among those were included facilities that produced highly profitable pickup trucks – the company's best sellers. Upon the Q1 earnings release, Ford announced that they had approximately **22,000 vehicles** awaiting installment of chip related components and it is expected to have **impact of over \$1 billion on its earnings**.

Currently, China and some neighboring countries still hold the "monopoly" of semiconductor production, and this disruption problem appears to last at least until 2022. However, given the speed of reaction of the US economy to disruptions, we predict that the market will fix the flaws. In the US, **vertical integration projects** for factories of this type of chips are already underway.

By 2025, with the market already stabilized and supply chain shocks mostly solved, we anticipate **an increase in the PR**, which will be close to the levels of 2018 (at **8%**).

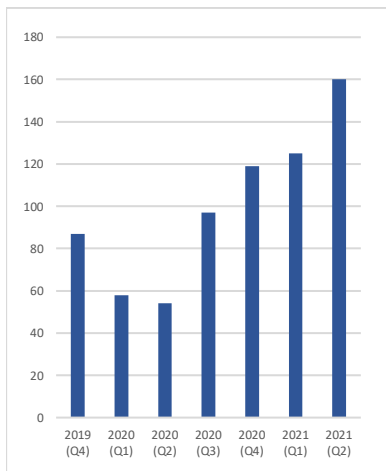
- **2025 - 2030**

Delayed Electric revolution

The five years between 2025 and 2030 will be decisive for the future potential of the automotive industry as they are years of more accentuated transition from **Internal Combustion Vehicles (ICV) to Electric Vehicles (EV)** and this will define the evolution of the PR between these years.

In North America, signs of change are becoming more visible. In terms of EV sales, in the U.S, the positive results stand out. 2020 Q4 surpassed the same period in the previous year by **36%** and when we compare Q2 2020 (where the BEV represented 3.6% of the vehicles sold in the US) with Q2 2021, the percentage variation approaches a **distinct 200%**.

Fig 8: U.S EVs sales | source: McKinsey



It is expected that this growth trend will continue, however there are some signs that this transition is **not being particularly effective and efficient in North America.**

High dependence on China at the supply chain level

Some factors contribute to this: the reluctance and distrust of the American consumer towards EVs; less support and tax incentives given to the purchase of EV; almost entirely reliance on a supply chain controlled by China that controls **90% of global capacity to process raw lithium**, about 70% of cobalt and 40% of nickel. China also has almost all the manganese- and graphite-refining capacity. It's hard to believe that in the near future the U.S will transition easily from a comfortable position in the production of ICV, whose supply chain dominates, to the still unknown and expensive world of EV. The rising price of electricity and the American ease of accessing oil do not promote this transition.

In recent months, General Motors, Stellantis and Toyota have each announced plans to build massive battery factories in North America. Ford said it and its South Korean partner will build three U.S. battery plants by 2025 with **enough capacity to equip one million EVs a year.** But it is still uncertain how the battery supply chain will come together and where they will obtain each of the necessary precursors, like cobalt and manganese.

The Biden administration, which released its National Blueprint for Lithium Batteries in June, signaled a readiness to **allocate \$174 billion to encourage Americans** to buy electric cars and trucks but **only \$7 billion** will go to the supply chain. The American priority is to get a reliable and solid battery supply in US soil, but it is certain that this implementation will take time.

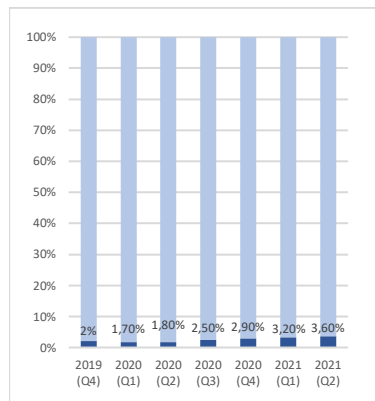
The aforementioned challenges will delay this transition, and, consequently, the possibilities of market expansion and PR growth are turning more **unlikely.** Given these factors, we make a **moderate forecast** for the success and boost that the electric transaction will bring, so we expect the **PR in 2030 to remain close to 2025 levels at 8%.**

NORTH AMERICA INDUSTRY VOLUME

	2018	2019	2020	2025F	2030F
Total Population able to drive	248,085	249,655	251,200	257,919	262,091
Penetration rate	8.78%	8.39%	6.28%	8.00%	8.00%
Industry volume	21,791	20,947	15,765	20,634	20,967
<i>%growth rate</i>		<i>-3.90%</i>	<i>-24.70%</i>	<i>30.90%</i>	<i>1.60%</i>

Considering the trajectory estimated above, we foresee an increase in Industry Volume of around **30% between 2020 and 2025** in North America (the most

Fig 9: U.S EV sales as share of total vehicle sales | source: McKinsev



accentuated difference is due to a particularly negative 2020 starting point) and significantly more modest growth of **1.6%** over the following five years.

If we take a broader look at the evolution of this indicator, our estimate indicates that only in 2030 the North American automotive industry will reach the volume levels of 2019.

EUROPE

FORECASTED EUROPEAN PENETRATION RATE

	2018	2019	2020	2025F	2030F
Penetration rate	3,72%	3,63%	2,70%	3,70%	4,00%
EV derived	0,09%	0,12%	0,27%	0,74%	2,03%
ICV derived	3,63%	3,51%	2,43%	2,96%	2,48%

- **2019 – 2020**

Looking at full-year 2020 results, we conclude that it was particularly negative for Europe. Overall, the EU passenger car market **contracted by 23.7% to 14 million** units as a direct result of the COVID-19 pandemic. Indeed, full-scale lockdowns and other restrictions throughout the year had an unprecedented impact on car sales across the European Union.

With record drop in levels of demand, sales plunged **55% in March and dived 76.3% in April**. Towards the end of the year, signs of recovery began to be visible and in September sales were even marginally higher than in 2019.

This activity drop in the sector was reflected in a very significant reduction in PR of around **1%** between 2019 and 2020.

- **2020 – 2025**

Chip shortage barrier delaying progress, as strong consumer demand is back on track

After a year that saw the sharpest drop ever in Europe car sales, **2021 has brought more encouraging results** in the European automotive industry and signs of recovery are beginning to be noticed. By February onwards, relative annual growth was indeed very significant, but it is relevant not to forget that 2020 - the base year for comparison - was historically low. Indeed 2021 sales volume, when compared to 2019, shows that the **industry's performance is far from its maximum potential** and have been facing challenges and obstacles.

Fig 10: European Union passenger car registrations | source: acea.auto

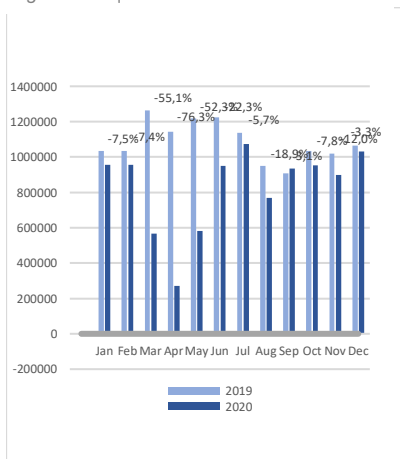
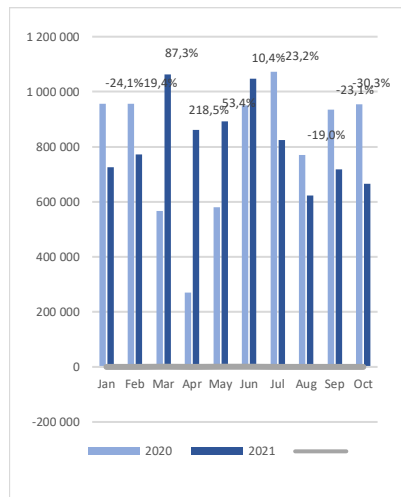


Fig 11: European Union passenger car registrations | source: acea.auto



The sales volume from May shows exactly that. Although that month sales rose by 53.4% compared to last year, totaling 891,665 units, this number is still considerably below the 1.2 million cars that were sold in May 2019. The main obstacle to the growth of the industry has been the **semi-conductor chip shortage**. This impediment to production, combined with a climate of uncertainty that is still experienced in some European countries, has made the recovery from a year of market stoppage, slower. Overall, the total sales volume for the first 10 months of 2021 was only **2.2%** higher when compared to the same period of the previous year, however still 25% below the first 10 months of 2019 sales.

The end of the shortage is not yet close, and certainly is going to last until at least the second half of '22.

However, the **demand side remains strong and order books are filled**, in this sense, with the situation normalized, we estimate that the sales volume of the automotive industry will approach pre-pandemic levels in 2023 onwards.

This indicator will be reflected in a PR that, in 2025, will return to levels similar to those registered in 2018/19, close to **3.7%**.

- **2025 – 2030**

Sales boost as Europe leads the Electric Revolution

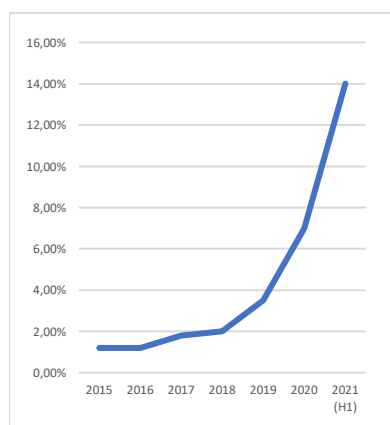
From 2025 onwards it is expected that the EU automotive sector will experience **massive structural changes**. We highlight the **electrical transition** and the initial emergence of **new mobility solutions**.

The current environmental regulations and incentives from governments makes Europe one of the most **promising markets** for the electric revolution on course.

Results already registered in 2021 show that this trend is growing stronger. In the first half of 2021, BEV sales in the top five European markets reached 336,000 units, **growing by 147%** in a YoY comparison. PHEV sales also thrived, up by **248% to 350,000 units**. Having doubled the EV market share to **14% from a year ago**, Europe is leading the way to a more electric future. This figure varies considerably from region to region. By 2020, Norway presented the larger EV share (57.3%) and Germany, with a 10.7% share was the larger market in absolute terms, having ended the year with over 394.000 new BEV (up 263% YoY). In a year in which electricity prices were particularly high, **these above-expected results** demonstrate a European trend that does not show reasons for slowing down.

We expect that from 2025 onwards, the EV technology will mature, leading to a **reduction in the cost of batteries**, which will be able to make BEV sales prices

Fig 12: Europe EV market share | source: <https://www.eea.europa.eu/>



competitive relative to ICVs. We expect that in 2025, the price of an EV will be on average 5% higher than an ICV. This development, allied to a greater and solid public charging infrastructure, will bring the segment closer to economic maturity, paving the way for an expansion of BEVs that are **less dependent on subsidies and policy**. In this sense, we expect that by the end of the present decade, the EV European market share will reach values **closer to 50%**.

Another trend we expect to see in Europe is the shift towards **new mobility solutions** such as car sharing and e-healing. We expect that it can be a **threat** to the automotive industry since its effectiveness can make the private car a **less essential and more superfluous good**, in this sense.

Overall, we estimate that the EV revolution will increase in the PR of automotive industry in the market, due to the greater attractiveness and efficiency of this new type of vehicle that year after year becomes more accessible to the general public. In this sense, we expect that the automotive industry **PR will end the decade around 4%**, increasing almost 1% in just five years (between 2025 and 2030).

FORECASTED EUROPEAN INDUSTRY VOLUME

	2018	2019	2020	2025F	2030F
Total Population able to drive	524,733	525,269	525,588	518,325	508,533
Penetration rate	3.72%	3.63%	2.70%	3.70%	4.00%
Industry volume	19,500	19,041	14,167	19,178	20,341
<i>%growth rate</i>		-2.40%	-25.60%	35.4%	6.1%

Considering these trends, we estimate an industry volume growth around **35.4% between 2020 and 2025** (the most accentuated difference is due to a particularly negative 2020 starting point) and significantly more moderate but not less **substantial growth** from 2025 to 2030 of **6.1%**.

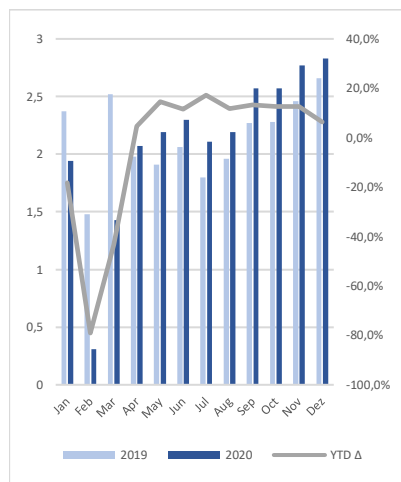
This forecasted growth in the industry volume will be driven by the increase in PR that we expect to be sufficient to offset the forecasted reduction in the able-to-drive population in Europe.

CHINA

FORECASTED CHINA PENETRATION RATE

	2018	2019	2020	2025F	2030F
Penetration rate	2.43%	2.47%	2.41%	3.00%	3.10%
EV derived	0.11%	0.12%	0.14%	0.6%	1.6%
ICV derived	2,32%	2,35%	2.28%	2.4%	1.6%

Fig 13: China automotive sales 2019 – 2020 | source: tradingeconomics.com



The economical stoppage caused by the epidemic in 2020 affected the country more at the beginning of the year and what was quickly brought under control. This context, allowed for a **reopening of the market in 2020** earlier than most Western countries and since April domestic auto sales had been witnessing positive **YoY growth**.

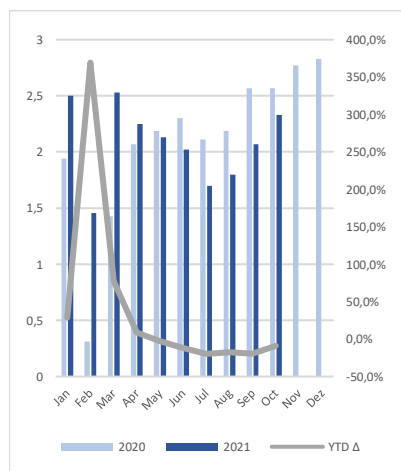
Escaping to the rule observed in the other markets, China ended 2020 with only slightly lower results. Sales in this giant market reduced only **1.8%** in 2020 when compared to 2019. This drop is reflected in the slight **decrease of the PR** that ended the year at **2.41%**.

- **2020 – 2025**

Comparing the performance of 2021 with 2020 one can see the effects of the shortage that are shaking the industry and creating an **obstacle to growth**. It is noticeable, interpreting Fig. 13, that the negative effects of this supply chain crisis began to be felt more strongly from April/May 2021 on. If in March of that year the performance was particularly positive, from then on, the decline is evident either month-to-month or YTD comparison with 2020.

As in the aforementioned markets, one of the biggest challenges for the Chinese auto market in these next five years seems to be **how it will deal with the chip shortage crisis**.

Fig 14: China automotive sales 2020 – 2021 | source: tradingeconomics.com



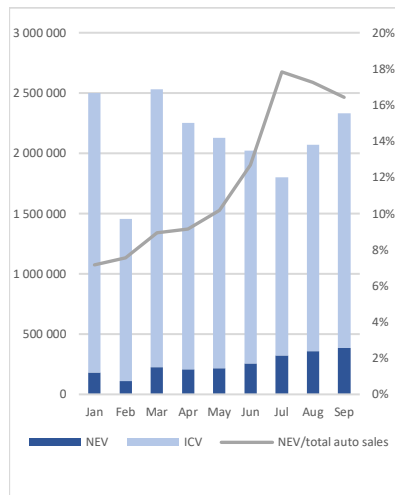
It is noticeable however that the worst phase seems to have passed. In the last four months sales are growing significantly, when compared to the same months of the previous year (2020) **the gap is getting shorter**. In October 2021, while in Europe and North America the drop in sales was very heavy (-30% YTD and -58% YTD, respectively), in China sales grew 12.6% when compared to November and were only 9.6% lower than those recorded in October 2020. Signs seem to indicate that the Chinese market is **reacting better than the rest to this demand shock**. This context makes us more confidently estimate a **market growth forecast** for the next five years and a consequent increase in the PR of the Chinese automotive industry, that will be **around 3% in 2025**.

- **2025 – 2030**

Between 2025-2030 we expect five years of EV revolution.

In China, **rigid legislation** is expected in terms of incentives to buy EV. Typically, in this region, given the political leadership of an authoritative nature, there is a higher correlation between the measures taken by the government and their

Fig 15: China automotive sales in 2021 (new energy vehicles in percentage of total sales) | source: tradingeconomics.com



implementation. In this sense, is expected greater **effectiveness in the electrical transaction.**

As we can see in Fig. 15 already in 2021, a year with significant setbacks, the evolution of NEV sales was striking, both in absolute terms and as a proportion of total sales (in January, NEV sales in the Chinese market represented around 7% of total sales and ended September at around 16%). Given this basis we estimate that in 2030 it will be **50/50 with ICV.**

If on the one hand the electrical transition brings with it a possible increase in the market, we estimate that the appearance of widespread **new mobility solutions will take away market space** from the automotive industry and impede its growth. In this sense, we forecast a slight growth of the PR from **3% in 2025 to 3.10% in 2030.**

FORECATED CHINA INDUSTRY VOLUME

	2018	2019	2020	2025F	2030F
Total Population able to drive	1,039,327	1,043,794	1,047,827	1,058,441	1,055,789
Penetration rate	2.43%	2.47%	2.41%	3.00%	3.10%
Industry volume	25,241	25,762	25,292	31,753	32,729
%growth rate		2.1%	-1.8%	25.5%	3.1%

Given this picture, we estimate increase in Industry Volume of around **25.5% between 2020 and 2025** (the most accentuated difference is due to a particularly negative 2020 starting point) and more moderate growth from 2025 to 2030, time when we expect the Chinese automobile market to establish and reach a steady state with marginal annual growth.

This forecasted growth in the industry volume will be mainly driven by the estimated increase in PR.

SOUTH AMERICA

FORECASTED SOUTH AMERICA PENETRATION RATE

	2018	2019	2020	2025F	2030F
Penetration rate	1.57%	1.45%	1.05%	1.50%	2.00%

The **PR is very reduced** when compared to western countries, not taking advantage of a market that would be able to scale and reach large proportions. In this region, most countries have low levels of development that make consumers have little purchasing power.

The **lack of an infrastructure** capable of supporting a massive electrical transaction and the **scarce incentives** given by most governments in the region illustrate the long delay in the development compared to the others presented. In

this sense we estimate that the EV revolution and the consequent increase in the volume of the automotive industry is **still far from taking place**. The forecast in terms of PR for the market is that by 2025 it will reestablish itself to values close to those verified in the pre-pandemic period (close to 1.5%) from then on, we expect a gradual annual increase until it **settles at 2%** in 2030.

FORECASTED SOUTH AMERICA INDUSTRY VOLUME

	2018	2019	2020	2025F	2030F
Total Population able to drive	279,987	282,379	284,732	300,726	311,751
Penetration rate	1.57%	1.45%	1.05%	1.50%	2.00%
Industry volume	4,398	4,097	2,984	4,511	6,235
<i>%growth rate</i>		2.1%	-1.8%	25.5%	3.1%

Overall, we expect industry volume to post a positive evolution over the next ten years, mostly driven by an estimated increase in target population and a residual increase in PR. IN 2030, we estimate that the South American automotive industry will be **above 6 million cars**.

MARKET SHARE

Considering the analysis made regarding the future industry volume, we will analyze now Ford's market share in the different regions in which it operates. We carried out an analysis of the current breakdown of the market and an assessment of the relevant **competitive advantages of Ford** in order to estimate its **future relevance in the automotive market**.

Through the past years Ford had a traditional OEM (original equipment manufacturer) built and sell transaction model. For the future, following the market trend, Ford aims to have a well-established **online order-bank system**, increasing number of online orders and thus reducing the need for dealer inventories. This decision will facilitate processes in the company, bringing **operational improvements**, which we will mention ahead in the report, it will also **reduce dealers' credit needs**. From the perspective of the customer, this process has the advantage of being able to **customize** the product that the customer wants, on the downside, has disadvantage of being a **longer delivery process**. This prolonged time gap will not be a competitive disadvantage as this shift is currently a common trend in major car brands as it can be seen in *Fig. 17*.

Fig 16: 2017-2020 Market share evolution in the U.S | Source: goodcarbadcar.net



Fig 17: Monthly U.S. auto industry inventory-to-sales ratio | source: Statista

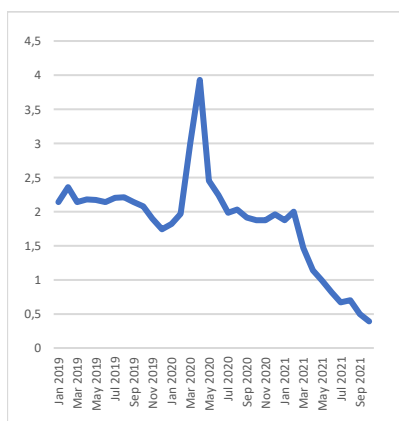


Fig 18: Estimated U.S market share held by selected automotive manufactures in 2020 | source: Statista

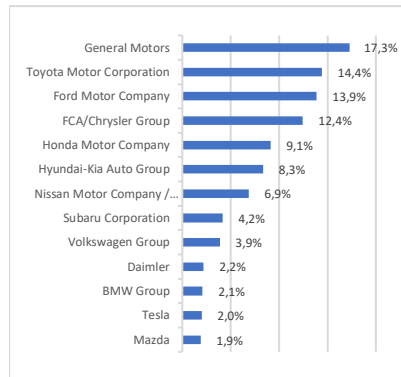


Fig 19: First 9 months Sales performance | source: goodcarbadcar.net

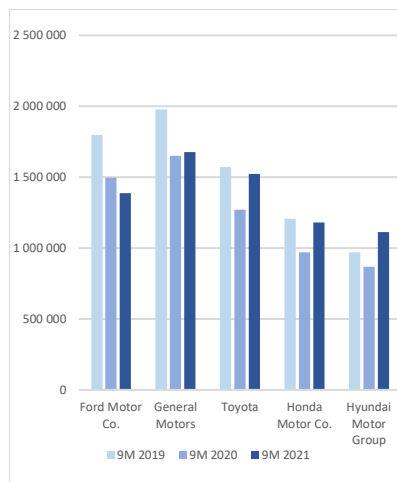
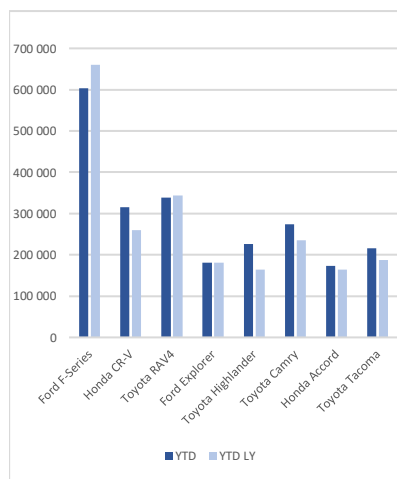


Fig 20: First 9 months wholesale units of bestsellers models in US (2020/2019) | source: goodcarbadcar.net



NORTH AMERICA

We carried out a more detailed analysis of the North American market as it is the most important and decisive market for Ford. At **around 17%**, General Motors (GM) held the **largest share of the automotive market in the United States in 2020**. GM remained the most successful automotive manufacturer in the United States. The highlight goes to Toyota, the Japanese company has been conquering more and more market in the US in recent years, and in the end of **2020, it surpassed the local giant Ford**, a trend that continued in 2021.

This increase in Toyota’s power in the North American market is clearly reflected in the evolution of its sales performance in the US. While, in the first nine months of 2021 YoY, Ford **decreased 7%** and the GM group rose only **2%**, Toyota rose **20%**. Toyota rose because of an increased focus on light truck models in the lineup and a better supply chain management throughout this last year, something registered in other Asian major brands (Honda; Hyundai), as observable in sales

performance reflected in Fig. 19. However, from 2022 onwards, a reaction from Ford is expected, materialized in a partnership with Global Foundries, a global leader in feature-rich semiconductor manufacturing. This will allow Ford to **address the chip supply and meet the growing demand**. It is in Ford's DNA to be a **differentiator**, since always looking for innovative solutions in the production chain. The Global Foundries partnership illustrates that the attitude of **permanent adaptation** remains in the company. At a time when chip shortage deeply shakes the automotive industry, Ford has emerged with this **competitive advantage** that will certainly allow the company to conquer market from its competitors.

When we look at the 2020 U.S bestselling automobiles, a clear **supremacy of the Ford F-Series** stands out. With about twice the number of units sold than the vehicle that comes in second place (*Honda CR-V*), Ford sold around 600,000 units in the first 9 months of 2020. This dominance seems to be to maintain and has **growth potential**, being that this model has already been electrified. The electrification projects of the best-selling vehicle in America - Ford F150 - are illustrative of this and consumers are joining the "wave" as the new *Ford F-150 Lightning* has already had reservations that surpassed **160,000 units in the U.S** twice as much as Ford’s annual production capacity announced (80.000 units). In a trend towards a more electric future, Ford's bet is clear on this vehicle. In fact, in a market where Tesla still largely dominates, holding over 68% of all electric car segment in the US, Ford is putting ambitious electrification plans into practice. In September 2021, the company and its partner *SK Innovation* said they would invest \$11 billion to construct an EV assembly plant, battery factory and supplier

park on the farmland 50 miles north-east of Memphis, plus two battery plants in Kentucky, this assemblies will Ford to reach its goal to produce **600,000 EV per year**, globally, within the next two years, which is a direct response to consumer interest in the automaker’s existing and forthcoming EVs.

It is to be expected that, once normality is established in the supply chain, the trend will be for **larger EV production and greater strength by Ford and its bestselling models** in conquering the competitive EV market.

This being said, by 2025 we predict no significant changes, being that Ford’s market share will keep approximately **13%**, similar to the figure recorded in 2020. From 2025 on, with the above-mentioned **production capacity growth**, we expect Ford to continue with high levels of demand but able to respond more effectively to this. This way it **will increase its share** in the North American market to **14%** in 2030.

EUROPE

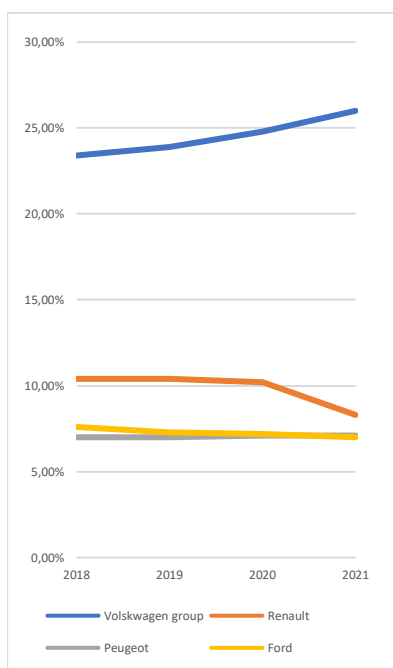
In Europe, although there have been some variations over the years, the market share of the main brands in the automotive industry **has remained relatively constant**. The Volkswagen group, given its strong presence and credibility with European consumers, has been maintaining a comfortable position of clear prominence against its competitors, with a market share considerably above the average. On the podium of the main brands follows Renault which has also been able to solidly maintain its position in the market, in the order of 10%. Ford and Peugeot, which have always been very close to each other, keeping a position slightly **above the 7%**.

Looking in particular at Ford’s European market share in recent years, it has always remained relatively constant. In this view, we would not have reasons to assume changes. However, Ford is taking some actions in the European market that, in our view, are quite significant and illuminating what could be **a future of market conquest by the company**.

The European Union clearly defined the goals in relation to the electrification of the automotive industry: sell 100% emissions-free cars in 2035. It is thus a key region for Ford to assume itself as one of the main players in the EV sector.

Ford announced that by mid-2026, 100% of its passenger vehicle lineup in Europe will be zero-emissions capable and the key to this transformation is an already underway: **\$1 billion investment in the Ford Assembly Plant in Cologne, Germany** – one of the largest manufacturing centers in Europe and the home of Ford of Europe.

Fig 21: Europe market share | source: analyst estimates



Still on this path to conquer the European market, in June 2020 Ford signed an important **deal with Volkswagen group**, the "king" of the European automotive industry. One of the most important clauses is a "Lead to a highly differentiated Ford electric vehicle for Europe by 2023 built on Volkswagen's Modular Electric Drive, or MEB, expanding on Ford's zero-emission capabilities in the region." With this Ford estimate **sales of 600,000 units** of Ford's MEB-based derivative "over several years." This number represents **2.6%** of the forecasted European industry for 2023 which will be reflected in the final market share.

In the competitive field, Ford has a strong presence in commercial and low-end vehicles. As Ford best seller in light commercial vehicles, we expect it to consolidate its position with the electrification of the *Ford Transit* model. In high-end vehicles, typically the European consumer opts for sports vehicles, a sector where Ford does not have significant expression. However, we foresee a good acceptance of the *Mustang Mach-E* that will be part of the mid-size electric SUV competition. Thus, Ford enters a **new segment**. This diversification will consolidate the company's position in the European market.

For 2025 we expect Ford to regain some of the market share lost in recent years, stabilizing at **7.5%**. Between 2025 and 2030 we do not expect any significant changes to Ford's competitive advantages, so we estimate a **maintenance in the market share**.

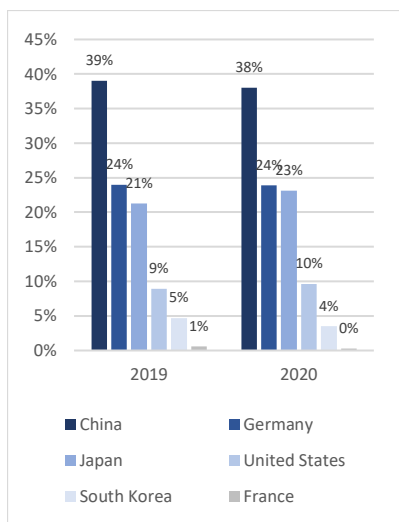
CHINA

Ford's retail market share in China increased modestly from 2.2% in 2019 to 2.4% in 2020. However, between 2015 and 2020, Ford has seen this figure tumbling more than half from **4.7%** in 2015 to only **2.4% in 2020**.

China is always a difficult market for foreign brands to penetrate. The Chinese market has a protectionist tendency, and this fact is clearly illustrated in the domain that Chinese automotive brands hold over the others. Volkswagen's case escapes this trend as the group is assuming itself as an outstanding market leader.

China's rivalry and trade wars with the US do not facilitate integration and make this market sometimes hostile to US brands. However, we believe that Ford can **regain some market space** in China and the company has been striving to penetrate it and take advantage of opportunities that arise. It is interesting to note that the 2015-2020 period of lost in market share coincides exactly with that of the Trump administration. His presidency brought a climate of **greater tension**, deteriorating relations with China, this affected the performance of American brands in this country. Biden's management has been committed to reestablishing

Fig 22: Market share of passenger vehicle sales in China 2019-2020, by brand origin | source: Statista



good relations, enabling an improvement in the brand's commercial conditions in China.

One of the sectors that can allow Ford to increase its market share in this market is the **Pickups** one. In China, pickup trucks have historically been kept out of majorly populated urban areas by local governments, but that's finally starting to change as the Chinese authorities decided to remove these restrictions. The China Association of Automobile Manufacturers (CAAM) now predicts that overall pickup sales in China will **double their current levels**, reaching **840,000** units by 2025 and as many as **1.67 million** units by 2030. Knowing Ford's historically recognized **manufacturing expertise** in this type of vehicle, with best-selling products like the F-150, the company is expected to **significantly capitalize** on this shift.

The *Mustang Mach-E* is also a bet for an increase in market share. Just recently, Ford announced a **50:50 joint venture with Changan Automobile** that it will allow the creation of a *Mach-E Mustang* production station entirely in China for local costumers.

This new Chinese BEV division, which was established to handle the research and development, **manufacture, sales, and user experience** of Ford EVs in the country.

We anticipate that the improved sales performance in the sectors where Ford was already active will lead to a recovery of market share in 2025 to the 2018 levels. In addition, following the CAAM forecast, as an assumption we assume a capture of 20% of this Pickup truck sector that will allow a market share growth of 0.6%. Overall market share will reach **3.5%** in 2025. In 2030 this figure will be around **4.4%** driven by another significant increase in the pickup market's relevance.

Fig 23: Main auto brands market share in China 2020 | source: Statista

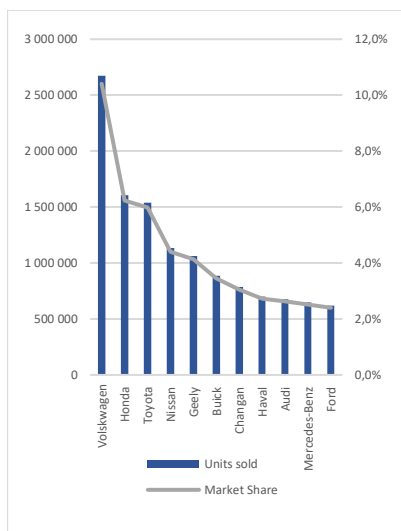
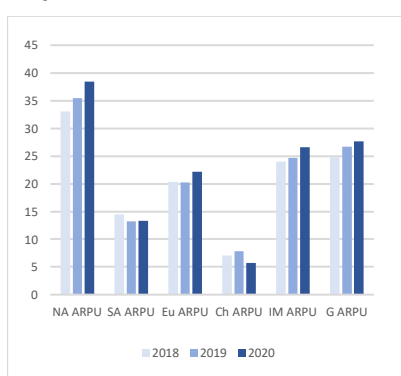


Fig 24: Ford's ARPU, per region | source: analyst estimates



3. FORD PERFORMANCE FORECAST

- (1) *Automotive Revenues=Wholesale units*Average Revenue Per Unit*
- (2) *Wholesale Units=Industry Volume * Market Share*

The revenues of the automotive segment are recorded when the factory send cars to the 11,000 dealers spread throughout the globe. The electrical transformation will have an important role in the cars price since, in 2020 the EV were **1,5x more expensive** than the ICV. Knowing Ford announced the ability to reduce the cost of the batteries in 40% alongside with the growing technology and high potential of the economies of scale to decrease costs we expect the EV to be **1,05x more expensive in 2025** since the cost is forecasted to reach parity in this year. We foresee it to even be **5%**

cheaper by 2030. The inflation will continue affect all car’s prices as in previous years.

CHINA

The relation between the Average Revenue Per User (ARPU) of the different regions remains almost constant since there were registered an increase in every region, with China being the country where **ARPU is the lowest**. This fact is due to Ford’s unconsolidated affiliates being responsible for selling 90% of the total registered wholesale units and not recording their impact on revenues, instead, their contribution to Ford’s profit is registered as **equity income**, something is expected to remain constant.

Paradoxically, from 2018 to 2020 the ARPU of recognized revenues is on an upward trend, shifting from **\$57.000 to \$60.000 per unit**, however, when counted overall, it has **decreased from \$6.000 to \$5.000**. This is due to a 4% increase in the weight that unrecognized revenues had. For the future, is expected that number unrecognized revenue units will remain constant at 90% as well as the Equity income/Non recognized units ratio of **\$86/unit**. Considering the mentioned measures of the Chinese government, we expect **20% of Ford’s vehicles to be electric in 2025** shifting to **50%** in 2030. Accounting for the relevance the pickup trucks will have and being their price in line with the ARPU of the recognized revenues, we forecast a gradual increase of the ARPU to **\$6,600 in 2025** and to **\$9,000 in 2030**.

UNITED STATES

In the United States there is a **large percentage of the upper-medium segment Trucks and SUVs**. From 2018 to 2020 the relevance of cars decreased by 11%, of which 10% was channelled to trucks and 1% to SUVs as shown in graph 10. This shift led to an **increase of 15% in ARPU**, since trucks are on average 3.9 times more expensive. With the growing demand for pick-up trucks in the United States we anticipate that Ford will be able to take advantage of the brand’s power and the receptivity of the electrified models, therefore is expected that the EV will represent, an above the industry average, 15% of the total sales reaching 25% in 2030. Ford will channel its production in order to increase sales of these vehicles therefore **increasing the ARPU** reaching **\$52,000** and gradually increasing to **\$62,000** in 2030, with the inflationary effect. We believe this trend has future potential, as Ford has prepared the ground to remain market leader in the pickup sector during the electrical revolution.

Fig 25: Ford’s China ARPU forecast | source: analyst estimates

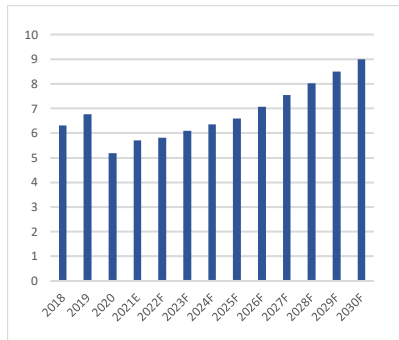


Fig 26: Ford’s U.S sales by type of vehicle | source: analyst estimates

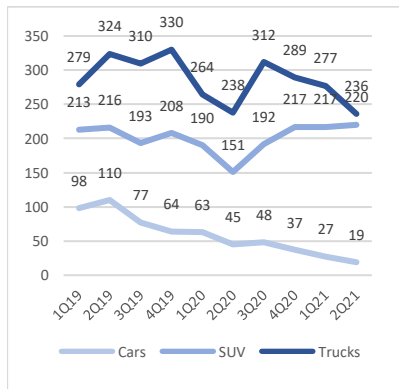
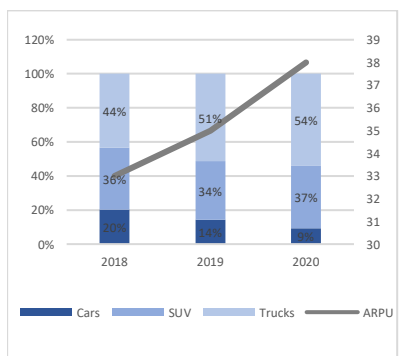


Fig 27: Proportion Sales by category in US and ARPU (in thousands) | source: analyst



EUROPE

The relatively historical low ARPU in Europe is due to the preponderance of the **lower price segments** in sales, with the best-selling cars being historically the *Ford Fiesta* and *Ford Focus* models. *Ford Transit* is also a success sale in this region, being the bestseller not only for Ford but also for the segment of commercial vehicles.

Recently, during the chip shortage, Ford has focused on building its **two most popular SUVs** (*Puma* and *Kuga*) entering in a popular segment in Europe. *Ford Puma* was Ford's best-selling vehicle through September in the region, with sales **up 49% to 117,218 units**. The *Kuga* was the second-best seller, up 50% to 83,371 units. The popularity of the two SUVs came at the expense of Ford's traditional best sellers, the *Fiesta* and the *Focus*.

Fiesta sales were down **21% to 78,800 units**, while *Focus* sank **47% to 67,791 units**. This shift implied changes in the ARPU of the first three quarters of 2021, which rose by an **average of 27%** when compared to 2020. We estimate that this product mix will continue in the future and that the corresponding ARPU will vary with **inflation** and with changes caused by **large scale electrification of models**, reaching **\$33.000** in 2025 (with 20% EV market share) and **\$44.000** in 2030.

SOUTH AMERICA

In South America, there is generally lower purchasing power, which makes the **low-price segment** the most sought-after, with the Ford best-seller being the *Ka*. The revenues that this strategy provided proved insufficient to cover production costs and Ford realized that there is a higher segment market in this region that was still to be explored that ensures a **higher ARPU**, positively contributing to an improved EBIT. In this sense, a new strategy is underway for this region. Ford announced a new portfolio line-up of connected and **increasingly electrified SUVs, pickups and commercial vehicles**. The closure of factories in Brazil will imply a revolution, the company will end sales of *EcoSport*, *Ka* and *T4* once inventories are sold. The effects on the value of ARPU were already felt in 2021, it increased 107% to close to \$27,000, when compared to 2020 values. We estimate that this value will stand at \$30,000 in 2025, given the expected inflation and 5% EV market share. In 2030 we foresee a **\$34,000 ARPU** value, with **10% EV** market share.

Fig 28: Europe bestselling models evolution | source: analyst estimates

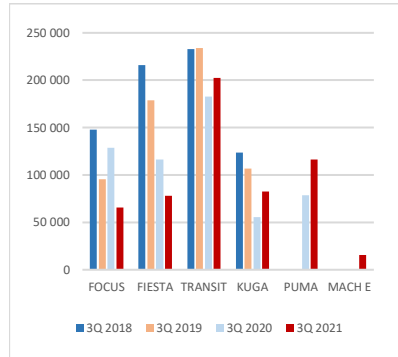


Fig 29: Ford's Europe ARPU forecast | source: analyst estimates

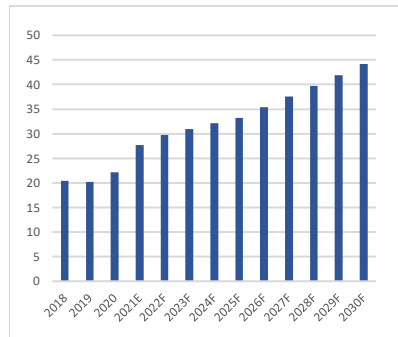
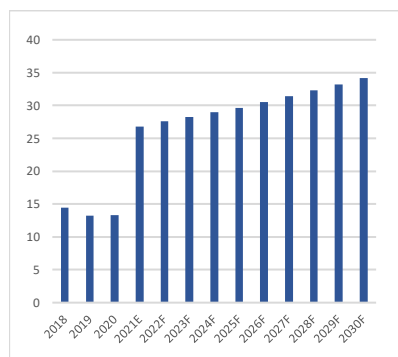


Fig 30: Ford's South America ARPU forecast | source: analyst estimates



COST STRUCTURE

The company reports costs under two broad headings: **Cost of goods sold (COGS)** and **SG&A**.

- **COGS**

Within the COGS, currently the **cost of production materials** represents the largest share with 72% of weight, and in this item, we also identify **depreciation costs**, costs with **warranties**, **R&D** and expenses with **manufacturing personnel**.

1. Production materials

Material costs are increasing significantly, and we expect this trend to continue as commodities have been experiencing sharp inflation. For 2021, we expect commodities to be **up \$3 billion to \$3.5 billion**, and they could be up another \$1.5 billion in 2022, largely driven by two central commodities such as steel and aluminum that beat price records in 2021 with approximately **50% and 25% higher** YoY comparison, respectively. The transition from ICV to EV production has also increased prices. While the total manufacturing cost of a compact electric car will fall by more than a fifth by 2030, to \$19,000, that will still be **9% higher** than comparable gasoline or diesel cars, according to data compiled by Oliver Wyman. On the flipped side, *UBS* estimates that by 2024 the EV cost production will be approximately in parity with ICV. There is no consensus on this matter. However, considering the Ford’s announced capacity to reduce the cost of batteries by **40%** by 2025 enabling a cost parity. With operational improvements driven by economies of scale expected between 2025 and 2030, we foresee the EV production cost to be already **5% lower** than the ICV.

2. Warranties

Warranties currently represent around 3% of COGS. We foresee a significant **gradual reduction in this cost as a percentage of total units sold**. Ford has been focusing on changes in design, inspection and supplier management - through vehicle connectivity data Ford can identify issues **earlier in the process to solve problems**. In addition to this the fact that EVs are statistically significantly **more reliable and less prone to breakdowns**.

Fig 31: Ford cost of **materials** forecast | source: analyst estimates

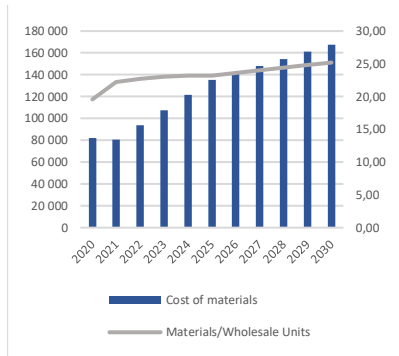
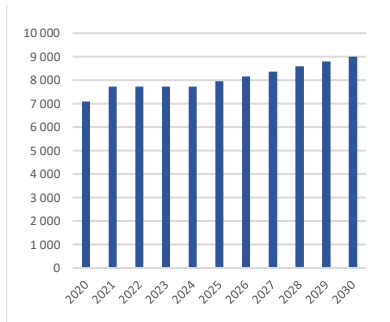


Fig 32: Ford **warranty** cost forecast | source: analyst estimates



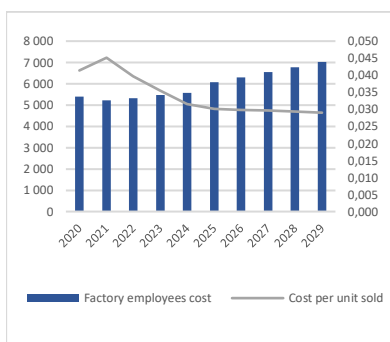
Fig 33: Ford R&D cost forecast | source: analyst estimates



3. R&D

R&D currently represents around 6% of COGS and we anticipate that this weight will **increase significantly** in the coming years. In an industry characterized by rapid technological advances, investment in product R&D is critical to the development of new innovative products and Ford is committed to this. Particularly in **the new mobility solutions and connectivity services (software development)**, Ford has been investing in redefining its go-to-market strategy. In fact, it has been AV testing in Miami since 2018 and in 2020 it added a new 140,000 square foot Command Center in Miami and along with Argo AI it's stimulating ride hail and delivery across six cities.

Fig 34: Ford factory employees cost forecast | source: analyst estimates



4. Factory employees' cost

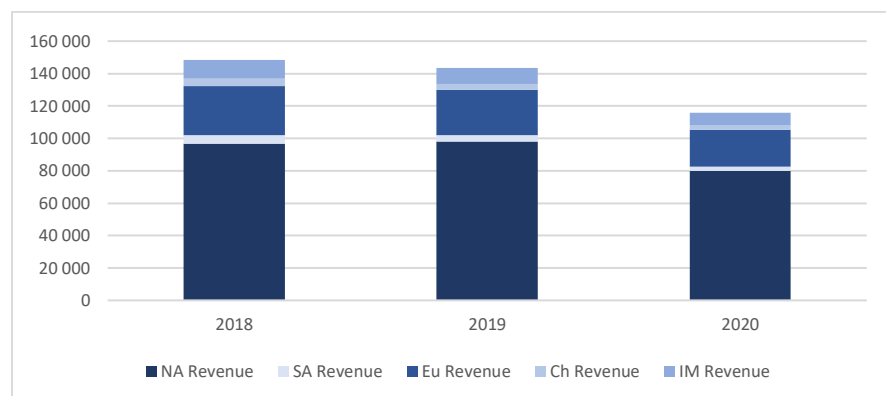
The number of factory workers has changed significantly year after year. In the ongoing production process revolution, CEO Jim Farley has closed factories and opened others. In the near future, investments made in the Thailand Factory and Blue Oval cities in the U.S will represent respectively 1,250 and 11,000 **new jobs** growing at the pace of Ford's increasing production. On the other hand, in the long term, **technological advances, economies of experience and the transition to the production of EV** will require **less need for labor force**, which is why we expect from 2025 on a gradual **reduction in the number of workers per unit**.

- **SG&A**

SG&A are costs that include salaries for Ford administrative staff (in this regard we do not anticipate significant changes in the coming years). This item also includes **advertisement costs**. We expect that its weight as a percentage of revenues (currently close to 2%) will **gradually reduce** as the company's strategy involves **increasing online ordering**, which will **reduce the need to make vehicles that are not in demand, attractive**.

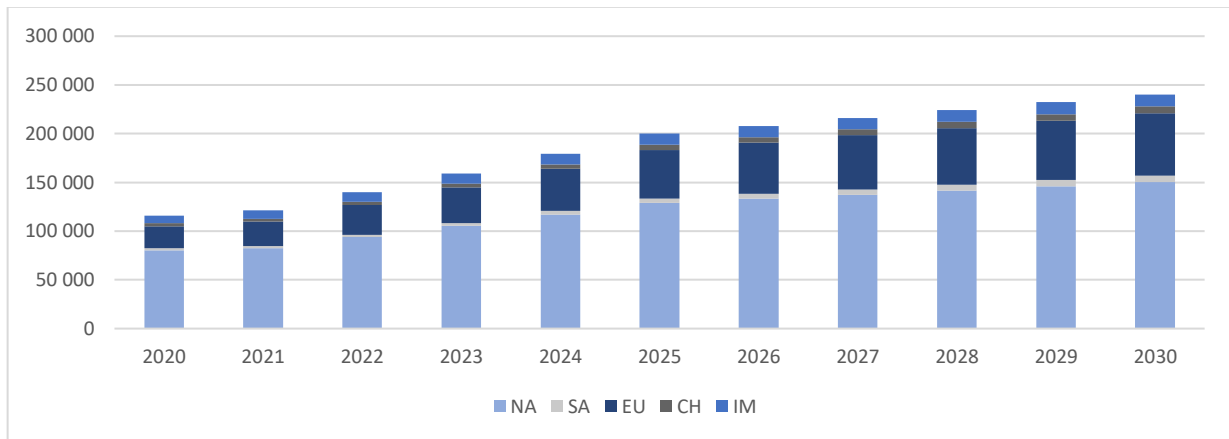
REVENUES

Fig 35: Ford's Revenue per region | source: analyst estimates



During Ford's last three years, sales have been decreasing, mainly due to the drop in the number of units sold, caused by a decrease in the global market share, from 6,3% in 2018 to **5,8%** in 2020, and a significant contraction of the industry volume from almost 95 million cars in 2018 to 24% less in 2020, related to the PR reduction caused by the pandemic crisis. The ARPU growth offsets part of the volume contraction since wholesale units decreased 30% and Ford's sales have declined

Fig 36: Ford's forecasted Revenue per region | source: analyst estimates



21%, falling from 160 to 127 billion dollars since 2018.

In the future, taking into account the estimates of all drivers referred to throughout the report, overall, revenues will increase by 105% between 2020 and 2030, with approximately 57% of this variation explained by the 88% increase in revenues in North America. In Europe, the expected variation is more expressive, with an increase of 180% in sales between 2020 and 2030, which explains approximately 33% of the total variation in sales. The remaining 10% variation in total revenues is explained by the impact of the remaining three regions, which we expect to increase by 98% in the mentioned period.

• **EBIT**

Regarding the EBIT, this caption decreased 9.1% between 2018 and 2019 mainly due to an increase in costs and, a drop in volume and exchange rates that was not fully offset by net pricing improvements.

Between 2019 and 2020 the recorded drop was 66.8% due to a large drop in the quantities of units sold that was not offset by the large improvement recorded in net pricing, which was due to the implementation of an **order bank system** that allowed prioritising more **profitable cars** for the company to thus achieve a more **favourable price mix**.

Fig 37: Ford's EBIT waterfall 2018-2019 | source: analyst estimates

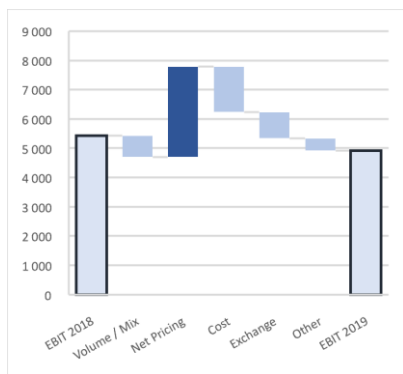


Fig 38: Ford's EBIT waterfall 2019-2020 | source: analyst estimates

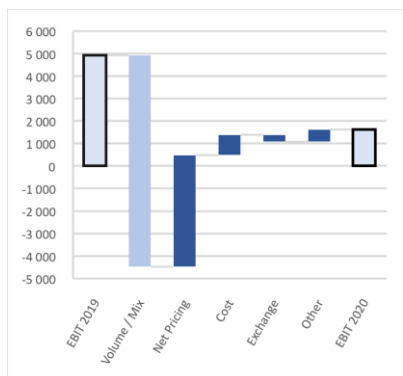
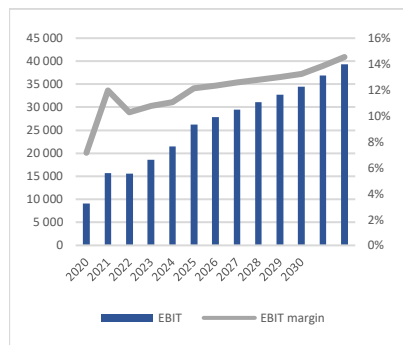


Fig 39: Ford's EBIT Forecast | source: analyst estimates



In this sense, we foresee that the aforementioned expected rises in the price of materials will be offset by this strategy of improved price mix (detailed in ARPU) and sales volume (debated in detail in market share and PR).

Forecasted EBIT will grow rapidly in the first few years, decelerating from 2025, stabilizing at a margin of 13%.

4. BALANCE SHEET

Looking in more detail at each of the items in Ford's current assets, we notice that a **volatile** development of **Ford's cash position stands out**. In 2020, a very significant increase in these Ford's most liquid assets is well reflected in Fig.42 (the cash and marketable securities went from 35,000 to almost 50,000) indicating that the company had **shored up its short-term liquidity** in preparation for the COVID-19 outbreak.

In 2021, Ford maintained a healthy cash and liquidity position throughout the year, providing the company with considerable **flexibility** to manage the current situation of constraints in the supply chain. It is therefore expected that in the near future the company will maintain an attitude of **prudence** regarding these reserves, keeping **proactive in managing the capital structure**.

Between 2017 and 2020, Ford's trade receivables and inventories have hardly changed in the last 4 years, with a slight increase in the weight of inventories throughout 2021. However, some changes are expected in these current assets, in particular the inventories. With a history of day supply somewhere around 75 days, its CEO has made it clear that the company **will not go back to that point**, Ford's management team has shown great willingness to go both to an order-based system and keeping the inventories between 50- and 60-days' supply. From 2023 Ford is expected to start to rebuild its inventories.

Ford's finance receivables are Ford's most heavy asset. In fact, these receivables are one of the company's most precious assets as they are financial assets that **directly generate income for Ford**. This income comes from the activity of Ford Credit - the captive finance arm of Ford, which acts as the bank **providing loans** to customers who require financing assistance - Ford will receive **interest income** - with the advantage of being quite **stable and predictable** contributing with a good stream of **revenue for the company**.

Fig 40: Ford's total Assets | source: analyst estimates

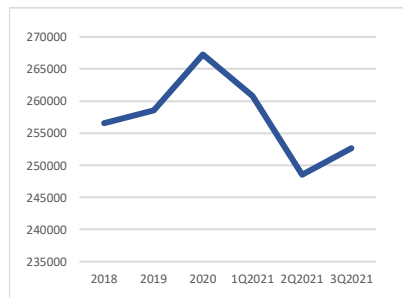


Fig 41: Ford's Current and Noncurrent Assets | source: analyst estimates

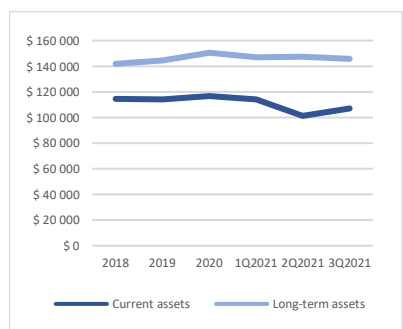


Fig 42: Ford's Current Assets breakdown | source: analyst estimates

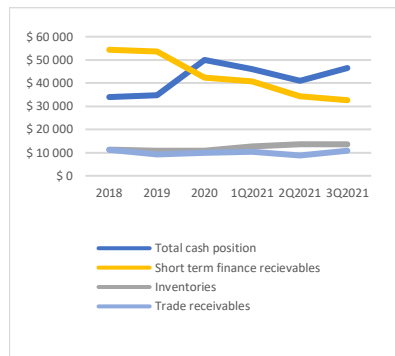
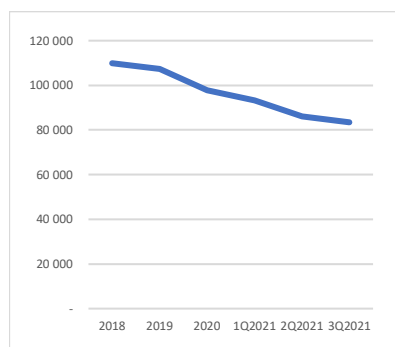


Fig 43: Ford's total finance receivable | source: analyst estimates



Ford's finance receivables have been on a **downward trend** for the past three years. From 2019 to 2020, the company lost more than \$10 billion in asset value, due mainly to the **reduction in dealer financing**, which went from about \$34 billion in 2019 to \$21 billion at the end of 2020. This downtrend means a **deteriorating vehicle demand** as fewer customers have signed up for Ford Credit's financial assistance. As already mentioned, the COVID outbreak in 2020 and the chip shortage crisis that followed have congested the activity and automotive sales thus, consequently, the volume of these Ford valuable assets. The finance receivables are expected to return to a **positive evolution in the relatively near future, in line with the expected increase in sales of financing orders.**

INVESTED CAPITAL

Overall, and in line with what was said above, we can expect an **asset light strategy** for the future of Ford.

Some actions in this area are already underway. Ford has taken decisions to make its structure more asset-light in countries outside the major markets of North America and Europe since the operation in these markets was **not profitable** in recent years.

In Brazil, Ford Lost \$7.8 billion in the past decade. The closure of the operation impacted 5000 works and 300 dealerships and had a total cost of **\$4.1 Billion**. To protect the local production, Brazil has a 35% import tariff. This highly reduces its competitiveness as an exporter in the company since it is **12% more expensive** to import a Brazilian-made car than a Mexican-made car considering there are free trade agreements between Mexico and North America (US, Canada). So, with the poor results in the past years and facing the impossibility to export, **Ford closed 75% of its Brazilian factories** maintaining only 20% of the workforce locally.

In India Ford was struggling to pass the 2% market share. The company accumulated \$2 billion losses through the past 10 years. Ford India was using only **25%** of the 440,000 car production capacity. With this conjecture, Ford reduced his presence in the country. This reduction will affect **4000 employees**, although the company maintains there the Ranger Pick-up engine production and relationships with suppliers. The implied cost reduction explains the growing EBIT margin in IMG.

- **Blue oval city**

The Blue oval city will be in Tennessee, being the biggest manufacture infrastructure of the us. With this campus ford aims to create a carbon neutral sustainable manufacture of automotive, bringing together the manufacturing and recycling of batteries (which enables ford to produce batteries at a lower price) and the EVs assembly, powered by solar energy. This will generate 6000 new jobs, requiring **\$5.6 billion investment** and the vehicle production starts in 2025, with the production capacity of 129 GWh, which represents, considering the lowest capacity of the F-150 lightning, 115KWh, a production capacity of approximately 1,120 million batteries per year.

In Kentucky, Ford is investing in partnership with SK with a volume of \$ 5.8 billion, generating 5000 jobs, Ford announced that the two factories will be able to produce a total of 129 GWh worth of batteries, which represents, considering the lowest capacity of the F-150 lightning, 115KWh, a production capacity of approximately of 1,120 million batteries per year.

CAPITAL STRUCTURE

From 2011 **debt increased year after year** until reaching 2020, when the company increased leverage to boost its liquidity during the COVID – 19 outbreak with a particularly high value of **\$161 Billion**.

The Debt was somehow accompanied over the years by a **rise in the level of Equity**, however it is important to note that the Debt-to-Equity ratio also increased, signaling an amplification in the weight of the total Debt on Equity. In 2020 this ratio reached **5.2**, a value considered quite **high and risky**. In fact, in that unusual year, a significant decrease in the Equity level (which went from \$33,230 Billion in 2019 to \$30,811 Billion) accompanied the increase in debt. Although the scenario continues to be of concern, Ford's financial health outlook appears to be **improving**. In the third quarter of 2021, the company's total debt **reduced about 10%** when compared to 2020 values. Equity increased **18%** in the same period. This resulted in a **D/E ratio of 4.0** by the end of the quarter.

When compared to its main competitor, General Motors, Ford is in a **worse position**. In absolute terms, GM's total debt is much smaller (year after year this difference has surpassed 40 billion) and Equity is significantly higher than Ford's – superior by 20 billion in 2020. In fact, Ford's debt leverage was more than twice as much as GM's debt leverage. In the year 2020, GM had a D/E ratio of 2.21. Like

Fig 44: Blue Oval city Ford's investments | source: ford.com

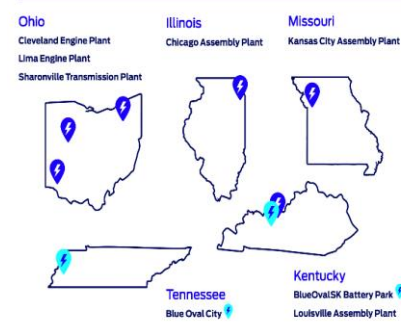


Fig 45: Ford co Debt and Equity evolution | source: analyst estimations

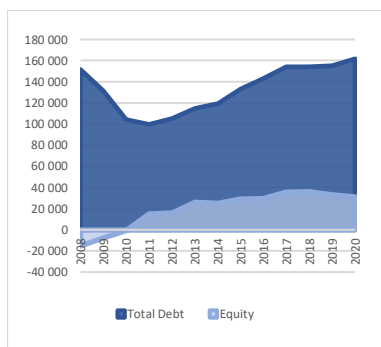


Fig 46: Ford Debt to Equity ratio | source: analyst estimations

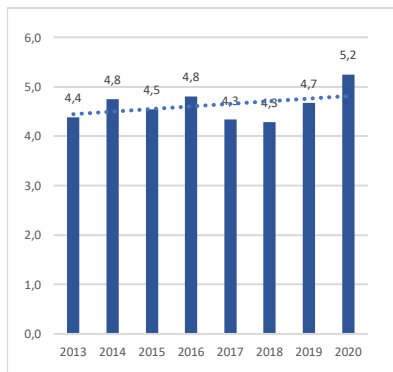


Fig 47: Ford Debt to Equity ratio | source: analyst estimations

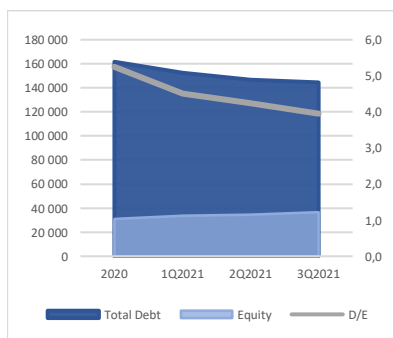


Fig 48: General Motors Debt to Equity ratio | source: analyst estimations

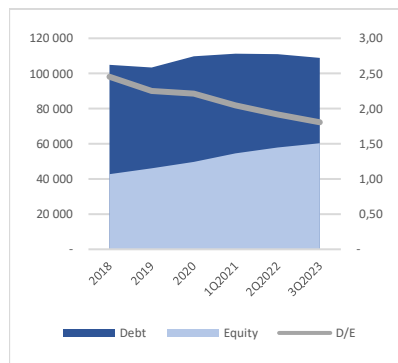


Fig 49: Ford total Debt breakdown | source: analyst estimations

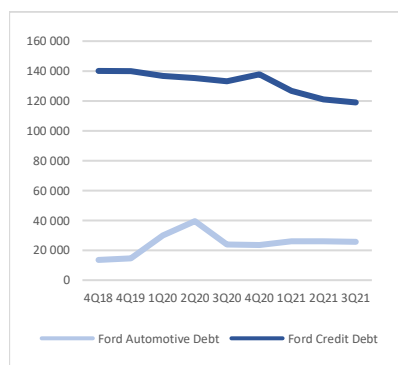
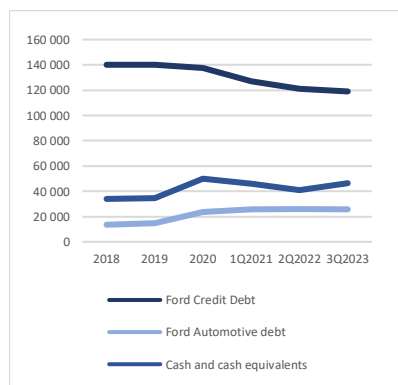


Fig 50: Ford total Debt breakdown | source: analyst estimations



Ford, GM has maintained a downward trajectory in the D/E ratio throughout 2021 and in the third quarter of the year it stood **at 1.8**.

Ford's total debt came mainly from two segments, and they are **Ford's automotive and Ford Credit** as showed in Fig.49

In 2020 Q4 Ford Credit's debt amounted nearly \$140 billion compared to only \$20 billion of Ford's automotive debt.

When the COVID-19 pandemic started to hit, to weather the negative impact of it, Ford Automotive took on an \$8 billion debt in 2Q 2020, causing **automotive debt to rise significantly in 2020**.

By the Q4 of 2020, Ford has repaid most of the debt drawn, causing the automotive debt to drop to \$24 billion.

By opposition, Ford Credit's debt **decreased** significantly during 2020 and reached \$133 billion by 2020 Q3. This downward trend continued during 2021. As the supply crisis is limiting sales, there will be fewer customers signing Ford Credit's leasing contracts and other financial services.

In short, Ford Credit acts on a very different business model from the Automotive, its debt **increases during a good economic cycle but decreases when the automotive business environment deteriorates**.

The alarmism of Ford's delicate financial situation is eventually mitigated by the fact that most of the debt belongs to the Ford Credit sector. The reason is that the debt loads issued within the scope of it, is backed by cash collected from Ford's finance receivables – a type of Ford's assets is originated from customers' borrowings from Ford Credit. **Ford Credit debt is considered safe and is backed by collateral** minimizing the risk for Ford.

When analyzing the evolution of **Net Debt**, the results are more encouraging for Ford. Ford's highly liquid assets, such as cash and marketable securities, have been increasing in value since 2020 when Ford enlarged its cash position, causing net debt to go slightly lower. Even so, the Net D/E ratio recorded in Q3 of 2021 was still significantly high and superior to that of GM (2.67 vs 1.41).

In the 3Q of 2021 the **substantially strong** value of the cash and equivalents reserves of **\$46,426 Million** is more than enough to cover the automotive debt (which in absolute value is almost half of the reserves) and is practically equal to the value that, at this very moment, represent short-term debt obligations (\$47,323 Million), meaning Ford would be able to cover them if needed.

5. VALUATION MODEL

DISCOUNTED CASH FLOW MODEL

We followed the **Discounted Cash Flows (DCF)** Model in order to arrive at an estimated Enterprise value

We believe that this model is the most suitable for the analysis that we have been following throughout the report, as it allows us to incorporate **all assumptions** and instill a level of **precision** in materializing the expectations we have for Ford and for the industry, necessary to reach the share value. Following the assessment, we carried out an assessment of **scenarios**, varying factors that seem more uncertain to us, as well as a sensitivity analysis of the share price.

Within the scope of the model, we apply a 10-year forecast period - from Q4 2021 to 2032 - and a growth in perpetuity rate from this last year on. The perpetuity rate was chosen based on OECD projections for long-term GDP. Applying a weighted average to the projected revenue weights for 2032, we arrived to the proxy of 3.3%.

Ultimately, the analysis resulted in a share fair value of **\$23.20**. In this sense, taking into account the market price, we consider that the share is **13%** undervalued and, in this sense, we issue a **BUY** recommendation.

WACC CALCULATION

There is **no evidence** that Ford intends to make significant changes in its capital structure, in this sense, we assume that the debt-to-equity ratio will **remain constant** throughout the forecast period. We assume the US corporate tax rate – **21%**.

For cost of debt was considered the YTM of a Ford 10-Year Corporate bond **4.85%**, an annualized default rate (ADR) of **0.66%** and a Loss given default of **30%** associated to the BB+ credit rating of the company, considering the median off the range of the credit rating, the considered cost of after taxes is **3.7%**.

To compute the Beta of Ford, a regression of Ford's against the S&P 500's monthly logarithmic returns was performed over the last seven years (Since January 2015). This regression resulted in a beta of **1.40**. We also applied the same procedure to other five peer companies (tesla, VW, Nissan, GM and Daimler), followed by the calculation of each unlevered beta, taking the median of the five, re-levering with

Fig 51: Ford WACC| source: analyst estimations

Ford Beta	1,40
Ford Beta Re-levered	1,24
Beta	1,32
5-Year Average of US LT Govt Bond Rate	2,00%
MRP	10,20%
Re	15,44%
Rd (after tax)	3,7%
statutory tax rate	21%
WACC	8,98%

Fig 52: Ford Cost of debt| source: analyst estimations

YTM	4,85%
LGD	30,00%
ADR(bb+)	0,66%
Maturity 10 YEARS	10
Cupon	9,63%
RD	4,65%

Ford's debt to equity structure. This procedure let us to a beta of 1.42. The analysis uses the average of this results, a beta of 1.41

The risk-free rate is **2%**, equal to the 5-Year Average of US Long-Term Government Bond Rate.

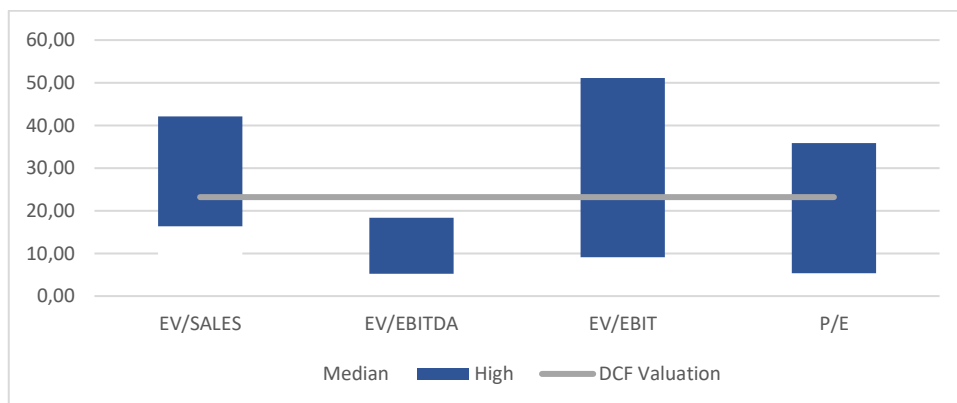
For the market risk premium, we assumed the average of the monthly logarithmic return of the S&P 500 over the same time series, annualized removing the risk-free rate and reached

The cost of equity (Re) was calculated through the formula: $Re = RF + \beta \cdot (MRP)$.

Having calculated all the variables, we reached a WACC of **8.98%**.

MULTIPLE VALUATION

Fig 53: Multiple valuation | source: analyst estimations



The current share price is being traded at a **higher P/E ratio than the median** of the five companies, suggesting that the company is overvalued in relation to those peers with the exception of Nissan. The ratios of the remaining four peers are very close to the median which reflects a **mature industry**. The change in Ford's management team and the good and renewed perception of the company by the market and the growing expectation regarding a positive future for the company, caused an increase in the share price that was not yet accompanied by earnings.

The EBITDA multiple assessment suggests that the stock is currently **overvalued**. This ratio is a barometer of the company's expected growth, typically companies with higher EV/EBITDA are companies with faster growth. Over the next three years we expect the volume of Ford units sold to grow at twice the pace of the market, so it is not surprising that the value proposed by DCF analysis is above the peers.

The multiple EBIT assessment indicates that Ford is above the median in relation to its peers. It suggests that the company has an above-average debt level

(something that is also reflected in Ford's credit rating), and a worse ratio between total debt and earnings generation than peers. So, the current Enterprise value does not translate what you would expect.

EV/sales indicates that the company is trading between the median and the maximum of the peers, however we expect that there will be a significant increase in sales in the coming years that justifies the current price.

SENSITIVITY ANALYSIS

		Long term Growth Rate							
		-1.5%	-1.0%	-0.5%	0.0%	0.5%	1.0%	1.5%	
		3.3%	3.4%	3.4%	3.4%	3.4%	3.4%	3.4%	
WACC	-1.5%	8.9%	24.08	24.21	24.34	24.47	24.61	24.74	24.88
	-1.0%	8.9%	23.65	23.78	23.91	24.04	24.18	24.31	24.44
	-0.5%	8.9%	23.23	23.36	23.49	23.62	23.75	23.88	24.01
	0.0%	9.0%	22.82	22.95	23.07	23.20	23.33	23.46	23.59
	0.5%	9.0%	22.41	22.54	22.66	22.79	22.91	23.04	23.17
	1.0%	9.0%	22.01	22.13	22.25	22.38	22.50	22.63	22.75
	1.5%	9.1%	21.61	21.73	21.85	21.97	22.10	22.22	22.34

In order to consolidate our BUY recommendation, we carried out a sensitivity analysis of two crucial variables for the evaluation according to the model used (DCF): the **Long-Term growth rate (LTGR)** and the **WACC**, whose variation has strong implications in the accession of the true value.

A -1.5% decrease in the estimated WACC causes a 5.47% increase in share value whereas a 1.5% increase in LTGR causes a 1.68% rise. Thus, we conclude that the share value is substantially **more sensitive to the WACC**.

Within the scenarios studied in the table, we identified that certain combinations may result in a **change** in our **stock recommendation**. Within the range estimated in the table, we verify that whenever the WACC is **1.5% higher** than the calculated value, the recommendation changes to **HOLD**, since even being higher than the current share price, it is less than 10% higher than that. We verified that the same situation occurs when the WACC greater than or equal to **1%** and there is simultaneously a decrease greater than or equal to **0.5% in the LTGR**. It is verified, however, that none of the estimated combinations results in a share price below the current trade value, being in accordance with our estimate of undervalued share price.

SCENARIO ANALYSIS

Next, we consider different scenarios aimed at valuing the company through changes in the estimation of some more **uncertain assumptions** that emerged during the valuation.

1. SCENARIO: MARKET DELAYED RECOVERY

In a first scenario, we consider the **prevalence until 2025** of supply chain disruptions caused by chip shortages, gradually returning to pre-crisis levels of sales volume from that year onwards. Furthermore, we considered that despite the reduced sales volumes, the maintenance of incentives to purchase EV and the gap between the price of fuel and electricity would not be sufficient to maintain the forecast of EV market share. In this scenario, we consider that the reduction in EV production and ARPU costs wouldn't be as sharp as initially expected, reaching production cost parity only in 2030.

In this scenario we see that the share price drops considerably. Under these conditions, the model results in a share price of \$11.66, significantly below the current trade. The recommendation would definitely change to **SELL**.

2. SCENARIO: OVERAPRICIATION OF THE EV IN NORTH AMERICA

With the high levels of demand presented by Ford's electrified models, we project a possible scenario in which the company has an increase in EV share in North America similar to that in Europe. This projected EV sales success would result in a market share growth to **15%**, which implies a sales volume **350,000 units above our base case**.

Under these circumstances, we found the share price to be \$34.32 - a clear **BUY**.

CONCLUSION

Ford has been demonstrating power in the market. The massive investments in Electrification will allow Ford to **capitalize on the growing demand** in the market for its products, with an emphasis on the North American market that will be the engine of this future. At the same time, Ford the agreements with SK and Global Foundries ensure **security in the supply chain**, given the possibility of prevalence of chip shortage, Ford will find there a decisive and preponderant **competitive advantage**.

Through the several analyses followed, we verified that the recommendation made is not irrefutable, however, due to the factors presented above, we are confident that the BUY recommendation made is the right decision for the investor to make.

Fig 54: Forecasted revenue Base vs Scenario 1 | source: analyst estimations



Fig 55: Forecasted COGS Base vs Scenario 1 | source: analyst estimations

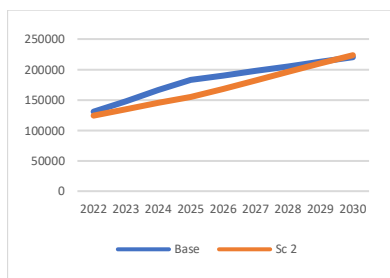
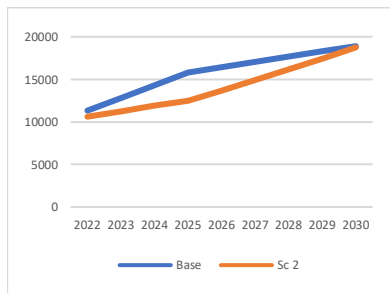


Fig 56: Forecasted SG&A Base vs Scenario 1 | source: analyst estimations



Appendix

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Financial Statements

INCOME STATEMENT

Core Business	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Revenues	160 312	155 859	127 088	131 457	151 491	172 452	194 364	216 991	225 658	234 368	243 098	251 820	260 500
Automotive	148 294	143 599	115 885	121 191	139 660	158 984	179 185	200 044	208 034	216 064	224 112	232 153	240 110
Credit	12 018	12 260	11 203	10 267	11 831	13 468	15 180	16 947	17 624	18 304	18 986	19 667	20 390
Cost of sales	136 269	134 693	112 752	109 677	130 674	147 789	165 946	182 962	190 248	197 627	205 085	212 611	220 150
SG&A	11 403	11 161	10 193	11 556	11 326	12 768	14 274	15 830	16 440	17 053	17 668	18 283	18 898
Ford Credit interest, operating, and other expenses	9 463	9 472	8 607	5 272	6 075	6 916	7 795	8 702	9 050	9 399	9 749	10 099	10 449
Core Result Before Taxes	3 177	533	-4 464	4 952	3 416	4 979	6 349	9 496	9 920	10 290	10 596	10 827	10 990
Statutory Tax	\$ 667	\$ 112	-\$ 937	\$ 1 040	\$ 717	\$ 1 046	\$ 1 333	\$ 1 994	\$ 2 083	\$ 2 161	\$ 2 225	\$ 2 274	\$ 2 300
Tax Adjustments	-\$ 13	-\$ 626	-\$ 696	-\$ 445	-\$ 445	-\$ 445	-\$ 445	-\$ 445	-\$ 445	-\$ 445	-\$ 445	-\$ 445	-\$ 445
Core Result	\$ 2 523	\$ 1 047	-\$ 2 830	\$ 4 357.19	\$ 3 143	\$ 4 378	\$ 5 461	\$ 7 947	\$ 8 281.88	\$ 8 574	\$ 8 816	\$ 8 999	\$ 9 110
%growth rate		-141%	137%	72%	-39%	28%	20%	31%	4%	3%	3%	2%	1%
Non-Core Business													
Equity in net income/(loss) of affiliated companies	123	32	42	347	381	419	461	508	558	614	676	743	810
Other income/(loss), net (Note 5 and Note 22)	2 247	-226	4 899	5 177	5 695	6 265	6 891	7 580	8 338	9 172	10 089	11 098	12 200
Non-Core Result Before Taxes	\$ 2 370	-\$ 194	\$ 4 941	\$ 5 524	\$ 6 076	\$ 6 684	\$ 7 352	\$ 8 088	\$ 8 896	\$ 9 786	\$ 10 765	\$ 11 841	\$ 13 000
Statutory Tax	498	-41	1 038	1 160	1 276	1 404	1 544	1 698	1 868	2 055	2 261	2 487	2 730
Tax Adjustments	-\$ 248	\$ 36	\$ 1 090	\$ 293	\$ 293	\$ 293	\$ 293	\$ 293	\$ 293	\$ 293	\$ 293	\$ 293	\$ 293
Non-Core Result	\$ 2 120	-\$ 190	\$ 2 813	\$ 4 070.91	\$ 4 507	\$ 4 987	\$ 5 515	\$ 6 096	\$ 6 735	\$ 7 438	\$ 8 211	\$ 9 061	\$ 9 990
%growth rate		1217%	107%	31%	10%	10%	10%	10%	9%	9%	9%	9%	9%
Financing													
Interest expense on Other debt	-57	-57	-46	-46	-46	-46	-46	-46	-46	-46	-46	-46	-46
Interest expense on Automotive debt	-1 171	-963	-1 603	1 411	1 637	1 800	1 992	2 151	2 194	2 236	2 283	2 329	2 375
Financing result before taxes	-1 228	-1 020	-1 649	1 365	1 591	1 754	1 946	2 105	2 148	2 190	2 237	2 283	2 330
Statutory Tax	-258	-214	-346	287	334	368	409	442	451	460	470	479	488
Tax Adjustments	0	0	0	0	0	0	0	0	0	0	0	0	0
Financing result	-\$ 970	-\$ 806	-\$ 1 303	\$ 1 078.10	\$ 1 257	\$ 1 386	\$ 1 537	\$ 1 663	\$ 1 697	\$ 1 730	\$ 1 767	\$ 1 803	\$ 1 848
Total comprehensive income	3 673	51	-1 320	9 506	8 907	10 752	12 513	15 706	16 714	17 742	18 794	19 864	20 990
Less: Income/(Loss) attributable to noncontrolling interests	18	37	3	3	4	4	4	5	5	6	6	7	7
Net income/(loss) attributable to Ford Motor Company	3 655	14	-1 323	9 503	8 904	10 748	12 509	15 701	16 709	17 736	18 788	19 857	20 983

BALANCE SHEET

	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Core Business													
Operating Cash	3 207	3 118	2 543	2 629	3 030	3 449	3 887	4 340	4 513	4 687	4 862	5 036	5 210
<i>%sales</i>	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Net Working Capital													
Accounts receivable, net (automotive)	11 195	9 237	9 993	10 451	9 763	10 226,63	11 526	12 868	13 382	13 898	14 416	14 933	15 448
<i>Collection Period</i>	28	23	31	31	26	23	23	23	23	23	23	23	23
Accounts receivable, net (Ford Credit)	109 897	107 354	97 678	83 439	106 482	121 215	136 617	152 520	158 612	164 735	170 871	177 002	183 107
<i>Collection Period (years)</i>	9	9	8,7	8,13	9	9	9	9	9	9	9	9	9
Inventory	11 220	10 786	10 808	9 442	10 892	11 913	12 922	13 746	13 772	13 765	14 285	14 809	15 337
<i>Holding Period</i>	30	29	35	31	30	29	28	27	26	25	25	25	25
Accounts payable	21 520	20 673	22 204	18 584	22 142	25 042	28 119	31 002	32 237	33 487	34 751	36 026	37 310
<i>Payable Period</i>	58	56	72	62	62	62	62	62	62	62	62	62	62
Assets held for sale, net	0	1 857	47	0	0	0	0	0	0	0	0	0	0
<i>%revenues</i>	0	1,19%	0,04%	0,61%	0,61%	0,61%	0,61%	0,61%	0,61%	0,61%	0,61%	0,61%	0,61%
Other current assets	3 930	3 339	3 534	3 230	3 723	4 238	4 776	5 332	5 545	5 759	5 974	6 188	6 402
<i>%revenues</i>	2%	2%	3%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Property, plant and equipment, net	36 178	36 469	37 083	36 597	38 597	41 597	46 197	47 197	47 197	47 197	47 197	47 197	47 197
Net investment in operating leases													
Automotive Segment	1 705	1 612	1 304	1 373	787	748	1 294	1 171	1 233	1 368	1 353	1 416	1 478
<i>%Automotive Sales</i>	1%	1%	1%	1%	1%	0%	1%	1%	1%	1%	1%	1%	1%
Ford Credit Segment	27 414	27 618	26 647	27 226	27 226	27 226	27 226	27 226	27 226	27 226	27 226	27 226	27 226
<i>%Ford Credit sales</i>	228%	225%	238%	230%	230%	230%	230%	230%	230%	230%	230%	230%	230%
Deferred income tax (to receive), net	9 815	11 373	11 885	11 024	11 024	11 024	11 024	11 024	11 024	11 024	11 024	11 024	11 024
Equity in net assets of affiliated companies	2 709	2 519	4 901	3 376	4 117	4 383	3 959	4 153	4 165	4 092	4 137	4 131	4 120
Other non-current assets	7 929	10 706	12 882	15 557	15 887	15 985	15 985	15 985	15 985	15 985	15 985	15 985	15 985
<i>%growth</i>		35,02%	20,33%	4%	2%	1%	0%	0%	0%	0%	0%	0%	0%
Liabilities held for sale	0	0	0	0	0	0	0	0	0	0	0	0	0
<i>%revenues</i>	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Other non current liabilities and deferred revenue	-30 694	-34 159	-37 052	-33 592	-34 936	-36 333	-37 787	-39 298	-40 870	-42 505	-44 205	-45 973	-47 812
Deferred income taxes (to pay)	-597	-490	-538										
<i>%revenues</i>	-19%	-22%	-29%	-10%	-10%	-10%	-10%	-10%	-10%	-10%	-10%	-10%	-10%
TOTAL CORE INVESTED CAPITAL	172 985	171 156	160 049	152 169	174 450	190 630	209 509	225 263	229 549	233 747	238 374	242 949	247 413
		-1%	-6%	35%	15%	9%	10%	8%	2%	2%	2%	2%	2%
Non Core Business													
Employee benefit plans	-2 835	-2 961	-2 826	-2 874	-2 874	-2 874	-2 874	-2 874	-2 874	-2 874	-2 874	-2 874	-2 874
<i>%total employees</i>													
Pension	-9 627	-10 063	-10 931	-10 207	-10 207	-10 207	-10 207	-10 207	-10 207	-10 207	-10 207	-10 207	-10 207
<i>%total employees</i>													
Accrued Interests	-988	-1 128	-1 215	-1 006	-1 159	-1 319	-1 487	-1 660	-1 727	-1 793	-1 860	-1 927	-1 993
<i>%sales</i>	-0,62%	-0,72%	-0,96%	-0,77%	-0,77%	-0,77%	-0,77%	-0,77%	-0,77%	-0,77%	-0,77%	-0,77%	-0,77%
TOTAL NON CORE INVESTED CAPITAL	-13 450	-14 152	-14 972	-14 087	-14 240	-14 400	-14 568	-14 741	-14 808	-14 874	-14 941	-15 008	-15 074
TOTAL INVESTED CAPITAL	159 535	157 004	145 077	138 082	160 210	176 229	194 941	210 522	214 741	218 873	223 433	227 941	232 339
Financial													
Excess cash	30 744	31 533	47 418	0	0	0	0	0	0	0	0	0	0
Debt	-154 347	-155 352	-161 805	-103 561	-120 157	-132 172	-146 205	-157 891	-161 056	-164 154	-167 575	-170 956	-174 254
Short term Debt	-53 493	-53 946	-51 343										
Long term Debt	-100 720	-101 361	-110 341	-103 561	-120 157	-132 172	-146 205	-157 891	-161 056	-164 154	-167 575	-170 956	-174 254
Noncontrolling interests	-134	-45	-121										
TOTAL FINANCING ACTIVITIES	-123 603	-123 819	-114 387	-103 561	-120 157	-132 172	-146 205	-157 891	-161 056	-164 154	-167 575	-170 956	-174 254

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Buy	Expected total return (including expected capital gains and expected dividend yield) of more than 10% over a 12-month period.
Hold	Expected total return (including expected capital gains and expected dividend yield) between 0% and 10% over a 12-month period.
Sell	Expected negative total return (including expected capital gains and expected dividend yield) over a 12-month period.

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