

**MASTER OF SCIENCE IN
FINANCE**

**MASTERS FINAL WORK
PROJECT**

**EQUITY RESEARCH OF VOLKSWAGEN:
VALUATION AMIDST OF AN EMISSION SCANDAL**

MARY ANNE GARCIA BOLOS

OCTOBER 2016

**MASTER OF SCIENCE IN
FINANCE**

**MASTERS FINAL WORK
PROJECT**

**EQUITY RESEARCH OF VOLKSWAGEN:
VALUATION AMIDST OF AN EMISSION SCANDAL**

MARY ANNE GARCIA BOLOS

**SUPERVISOR
VICTOR MAURÍLIO SILVA BARROS**

OCTOBER 2016

Index

Abstract	ii
Resumo	iii
Acknowledgements	iv
List of Figures	v
List of Tables	vii
Research Snapshot	1
1. Investment Summary	3
2. Business Description	4
3. Management and Corporate Governance	6
4. Emission Scandal	7
5. Industry Overview and Competitive Positioning	9
6. The Future	13
7. Investment Risks	13
8. Financial Analysis	15
9. Total Estimated Cost Impact of Emission Scandal	17
10. Valuation	18
Appendix A: Definitions	21
Appendix B: Balance Sheet Statement	21
Appendix C: Income Statement	24
Appendix D: Projected Cash Flow Statement	25
Appendix E: Du Pont Analysis	25
Appendix F: Forecasting Assumptions	26
Appendix G: Corporate Structure and Strategy	30
Appendix H: VW's House of Brands	32
Appendix I: Key Personnel Management	33
Appendix J: Diesel Scandal	34
Appendix K: SWOT ANALYSIS	35
Appendix L: Porter's Five Forces	37
Appendix M: VW's Share Price	38
Appendix N: Valuation	38
Appendix O: Peer Selection Methodology	42
Appendix P: Risk Matrix	44
References	45

Abstract

This project report follows the format recommended by the CFA Institute “(Pinto *et. al.*, 2015)” and materials on this report will only reflect the public information issued on Volkswagen AG until September 30th, 2016.

Volkswagen AG is Europe’s largest auto-manufacturer and one of the largest worldwide. The company offers a wide selection of brand portfolios and generates the highest economies scale in Europe in this industry. The emission scandal it faced on 2015 reflected negatively in the company’s financials and its stock price plunged to nearly 50%.

Conducting an in-depth analysis on the company’s management, financials, market and risk assessment along with the application with the most realistic assumptions enabled a proper valuation on the company’s target price. Using the discounted cash flow (DCF) to the firm as the main valuation methodology, a target price of €146.36 for 2017YE was attained with an upside potential of 25.1% from its current price of €116.95 on September 30th, 2016 rated the company with a “Buy” recommendation with high risk. Complementary valuation methods were used and market uncertainties in our estimations were stressed, and all supported our “Buy” recommendation.

The current target price of €146.36 is a downward revision by me if the company did not have such scandal. I have valued VW with and without the scandal and the impact on price target was a decrease of about €43.32 per share, or €21.7 billion (for 501 billion shares outstanding) in terms of present value at 2017YE. Despite the loss in its fundamental (present) value of around 29.6% (€21.7 billion), in this report the total estimated and not discounted ‘direct’ cost of the scandal reaches about €46.4 billion.

JEL classification: G10; G30; G32; G34

Keywords: Emission scandal, Diesel issue, automotive, valuation, DCF

Resumo

Este relatório de projeto segue o formato recomendado pelo CFA Institute “(Pinto *et. al.*, 2015)” e os conteúdos deste relatório apenas refletem a informação pública emitida sobre a Volkswagen AG até 30 de setembro de 2016.

A Volkswagen AG é a maior produtora automóvel da Europa e uma das maiores do mundo. A empresa tem disponível um vasto portefólio de marcas e gera as maiores economias de escala da Europa na indústria. O escândalo das emissões que enfrentou em 2015 influenciou negativamente as contas da empresa e o preço das suas ações desvalorizou quase 50%.

O desenvolvimento de uma análise detalhada da gestão da empresa, contas, mercado e avaliação de risco conjuntamente com a aplicação dos pressupostos mais realistas permitiram uma adequada avaliação do preço alvo da empresa. Através do modelo dos fluxos de caixa descontados (DCF) para a empresa como principal metodologia de avaliação, o preço alvo de €146,36 para 2017FA foi obtido com um potencial de crescimento de 25,1% do preço atual de €119,95 em 30 de setembro de 2016, classificou a empresa com uma recomendação de “Comprar” com elevado risco. Métodos de avaliação complementares foram usados e alterações em estimativas incertas de mercado foram testadas, tendo todas elas suportado a recomendação de “Comprar”.

O preço alvo atual de €146,36 corresponde a uma revisão em baixa caso a empresa não tivesse tido o escândalo. Avaliei a VW com e sem o impacto do escândalo no preço alvo, correspondendo a uma diminuição de cerca de €43,32 por ação, ou €21,7 mil milhões (para 501 mil milhões de ações em circulação) em termos de valores atuais a 2017FA. Apesar da perda no seu valor fundamental (atual) de cerca de 29,6% (€21,7 mil milhões), neste relatório a estimativa do custo ‘direto’ total do escândalo, não descontado, chega a cerca de €46,4 mil milhões.

Classificação JEL: G10; G30; G32; G34

Palavras-Chave: Escândalo de emissões, problema do Diesel, automóvel, avaliação, DCF

Acknowledgements

Writing a thesis is a daunting experience but at the same time very self-rewarding and self-satisfying. This would have not been possible without the never-ending support of my family, friends and mentors.

Mom, Fatemah and Sarah, you guys are my strength. Thank you for always being there, for the push and making sure I make it through.

Professor Clara, you have been an instrumental part of my journey and I thank you for being an inspiration and an ideal figure. I can't thank you enough for giving me this opportunity and it has been an honor learning from the finest professors of ISEG.

Victor, you make writing a thesis enjoyable. Your vast knowledge and attention to details helped me greatly through my uncertainties and doubt. Your thoroughness and attentiveness is very much appreciated and it has been an amazing experience learning from the best. Thank you for believing in me, for your knowledge and support, and lastly for being a friend and a mentor.

List of Figures

Figure 1: VW Market Share Movement	1
Figure 2: Valuation Recommendation	3
Figure 3: Diesel Issue – Negative Impact	3
Figure 4: Key Trends in the Automotive Industry	3
Figure 5: Vehicles Sales	4
Figure 6: Portfolio Growth	4
Figure 7: Employees by Region as at Dec. 31 2015	5
Figure 8: VW’s “Strategy 2018”	5
Figure 9: VW’s New Direction	6
Figure 10: Shareholder structure as at Dec. 31 2015	6
Figure 11: Voting rights distribution as at Dec. 2015	6
Figure 12: VW Preventive Approach to Compliance	7
Figure 13: VW’s Emission Scandal	8
Figure 14: VW’s Share Price	8
Figure 15: Auto Companies Effect on Prices	9
Figure 16: Passenger Car Registration Market Share by Region 2015	9
Figure 17: Global Vehicle Sold	9
Figure 18: EU Passenger Car Trade in Value	9
Figure 19: EU Market Share Breakdown 2015	9
Figure 20: Global Vehicle Production	10
Figure 21: Real GDP Growth	10
Figure 22: United Nation’s Population Projections by World Region	10
Figure 23: Interest rates on New and Used cars	10
Figure 24: Transportation Options	11
Figure 25: Electrified Powertrain Production Forecast	11
Figure 26: Changing Automotive Environment	11
Figure 27: Global OEMs - Connectivity and Self-driving Cars	12
Figure 28: Porter’s Five Forces	12
Figure 29: SWOT Analysis – Prior and Post Scandal	12
Figure 30: Risk Matrix	13
Figure 31: Sales Revenue Vs. Sales by Unit	15
Figure 32: Sales Revenue Breakdown	15
Figure 33: Net Profit and Sales Revenue	15
Figure 34: Provisions	16

Figure 35: Dividends Paid	17
Figure 36: Sales of Suzuki Shares	17
Figure 37: Total Estimate Cost of Emission Scandal	17
Figure 38: Target Price With and Without Scandal	18
Figure 39: Sales Revenue	18
Figure 40: Monte Carlo Simulation	20

List of Tables

Table 1: VW Market Data 30/09/16	1
Table 2: VW Target Prices (2017YE)	1
Table 3: Student Risk Assessment on VW	2
Table 4: VW vs. DAX Performance	2
Table 5: VW's Brief Profile	4
Table 6: Top 5 Largest Auto Companies Worldwide 2015	5
Table 7: Strategy 2025	6
Table 8: Changes in Management after Scandal	7
Table 9: Sustainability Concentration	7
Table 10: Rating on VW	8
Table 11: VW Five-point Plan	8
Table 12: Compensation and Buyback US – 2 Liter Engines Vehicles	17
Table 13: Compensation and Buyback U.S	17
Table 14: DCF Price Target	18
Table 15: WACC Assumptions	19
Table 16: Peer Analysis	19
Table 17: Forward Multiple	20
Table 18: EV/SALES – Price Target	20

MOODY'S RATING A3 31 Dec. 2015	LAST PRICE €116.95 30 Sept. 2016	TARGET PRICE €146.36 December 2017	TICKER (XETRA) VOWG_p.DE Reuters	INDUSTRY Auto & Truck Manufacturers	HIGH RISK <i>Upside: 25.1%</i> 30 September 2016
---	---	---	---	---	---

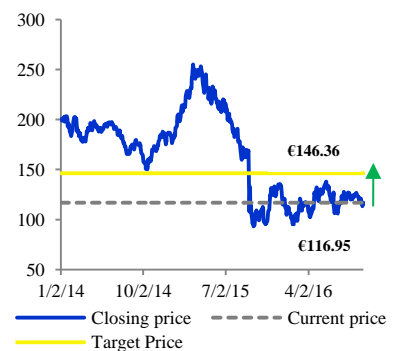
Volkswagen AG: Braving the Emission Scandal

Research Snapshot

Based on the analysis conducted on Volkswagen AG (VW), a **BUY** recommendation is initiated with a **target price of €146.36** for 2017YE, indicating an **upside potential of 25.1%** from its closing price of €116.95 on September 30, 2016. Despite the diesel emission scandal that fell on the company on September 2015 along with the competitiveness and uncertainties in the automotive market, a buy rating is recommended. This is primarily driven due to the following factors:

- Volkswagen AG – a diversified group:** VW's strong and diverse collection of brands (serving both mass and luxury automotive market) keeps the company's operating business in good shape despite the diesel issue. In 2015, vehicle deliveries to VW Group reached to almost 10 million customers and sales revenue grew by 5.4% compared to prior year. This indicates customer trust and loyalty in the group's brand, its production and VW as a whole. Without the special items caused by the emission scandal, operating results (EBIT) would have slightly exceeded prior results making it another successful year for VW. Furthermore, other scandal emerging from automotive companies are putting back VW's reputation close to historical level.
- New key pillars of strategies:** As a result of the emission scandal, VW set a new strategic plan which aims to counteract future challenges by transforming its core business, building mobility solutions business, secure funding and strengthen its innovation power. With this new "Strategy 2025", the operating return on sales is expected to gradually increase, growing from 2.2% in 2016 to 7.5% by 2021.
- High earning power:** The company's stronger premium positioning, volume growth, market share gains, and controlled manufacturing cost enables the company to achieve high earning power. Its operating profit before the inclusion of the cost effect of emission scandal would have recorded an EBIT of €12.8 billion in 2015 (2014: €12.7 billion). At the same time, the company's share of operating profit in its Chinese joint venture amounts to over €5 billion.
- State-of-the-art production:** With 12 fascinating brands, continuous multitude of new and redesigned model marketed in all segments, and wide commercial vehicle coverage, the company's product offers unique and unparalleled high product diversification among European carmakers.
- Maintaining a good stance in its competitive position:** VW's innovative R&D, skilled employees and up-to-date modular toolkit system enables the company to produce top-notch quality products and meet customer's future demand. Furthermore, the company's effort to increase efficiency by large-scale launch of fault free processes and reducing cost gives the company a competitive advantage among its peers.

Figure 1: VW Market Share Movement



Source: Thomson Reuters

Table 1: VW Market Data 30/09/16

Key information	
Closing Price	€ 116.95
52-week price range	€92.7- €139.40
Volume	1,313,487
1 year return	-0.335
Shares outstanding	501 billion
Market Cap.	€59.19 billion
Reuters/ Bloomberg	VOWG_p.DE/ VOW:GR

Source: Thomson Reuters

Table 2: VW Target Prices (2017YE)

Valuation	Target Price
Current stock price - 30/09/2016	€ 116.95
DCF	€ 146.36
EV/SALES	€ 145.02

Source: MB estimates

News Highlights

- **VW's diesel emission scandal – 23/09/2015.** VW guilty of installing smart defeat device software to its diesel vehicles affecting around 11 million vehicles worldwide.
- **VW's multi-billion dollar action plan “Together – Strategy 2025” – 16/06/2016.** The 2025 time horizon plan is geared for sustainable profitable growth focusing on cleaner gas engines, transformation of its core business, and electrification initiatives.
- **VW to pay more than USD10 billion for U.S emission scandal – 23/06/2016.** A settlement claim of about USD10.3 billion (€9.3 billion) to be paid to U.S regulators which includes a buy back offer of nearly 500,000 vehicles and an average compensation of \$5,000 (€4,496) to U.S car owners.

Financial Highlights

In € million	2014	2015	2016F	2017F	2018F	2019F	2020F	2021F
Sales revenue	202,458	213,292	210,881	218,127	226,400	224,512	231,997	239,706
Other operating exp.*	-6,992	-20,171	-17,385	-14,386	-11,131	-9,142	-9,389	-9,641
EBIT	12,697	-4,069	931	4,613	11,560	14,482	16,183	17,979
Net Profit	11,068	-1,361	2,773	5,535	10,746	12,937	14,213	15,560
Total Asset	351,209	381,935	388,267	408,886	430,107	444,811	466,445	489,299
Total Liabilities	261,020	293,664	292,978	308,593	320,648	324,958	335,456	346,432
Total Equity	90,189	88,270	95,289	100,293	109,460	119,854	130,988	142,867
Operating margin	6.27%	-1.91%	0.44%	2.12%	5.11%	6.45%	6.98%	7.50%
Net profit margin	5.47%	-0.64%	1.32%	2.54%	4.75%	5.76%	6.13%	6.49%
ROE	12.28%	-1.53%	3.02%	5.66%	10.25%	11.28%	11.33%	11.36%
ROA	3.28%	-0.37%	0.72%	1.39%	2.56%	2.96%	3.12%	3.26%

*Other operating expenses include special items relating to the emission scandal.

Table 3: Student Risk Assessment on VW

Low	Medium	High
		High

VW is identified to be a high risk investment. This risk assessment is centered on the intense competition domestically and internationally.

Furthermore, the company's recent emission scandal and ongoing investigation has the company standing on the edge

Source: MB analysis

Table 4: VW vs. DAX Performance

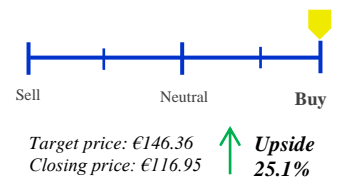


Source: Thomson Reuters

1. Investment Summary

An in-depth analysis on Volkswagen AG (VW) - Europe's largest car manufacturer - rated a **Buy** recommendation with a target price of €146.36 for 2017YE, representing an upside potential of 25.1% from its closing price of €116.95 on September 30, 2016 - Figure 2. A huge drop in price of nearly 50% was witnessed due to the diesel issue since September 2015 created a fluctuation and miss presentation in price.

Figure 2: Valuation Recommendation

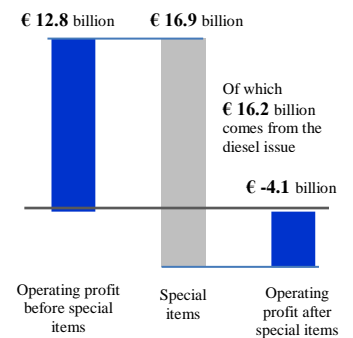


Source: MB estimates

Negative earnings as a consequence of the diesel issue

The rise of the diesel emission scandal confronted VW with major challenges which have mirrored their financials. Total charges arising from the diesel issue amounted to €16.2 billion in 2015. Furthermore, economic havoc and slowdown in Russia, Brazil and China also negatively affected its sales performance. This resulted to a negative operating profit after special items of €4.1 billion – Figure 3. However the company is anticipating a positive outlook in the coming years and to grow its operating margin from 0.4% in 2016 to 7.5% by 2021.

Figure 3: Diesel Issue – Negative Impact



Source: Company data

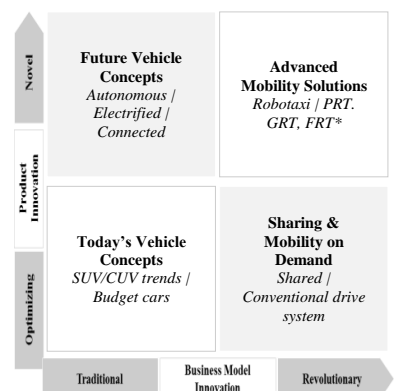
Leveraging on loyal stakeholders

The consequences of the diesel issue, the recent fuel economy scandal from Mitsubishi Motors, the restrained growth prospects in the automotive sector, political uncertainty along with strong currency fluctuation and the difficulties in some countries poses an extra challenge for the company in the coming years. However, the company is determined to strengthen its economic position and gain back customers trust. With the realignment of its brand grouping, re-examination of their strategies and by redefining its steering model further the company is more confident in achieving this.

Volkswagen still in a good position to compete

Changes in the global environment are reflected in the major trends in the automotive industry. These trends include product innovations, stricter emission legislation and new business models such as mobility services and future vehicles concepts – Figure 4. Early 2016, VW exhibited its latest innovation in the Geneva Motor show and Beijing Motor Show creating a buzz on its latest digitalized car. These revolutionary changes create opportunities for VW and with its new program “Together - Strategy 2025” the company is confident that it will be able to meet the future requirements.

Figure 4: Key Trends in the Automotive Industry



* PRT=Personal Rapid Transit, GRT=Group Rapid Transit, FRT=Freight Rapid Transit

Source: Company data

Growth in the automotive sector – Energy cars

Global automotive production is projected to grow as demand in automobile and auto financial services escalate. As awareness in the environment becomes more of a concern demand for environmental friendly vehicles are favored. By 2020, production of energy cars are expected to reach to 5.1 million compare to 3.1 million electric vehicles in 2015. This becomes a great opportunity for VW to concentrate in this sector and gain competitive advantage among its peers.

Valuation Methods

The discounted cash flow (DCF) model was the main methodology used to value VW and a target price of €146.36 in 2017YE was achieved giving an upside potential of 25.1% from its closing price of €116.95 on September 30, 2016. To complement the cash flow approach, a relative valuation using multiple (EV/Sales) and Monte Carlo simulation was applied as another tool and proved to support the DCF target price to a buy recommendation.

Scandal Cost and Prior Scandal

Based on the analysis I have conducted, the ‘direct’ cost of the scandal was estimated at €46.4 billion, although it affected the fundamental (present) value by about €21.7 billion. Without the scandal, the target price would have been at €189.68. The current target price (with scandal) of €146.36 is downward revisions by €43.32 per share have the company not been involved with the diesel issue.

Risks to Price Target

A number of factors affect the price target of VW and among the most sensitive variable are the terminal growth rate and WACC. A sensitivity analysis was conducted based on these

factors illustrating the decrease in price as the discount rate increases or with a lower terminal growth rate.

Investment Risks

Based on the risk assessment conducted, VW's recent emission scandal and ongoing investigation has identified the company to be a high risk investment. The intense competition domestically and internationally adds to the company's vulnerability. Moreover, cleaner environment regulation and strict gas emission regulation have recently been a growing concern to consumers and regulators as more and more automotive companies have been involved in environment related scandal. Unfavorable market conditions and operational risk may also negatively affect the demand on automobiles. Key risk investors should be aware the effect of such factors to automotive companies' target performances and financials. **(Details on Investment risk and mitigants are elaborated in the Investment Risk section)**

2. Business Description

Company Profile

Volkswagen AG, a German automotive manufacturer, is the largest carmaker in Europe and one of the largest automobile manufacturers worldwide with total unit vehicle sales of 10.2 million in 2014 and 10.0 million in 2015 - Figure 5. Founded in 1937 by Deutsche Arbeitsfront (German Labour Front), the company's headquarter is located in Wolfsburg, Germany - Table 5.

VW is the parent company of Volkswagen Group (Appendix H). The company does not only manage production of Volkswagen brand vehicles but include other brands such as Audi, SEAT, ŠKODA, Bentley, Lamborghini, Porsche, Bugatti, Ducati, Scania and MAN. VW's brand product ranges from affordable mass vehicles to luxury passenger vehicles and has recently expanded its models to motorcycles. Its commercial vehicles (CV) vary from buses to pick-ups and trucks.

Besides the production of branded vehicles, VW is also involved in manufacturing diesel engines for marine and power plants, spare parts, turbomachinery equipment, compressors, chemical reactors and other vehicle components.

To complement the manufacturing business, the company provides a wide-range of services from financing, leasing, insurance and banking activities to fleet management and mobility services in more than 51 countries - Figure 6.

Volkswagen Business Division

AUTOMOTIVE DIVISION			FINANCIAL SERVICE DIVISION	
Passenger Cars		CV & Power Engineering	Volkswagen Financial Services	
VW Passenger Cars	Audi SEAT	VW Commercial Vehicles	<ul style="list-style-type: none"> • VW Financial Services AG (Europe/Asia-Pacific/North-South America) • VW Financial Services (USA/ Canada/ Spain/ Argentina) • Scania Financial Services • MAN Financial Services • Porsche Holding Financial Services • Porsche Financial Services 	
SKODA	Bentley Bugatti	Scania		
Lamborghini	Porsche Ducati	MAN		

Source: Company data

The primary companies in Europe of VW's Financial Services division are Volkswagen Bank GmbH, Volkswagen Leasing GmbH and Volkswagen Versicherungsdienst GmbH and VW Credit, Inc. in North America (Appendix G).

With operations in 119 production plants in 31 countries, the company produced more than 10 million vehicles per year in 2015. Its wide geographical presence reaches out to 153 countries recording total sales revenue of €202.5 billion in 2014 and €213.3 billion in 2015. As of December 31, 2015, VW's employees totaled to 610,076, a 3% increase from

Figure 5: Vehicles Sales (Units '000)



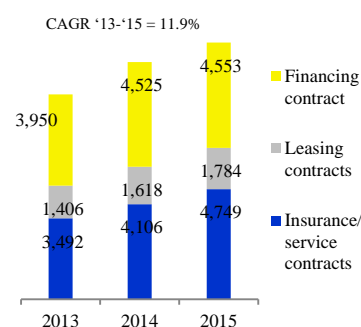
Source: Company data

Table 5: VW's Brief Profile

Type	Public
Traded as	Frankfurt Stock Exchange: VOW, VOW3
Headquarters	Wolfsburg, Germany
Key people	President: Hans Dieter Pötsch CEO: Matthias Müller
Products	Automobiles, commercial vehicles, motorcycles, engines, turbomachinery
Services	Banking, financing, fleet management, insurance, leasing
No. of employees	610,076 (2015)
Auditor	PricewaterhouseCoopers

Source: Company data

Figure 6: Portfolio Growth ('000)



Source: Company data

previous year (592,586), mostly due to the new plants in China, Poland and Mexico and the recruitment of specialist - Figure 7.

In 1985, Shanghai Volkswagen Automotive Co. (SVW) was formed as a joint venture (JV) with Shanghai Automotive Industrial Corporation (SAIC) and another JV with First Automotive Work (FAW) forming FAW-Volkswagen Automotive Co. Ltd. (FAW-VW) in 1991. Volkswagen Group China (VW China) was later founded in 2004 to oversee the management of activities within China. More than 3.5 million vehicles are delivered to China in 2015 (3.5 million in 2014) dropping by 3.5%. The company plans to expand its capacity to about five million vehicles annually by 2020. VW's strong position in the Chinese market is backed by its strong brand image amongst the local population and its steady increase in sales. (Appendix G)

Fortune Global 500 ranked VW number eight in its listing of "The World's 500 Largest Companies" in 2014 in terms of revenues and profit, and ranked number two in "The Largest Auto Companies in the World 2015" by Forbes - Table 6; coming behind Toyota Motor Corporation (Toyota). However, in the first half of 2015, VW distributed 5.09 million vehicles and outranked Toyota's deliveries of 5.02 million vehicles over the same time period. This resulted to total sales revenue of €109 billion, a 10% growth compared to last year. Majority of its unit sales were generated in Europe and Asia-Pacific¹ at 43% of total unit sales in 2014 with Asia-Pacific trailing next at 40% followed by North America and South America. Unfortunately, on September 2015, the company underwent a crisis when it revealed that 11 million of their vehicles have been fitted with smart defeat device software that emits less pollution when being tested. As a result, Toyota redeemed back its former position.

In September 2015, the partnership between Suzuki Motor Corporation and VW ended when Suzuki breached their agreement as it continued purchasing diesel engines from Italian Fiat instead of VW.

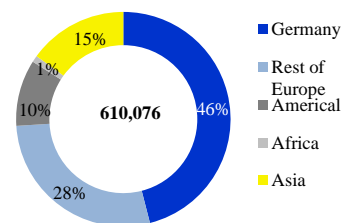
Company Strategies

• **Strategy 2018**

In 2007, the company released a development plan "Strategy 2018" as a way of positioning itself to becoming the largest economic and environmental automobile manufacturer in the world by 2018. This plan was also associated with its long-term business strategy in China. Having this goal in placed, the company identified 4 major factors that holds the key to the success of the company and has already been well in track in implementing them² - Figure 8. These factors were:

1. Improving **customer satisfaction and quality** by innovation on its products. This is done by anticipating customer's future demand or specific taste of individual markets and converging this into innovative technologies.
2. Becoming the **top employer** in the automotive industry by having the best qualified engineers and ensuring they are always highly motivated.
3. Targeting a **long-term profit before tax of more than 8%** in order to maintain a healthy financial position and at the same time safeguards for any unforeseen difficult period in the future. In 2013 and 2014, profit before tax averaged to 7.3%. However this margin plunged in 2015 to -0.6% due to the diesel issue
4. **Increasing sales unit to more than 10 million vehicles per year** and capturing a high market share in the automotive industry with the use of their improved modular toolkit system. Using this system will considerably reduce its fuel consumption, enable vehicles production at a competitive cost internationally and thereby increase production efficiency, flexibility and profitability. In 2014, the company achieved a major milestone when sales unit reached its 10 million vehicles mark recording sales revenue of €203 billion and €13 billion of operating profit attributing an increase in the operating margin to 6.3%.

Figure 7: Employees by Region as at Dec. 31 2015



Source: Company data
(Total employees includes Chinese JV)

Table 6: Top 5 Largest Auto Companies Worldwide 2015

Rank	Companies	Country
1	Toyota	Japan
2	Volkswagen	Germany
3	Daimler	Germany
4	BMW	Germany
5	Honda	Japan

Source: Forbes (based on 2014 performances)

Figure 8: VW's "Strategy 2018"



Source: Company data

¹ Sales revenues of the joint venture companies in China are not included in the figures for Asia-Pacific market.

² Prior emission scandal

- **Strategy 2025**

After the scandal incident, the company is currently framing its new business plan - Figure 9. The main objective of this plan is to increase revenues outside its core business significantly, outgrow competitors by utilizing its digitization better and offer autonomic driving at a broader range, enhance its existing vehicle portfolio of brands, and re-establish its sustainability reputation through e-models.

Its new program “Together – Strategy 2025” aims to concentrate in transforming its core business through developing, building and selling its vehicles; and building new mobility solutions as a cross-brand and this will be accomplished by establishing a true innovation culture within the Group and by securing finance for its future investments – Table 7.

- **Essential Strategy levels**

- Efficiency strategy:** VW has been branded as a low cost leader and the company accomplishes this by sharing auto components and vehicle platform across its other brand affiliates.
- Differentiation strategy:** By concentrating on product quality improvement, innovation and sustainability, VW ensures that its customers are well satisfied and are willing to pay for the company’s premium products.
- Corporate strategy:** The company has low level of diversification as majority of its revenues comes from auto sales. This is because its products share the same technology, resources, supply-chain operations and distribution channels. The company’s horizontal integration with its famous brands such as Porsche lets the company enjoy economies of scales and scope thereby toughening its presence in the market, especially in the luxury segment.
- International strategy:** VW’s international presence proves the company’s dedication to becoming a leader in the auto industry by targeting larger market share, reaching above average returns, and setting up plants in different locations in order to achieve lower transportation and production cost.
- Cooperative Strategy:** VW forms strategic partnership with well-established automotive manufactures in order to benefit from the combined resources, strategies, capabilities and core competency.

- **Restructuring the Company**

A new management structure has been designed for VW and is set to be implemented by 2016³. The company’s management structure aims to follow more of the modular toolkit system and to reinforce individual brands and regional accountability. Furthermore, the company intends to reorganize its 12 car brands by dividing into 4 holding groups: (i) VW Passenger Cars, SEAT and ŠKODA as the mass volume brand group; (ii) Audi, Lamborghini and Ducati as another holding group; (iii) a single unit with Porsche, Bentley and Bugatti; and (iv) a division for the VW Commercial Vehicles, Scania and MAN. The main function of the groups will be to focus on efficiency and to enhance its decision making strategy. (Appendix G)

Shareholder Structure

On December 2015, VW share capital amounts to €1.28 billion which comprise of 295 million ordinary shares and 206 million preferred shares. Porsche Automobil Holding SE holds 31% shares of the company and 21% by foreign institutional investors while the rest are divided between Qatar Holding LLC State of Lower Saxony, private shareholders and German institutional investors - Figure 10. More than half of the distribution of the voting rights is held by Porsche Automobil Holding SE - Figure 11.

3. Management and Corporate Governance

Corporate Management

The Supervisory Board of VW is responsible for appointing, monitoring and advising the VW Board of Management (BoM). The BoM is in charge of managing VW Group and

Figure 9: VW’s New Direction



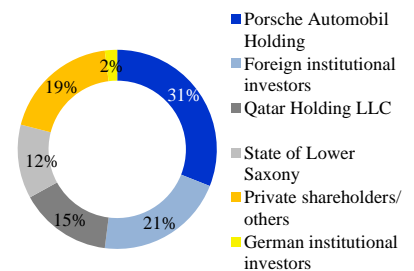
Source: Company data

Table 7: Strategy 2025

Strategy 2025 - Initiatives at a glance	
Transform Core Business - Grow profitability - Develop strategic capabilities - Enhance enterprise neutral spirit	Build Mobility Solutions Business
Strengthen Innovation Power	Secure Funding

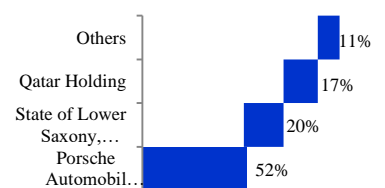
Source: Company data

Figure 10: Shareholder structure as at Dec. 31 2015



Source: Company data

Figure 11: Voting rights distribution as at Dec. 2015



Source: Company data

³ The restructuring of the company has no direct relation to the recent happenings of the emission scandal.

sends monthly reports on the business position and forecast of the current year to the Supervisory Board. The Supervisory Board has formed five committees in order to perform duties entrusted to it: 1. Executive Committee, 2. Nomination Committee, 3. Mediation Committee, 4. Audit Committee, and 5. Special Committee on Diesel Engines. (Appendix I)

On September 26, 2015, Matthias Muller was appointed as the new Chairman of the Board of Management of VW AG replacing Dr. Martin Winterkorn, who took responsibility for the emission scandal. Other changes in the Management have also been implemented due to the scandal - Table 8.

Corporate Governance

An essential requirement that VW espouse to continue its success is by gaining trust from its customers and investors. This is achieved through transparency and responsible corporate governance. Another important aspect of VW's governance is compliance. The company adopts a preventive approach to compliance which aims to create corporate culture to prevent potential breaches by bringing awareness and educating its employees - Figure 12.

Sustainability and Corporate Social Responsibility (CSR)

The business activities of VW are conducted in way that its customers, investors, society and employees also profit from their growth. Its sustainable development strategy concentrates on the economic, environmental and social aspect in which these are applied to 16 action areas – Table 9.

CSR has always been an integral part of the company where it supports around 200 projects worldwide. VW Group supports several projects relating to social development, arts and culture, education, health, sports, nature conservation and regional structural development. (Appendix G)

4. Emission Scandal

VW has always shown interest in supporting and encouraging a cleaner environment and was one of the first manufacturers to apply and get certified for the ISO 14000 environmental management standards. Advocating the green environment, VW took responsibility by supporting fuel efficiency and minimizing harmful emission in their vehicles. VW's reputation in terms of supporting environmentalism has been impeccable until its recent emission scandal that came to light in 2015. VW reported that around 11 million vehicles were affected and is widespread across its brand Volkswagen, Audi, SEAT, ŠKODA and Porsche (Appendix J). This scandal is about the company's deliberate manipulation on the emission test of its diesel vehicles by giving an impression that it is more environmental friendly than it really is. On September 3, 2015, VW admitted to the accusation of the U.S Environment Protection Agency (EPA) in installing an illegal software-based defeat device to understate the discharge of nitrogen oxides (NO2) when undergoing the emission standard compliance test. VW was found guilty in tricking regulators for almost seven years by hiding emissions of 10 to 40 times above compliant levels (Appendix J). Furthermore, investigations on the carbon dioxide (CO2) emission irregularities are also being tested. This scandal caused a significant dent in the company's environmental credentials.

Average Emissions of Nitrogen Oxides in on-Road Testing

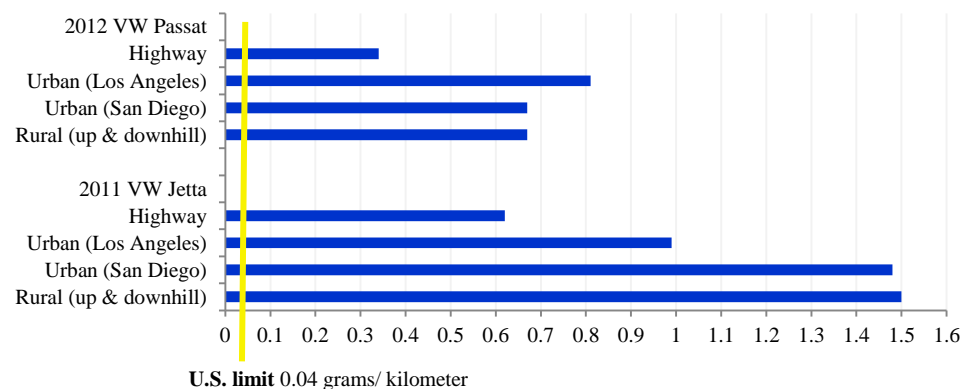


Table 8: Changes in Management after Scandal

New Member	Old Member	Appointed date	Role as
Mathias Muller	Replaced Martin Winterkorn	Sept. 26, 2015	Chairman of the BoM
Mathias Muller	Replaced Christian Klingler	Sept. 25, 2015	Member of the Board VW AG: Sales and Marketing
Hans Dieter Potsch	Replaced Julia Huhn-Piech	Oct. 7, 2015	Supervisory Board of VW AG
Frank Witter	Successor to Hans Dieter Potsch	Oct. 7, 2015	BoM of VW AG: Finance and Controlling
Christine Hohmann Dennhardt	n/a	Jan. 1, 2016	BoM of VW AG: Integrity and Legal Affairs.

Francisco Javier Garcia Sanz's contract extended to 5 more years as Board of Management of VW AG: Procurement

Source: Company data

Figure 12: VW Preventive Approach to Compliance



Source: Company data

Table 9: Sustainability Concentration

Economy	People	Environment
Customer satisfaction	Attractiveness as an employer	Environmentally friendly products/ electrification
Quality		Intelligent mobility and networking
Stability and profitability	Participation Training	Vehicle safety
Compliance, risk management, corporate governance	Corporate responsibility	Climate and environmental protection
Supplier relationship	Health Diversity and equality	Resource conservation across the lifecycle

Source: Company data

Source: Arvind Thiruvengadam, Center for Alternative Fuels, Engines and Emissions at West Virginia University

The Domino Effect within Volkswagen

The emission scandal has had a tremendous impact on VW's business and further emission allegations on the company are expected to rise as investigations continue. Its recent outranking of Toyota as the world's largest automaker mid-2015 will be short-lived as a turbulent future is foreshadowed in the short-run. At the same time, it has lost the trust of its customers, investors and suppliers hence affecting its strong position in the market. Apart from these over looming issues, the effect of the scandal on VW showed significantly - Figure 13.

Setback in the operating results for 2015⁴

The irregularities in the software in diesel engines resulted to a negative operating profit of €4.1 billion. Total provisions of €16.2 billion were charged as special items in the operating results which are attributable to the pending technical modifications, repurchases and customer-related measures including legal risk.

Legal risk

Numerous legal risks resulted relating to the scandal and a total of €7.0 billion has been recognized in 2015. This provision was attributed to the risk complexity of individuals, the ongoing approval process with the authorities and the continuous investigations. The legal risk includes⁵:

- the criminal and administrative proceeds worldwide (excluding the USA and Canada),
- product-related lawsuits worldwide (excluding the USA and Canada),
- lawsuits filed by investors worldwide (excluding the USA and Canada)
- proceedings in the USA and Canada

Changes in Management

The former Chairman of the BoM of VW, Prof. Dr. Martin Winterkorn stepped down from his position on September 25, 2015, taking responsibility for the scandal and Mr. Mathias Muller took over as the new Chairman. Other personnel responsible for the scandal have also been replaced and the company continues its internal investigation. (Appendix I)

Sharp decline in share price

News on the emission scandal, immediately reflected the company's share price plunging by 38% in a span of two weeks (from €170 to €106) wiping out almost a quarter of its value - Figure 14 (Appendix M). The shares further plummeted to €94 by 11%, one of its lowest record since 2011 when VW encountered evidence that irregularities in its CO2 for vehicles' type in the EU28 countries. In the first quarter of 2016, share prices have been volatile based on the companies news but tends to slowly recovered.

Ratings downgraded

As a result of the irregularities in the defeat devices software, the outlook for VW rating has been downgraded to a negative. On December 2015, Moody's Investor Service outlook on VW has been downgraded to a Negative from Positive in 2015. Similarly, S&P's changed stance from Stable to a Negative - Table 10. The company is still on the lookout for further potential downgrade.

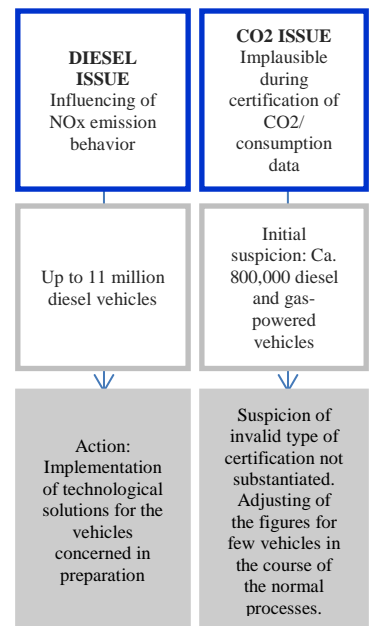
VW in action

VW took immediate action and set a five-point plan to realign the Group - Table 11. A new set of objectives have been structured for the company. The company's key foundation Strategy 2018 will remained unchanged however an additional *Future Track* was set for the realignment that aims to tackle issues of the future such as e-mobility. At the same time, the company recently set its "Strategy 2025" which aims to define their technological and strategic direction for the coming next ten years.

⁴ Detailed analysis is explained in the Financial Analysis section.

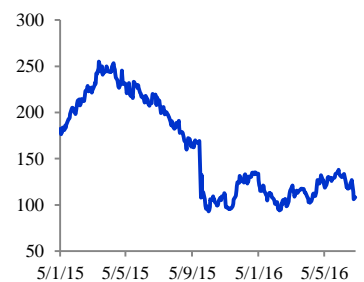
⁵ Detailed on the legal risk and emission risk can be found in Section 9- Investment Risk.

Figure 13: VW's Emission Scandal



Source: Company data

Figure 14: VW's Share Price



Source: Bloomberg

Table 10: Rating on VW

	2015	2014	2013	2012
Standard & Poor's				
Short-term	A-2	A-1	A-2	A-2
Long-term	BBB+	A	A-	A-
Outlook	-	stable	+	+
Moody's Investors Service				
Short-term	P-2	P-2	P-2	P-2
Long-term	A3	A3	A3	A3
Outlook	-	+	+	+

Note: - = negative; + positive

Source: Company data, Moody, S&P 500

Table 11: VW Five-point Plan

Priorities	Description
1. Helping customers	Communication and providing effective technical solutions
2. Uncovering what happened	Discovering the truth and learning from it
3. New structure	Launching a more entrepreneurial & decentralized Group Structure
4. New mindset	Changing the way they do things
5. New objectives	Re-evaluating what they do and re-defining targets

Source: Company data

Another strategy the company can adapt is by applying a similar technique as that of Toyota's "Andon Cord". This Andon Cord was set to manage quality control where Toyota's employees can pull the cord as they see fit when problems arise during production.

Shock Waves in the Automotive Industry

The impact of VW rigging its emission test does not solely target the company but spreads widely to the entire automotive industry. In fact, it would greatly affect the European economy, especially Germany. Over the last few decades, Europe is seen to have highly invested in the diesel technology.

Automotive companies such as Ford, GM and others are also being tested for any deceitful acts. The knock-on effect also affected other automotive companies' share prices falling by 2-4% a few weeks after the scandal broke out illustrating the loss in confidence in car manufacturers – Figure 15. As a result of this scandal, the European automotive industry is likely to have a stricter regulatory regime with additional regulations and a more thorough test enforced to all automobile companies. Furthermore, other fueled engines may also be caught in the crossfire and undergo future scrutiny. Overall, the automotive industry will experience difficulties in growth temporarily and taint its sector's reputation for quite some time.

5. Industry Overview and Competitive Positioning

INDUSTRY OVERVIEW

The automotive industry plays a critical role in the global economy and is one of the main drivers of macroeconomic growth, stability and technological advancement. Despite the 2008 financial crisis, the auto market is still recovering albeit at a gradual pace. In 2015, global passenger car sales grew by 2% compared to prior-year level reaching to 72.8 million cars (2014: 71.4 million units). Of the total passenger car registered, 42.6% of the market share is dominated by Asia of which China covers 26% of the total global sales (19.3 million units) and trailing next are North America and Europe at 23.6% and 22.9% respectively - Figure 16. Simultaneously, the commercial vehicles also showed an increasing trend from the last previous years. The major market players of the automobile industry are Asia-Pacific (mainstream in China), North America (majority in US) and EU with a market share of 26%, 20% and 19%, respectively. It is projected that the European market will further add value in the premium segment while China will continue its strong performance in the mass-product segment and India to surge demand in the small vehicle segment. The top major companies in terms of unit sales in the automotive industries are Toyota Motors, VW Group, General Motors (GM), and Hyundai Motor Group - Figure 17.

In 2015, the global economic conditions worsened making it riskier and more complex to invest in a country without fully assessing the market conditions. The industry is in the midst of undergoing through fundamental changes and to start investing more on digitalized vehicles, showrooms and plants and after the latest emission scandal, a stricter emission standard legislation will be imposed and implemented. Besides VW's emission scandal, Mitsubishi Motors was also found guilty in manipulating fuel economy data while GM sold SUVs stating incorrect fuel economy information on its stickers.

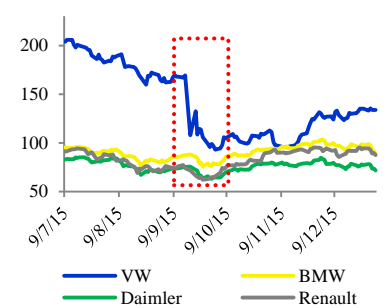
The Automotive Industry: Europe's Drive Train

The European economy contributes significantly to the automotive industry attributing to around 6.3% of the EU's GDP and recorded a trade surplus of €96 billion in 2015 - Figure 18. According to European Automobile Manufacturers Association (ACEA), in 2016, passenger cars and commercial vehicles are anticipated to grow by 2% totaling to a nearby 14 million vehicle units. Supporting over 12.1 million jobs in the European workforce, the European automotive industry accounts to 25% of the world auto production in 2015 and is led by Germany, UK, France, Italy and Spain – Figure 19. The industry is also one of the largest contributors in the Research and Development (R&D) in Europe investing more than €41.5 billion annually (approximately 5% of the total industry turnover).

Germany: Europe's Hub of Innovation

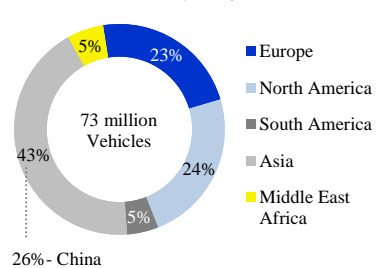
Germany has been dubbed as Europe's leading automotive market and hub of innovation due to its topnotch R&D infrastructure, stable labor costs, exceptional production standard and skilled manpower. The auto industry is the largest sector in the country and recorded a

Figure 15: Auto Companies Effect on Prices



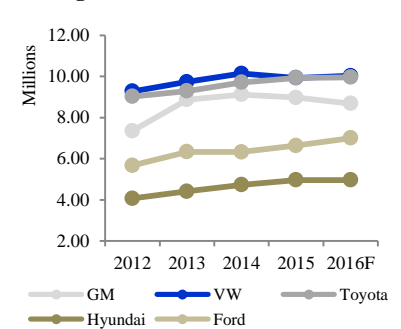
Source: Bloomberg

Figure 16: Passenger Car Registration Market Share by Region 2015



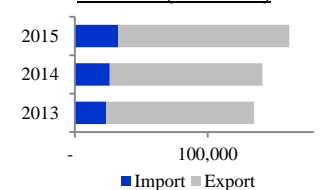
Source: IHS, ACEA-ACEA Economic and Market Report Q4 2015

Figure 17: Global Vehicle Sold



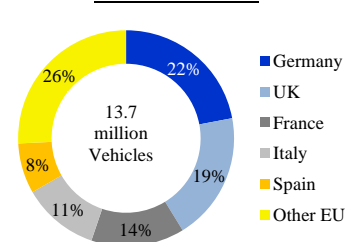
Source: Bloomberg

Figure 18: EU Passenger Car Trade in Value (€ Million)



Source: Eurostat

Figure 19: EU Market Share Breakdown 2015



Source: IHS, ACEA-ACEA Economic and Market Report Q4 2

turnover of €384 billion (20% of the total German industry revenue) in 2014. In terms of production, it accounts to 35% of the passenger cars produced and 24% of the passenger car registered in 2015.

Supply Factors

Despite the continuous unrelenting market conditions and fierce competition in the automotive industry, a growing trend in the global production was still seen in 2015 growing by 2.7% to 72.6 million units compared to the previous year. Global auto production is expected to grow by 3.6% from 93.2 million units in 2015 to 107.4 million units in 2020 – Figure 20. This growth can be attributed to the growing demand in cars. Moreover, the availability of a wider dealer network along with the presence of auto financing option helps automobile companies serve customers across a larger geographical area.

Raw materials account for nearly half of COGS

Even though automotive companies develop and manufacture their own vehicles they purchase raw materials from suppliers. About 47% of the costs of vehicles come from raw materials and majority of these materials are steel. Therefore, fluctuations in the global steel prices will affect production and have a direct impact on the profitability of the company. At the same time labour cost, machinery and input cost can affect the supply of cars.

Price insensitivity

Car manufacturers set car prices based on consumer’s reaction to gasoline prices.⁶ There is a negative relationship between the changes of gasoline prices and the auto sales⁷ as prices do not only affect the demand of cars but also the supply. Generally, if the price of a car is high then eventually the car manufacturer would want to supply more units. As the automotive is an oligopoly type of market, a drop in price of small cars will have a huge impact on the sales of small cars as well as other type of cars. Additionally, government policies and taxes play a major role in the supply of cars. Changes in government policies such as increasing tax paid for every unit sold or the stricter emission legislation can cause supply of cars to fluctuate.

Demand Driver

Amid the challenging market condition, improvement in many industrialized countries was witnessed and global demand for cars rose. By analyzing the demand and supply factors of the automotive industry, the upturn and the downturn are based on multiple factors that govern the market sector.

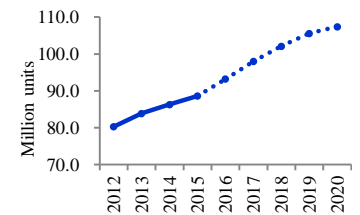
Volumes and macroeconomic conditions

Margins of the auto sector are highly influenced on volumes which in turn is dependent on the macroeconomic factors. Such factors include the income of consumers, consumer confidence, unemployment, GDP growth and improvement in road infrastructure – Figure 21. At the same time, the increase in consumer middle class and emerging economies (especially in China and India) contribute largely to the growth in global sales of cars. A vital factor that drives demand is the high disposable income and this means the affordability level for customers is more. Thus, as consumer disposable income increases the number of car import also increases.⁸ Furthermore, the growth of per capita income, growth in global population and socio cultural factors such as changing lifestyles are a huge demand driver – Figure 22.

Financing condition

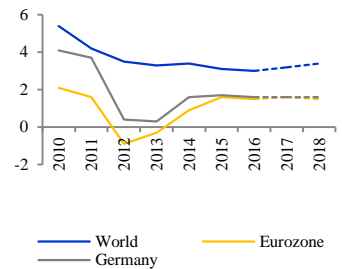
Availability of financial services is another tool that affects the sales of automobile. With the challenging economic environment along with legislation requirements, global demand for auto financial services rose. Beside the traditional finance product, the insurance and the services business also expanded. Majority of the new car sales are backed by auto finance due to lower interest rates for new cars. Nowadays, consumers have a wider financing option when purchasing new cars provided by manufacturers, credit unions, national banks and regional banks. However, financing through a car manufacturer is cheaper than other financing agencies as rates are 33% lower than average - Figure 23.

Figure 20: Global Vehicle Production



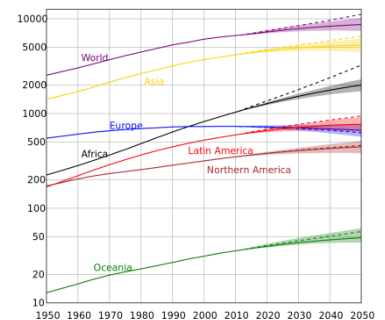
Source: Statista
<http://www.statista.com/statistics>

Figure 21: Real GDP Growth



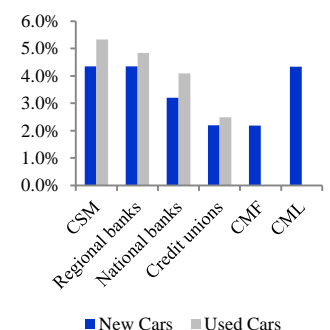
Source: Bloomberg

Figure 22: United Nation’s Population Projections by World Region



Source: United Nations

Figure 23: Interest rates on New and Used cars



Note: CSM = Community small banks;
 CMF = Car manufacturing financing;
 CML = Car manufacturing leasing

Source: 2016 Auto financing report, Evolution Finance
 Data is based on a 36-month term

⁶“(Langer & Miller, 2008)”

⁷“(Kilian & Sims, 2006)”

⁸“(Lin, 1982)”

Product mix and innovation

An automotive company earns margin depending on the type of vehicles its sells. For example, selling larger premium cars such as SUV earns higher revenues than mass vehicles. Launching new models and attractive marketing are also important metric that help achieve better sales volume.

Social economic and political factors

In 2015, numbers of passenger cars registered grew and this slow in growth is dedicated to the economic conditions. For instance, the political crisis and government scrapping program⁹ in Russia had a negative impact on the demand for auto market where sales dropped down by 35% in 2015 compared to prior year.

Foreign exchange

Auto companies not only sell their products locally but also have wide presence internationally; therefore making them exposed to currency exchanged risk. European car makers benefit from a weakened Euro and this increases demand for their products and increasing exports in vehicles.

Snapshot outlook 2016

Europe and North America automotive market are expected to continue its strong demand due to the continuous recovery in the domestic market Europe and exports from the U.S, while North America benefited from low interest rates and low prices of gas. At the same time, the improvement in the emerging market is estimated to contribute to grow by 3.2% in 2016. India, similarly to the US, is expected to remain strong backed by low interest rates and low prices of gas. In the second half of the 2016, the ASEAN¹⁰ region will start building its market momentum partly due to Thailand’s ability to expand contrary to the slowing domestic market. **China is expected to have the highest influence in the demand supporting at least 5% of the global demand for vehicles.** However, due to the difficult economies in Brazil and Russia, the automotive industry will contract in 2016.

The Industry is Changing

Worldwide demand for automobile and auto financial services has been a growing trend. Owning a car still has an unparalleled image compare to alternatives in terms of comfort and efficiency - Figure 24. However, consumers are spending more on personal mobility where demand for new mobility services such as carpooling continues to grow. Furthermore, an emergence of heavy duty vehicles such as farming and marine equipment is expected to create a new trend in the market. The automotive industry is also highly dedicated on energy efficiency. One of the main goals of car manufacturers is to lessen engine emission of pollution and become more environmental friendly. This legislation will lead manufacturers to start focusing on the production of hybrid and electric cars.

Digitalized Innovation: Energy Cars

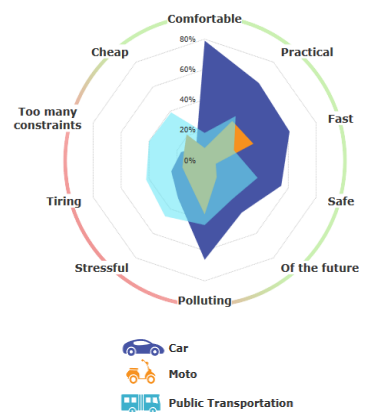
Due to the stringent regulation on auto companies especially after the recent manipulation of Volkswagen in the emission test and greater awareness on the environment, a curb in the demand for diesel engine will likely happen and may be substituted by a friendlier environment technology. Hence, a gradual increase in the production of energy cars may be foreseen in the years ahead. In 2015, a total of 3.1 million electric vehicles were produced and is expected to grow to 5.1 million units by 2020 - Figure 25.

COMPETITIVE POSITIONING

Stringent Regulations Steering to Digitalization

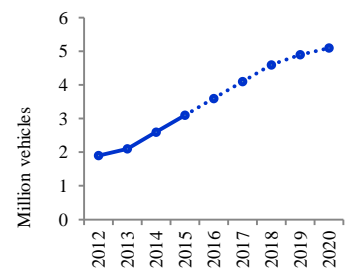
Regulations have a huge influence on the structure and future growth on the automotive industry. Higher capital requirements, fiercer competition faced with intricate environment, technological trends is changing the automotive environment – Figure 26. Emission of harmful substances affecting the climate change is also major concern. According to the European Commission, carbon dioxide (CO2) emission needs to be further cut and has set a

Figure 24: Transportation Options



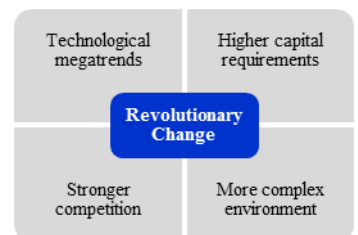
Source: TNS Sofres

Figure 25: Electrified Powertrain Production Forecast (million units)



Source: KPMG’s Global Automotive Executive Survey 2015

Figure 26: Changing Automotive Environment



Source: Company data

⁹ In September 2014, the Russian government introduced a program that aims to promote the local production of new vehicles thereby slumping demand import of vehicles.

¹⁰ Association of Southeast Asian Nation: 10 States — Brunei Darussalam, Cambodia, Indonesia, Laos, Malaysia, Myanmar, Philippines, Singapore, Thailand, and Vietnam.

target of 95g CO2/km on average per new car by 2020. This restriction will increase the penetration rate of hybrid and electric vehicles.

Moreover, with the radical changes happening in the economies triggered by the rising affluence in emerging markets, rapid growth of new technologies, sustainable policies and customers preference, the automotive sector trends have been directed to diverse mobility, autonomous driving, digitization and connectivity. This trend direction is also attributed to lower battery cost, wider availability of charge stations and strong acceptance and penetration of electric vehicles. VW is not far behind in following the trend, wherein in 2013, it launched its first electric car. At the same time, according to the 2015 survey conducted by KPMG, VW is one of the top five that is seen to lead in the field of connectivity and self-driving cars - Figure 27. At the same time, the upgraded modular toolkit will enable the company to compete in terms of creativity and state of art technology.

Efficiency upsurge - VW modular Approach¹¹

VW success was built on the creation and knowledge sharing between different affiliates of the company. One of VW strategy to increase its efficiency is based on the cross-brand platform and module strategy. The platforms set a common design, engineering and production including main components for certain car models whereas the standardized modular toolkit are primarily used in building an engine and vehicle electronics such as the modular diesel system or modular infotainment system. By stimulating synergies between models in one series and through all the series and brands this increases the company’s efficiency as it helps in transferring and circulation of innovation, technology and knowledge throughout the many affiliates of the company. At the same time using a standardized system helps significantly in cost savings such as reducing R&D cost per vehicles.

International Rivalry

The strengthening trend and intensity of automotive industry will be a huge challenge for VW and its recent involvement in the emission scandal will make it excruciatingly difficult for the company to rebound from the massive cost it shouldered - Figure 28. (Appendix L) To prevent losses or maintain its profit margin, VW will need to focus in getting back its stakeholders and consumers trust by decreasing prices, providing attractive discounts and scheme packages, and enhance its corporate culture. Moreover, the company should also concentrate on its R&D investment to maximize its innovation process so it can compete head to head with the fierce rivalry among its competitors.

In mid-2015, VW outranked Toyota from being number one in terms of revenue sales selling 5.09 million vehicle units. However, due to the emission scandal that erupted in the 3rd quarter of 2015, this will be a huge step back for VW and will need to revive to overcome the effect of the scandal. The company is in the process of fixing the problem and has recently updated its Strategy 2018 to Strategy 2025. This strategy will focus on digitalization, sustainability and integrity.

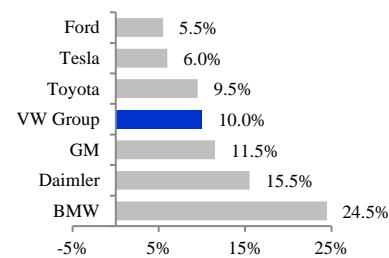
Driving Destination Launch

Global growth profit margins for automotive companies are expected to grow by 50% by 2020 and this will emanate from emerging countries. As China is anticipated to remain its strong growth, VW can further take advantage of this as it already has presence in the Chinese market especially in aftersales market such as spare parts, services, financing and used car sales. VW should enhance its dealership capabilities as the aftersales market is projected to grow faster than the new car sales. Moreover, VW should increase its presence in the next emerging markets like Thailand and South America.

The Scandal as an Opportunity

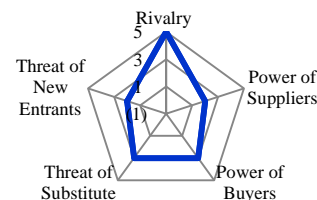
Based on the SWOT analysis conducted on the company, the company’s internal strength and external opportunity have shrunk post scandal - Figure 29. (Appendix K) However, the company sees this as an opportunity to realign the Group especially now that the automotive industry is facing epoch-making changes. By developing its future strategy with relation to e-mobility, urbanization and digitalization, the company will be well prepared for the challenges to come in the coming years.

Figure 27: Global OEMs - Connectivity and Self-driving Cars



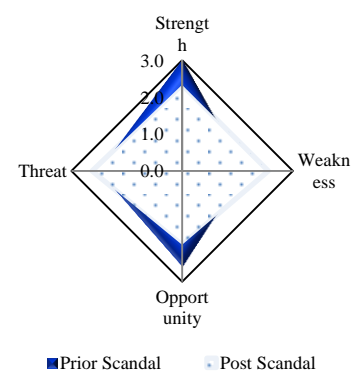
Source: KPMG’s Global Automotive Executive Survey 2015

Figure 28: Porter’s Five Forces



Source: MB analysis

Figure 29: SWOT Analysis – Prior and Post Scandal



Source: MB analysis

¹¹ “(Rugraff , 2012)”

6. The Future

Despite the spillover, there is still hope for VW to recover from the scandal. Previous automobile scandals such as the Ford transmission defect, Ford Explorer-Firestone tires disaster, Toyota's unintended acceleration and the GM faulty ignition (in which it recalled 3.3 million cars in 2014 with a total cost of \$5 billion) recovered from disastrous scandals and presently still managed to run strongly in the automotive industry.

Furthermore, the company's most profitable vehicles in the US (Porsche and Audi¹²) were not included in the installation of the cheating software. Another hopeful prospect is one of VW largest market - China, where only a small portion of the diesel-powered cars are sold in that market. At the same time, VW can concentrate more on the emerging markets to gain market leadership.

The emission scandal did not deteriorate the company's qualities overnight. Its strong brand, outstanding technology expertise and innovative strength, global presence and loyal customers worldwide, and committed team held the company strong against the scandal.

VW also showed its determination to compete amongst other car manufacturers in the market despite the hurdle it is facing and premiered its latest and new innovative design at the Geneva Motor Show 2016. With the company's future strategy to invest more in electric cars, VW planned a multi-billion-euro investment programme that aims to present at least 30 new electric vehicles by 2025. Furthermore, at the end of 2015, unit sales on VW Group vehicles were not badly affected and only dropped by 2% in comparison to the previous year. Albeit it's temporary depleted state, the future outlook of VW still looks positive.

With the realignment of VW Group, reviewing its strategy and outlining its steering model accurately, the company strives to reach last year's volume of vehicle deliveries and strengthen its economic position in the coming years.

7. Investment Risks

The risk management system (RMS) and internal control system (ICS) aims to identify the potential risk at an early stage of VW and act against any threat or lessen the effect of any risk that may arise – Figure 30.

Market Risk | Macroeconomics (MR1)

Unstable financial markets and structural deficits pose a threat to the company's operation and may cloud its outlook for growth. Furthermore, geopolitical tension and conflicts adds another factor to the risk. However, the probability of global recession occurring is low and a positive development in the market will give rise to opportunity to VW.

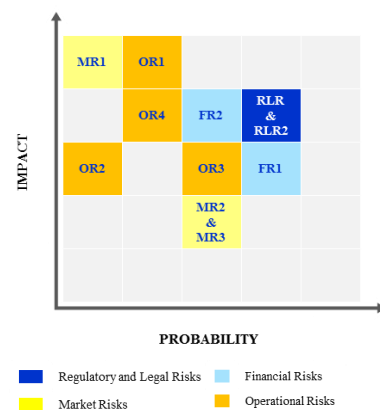
Market Risk | Sector-specific (MR2)

Economic trends in the automotive sector differ from region to region. In 2015, the US economy expanded strongly while market conditions in the Eastern Europe and South America remained in distressed. In the Western Europe, the economy continues to stabilize whereas growth trend in China slows down. The trading and sales business of VW uses its efficient inventory management and profitable dealer network as a counteract measure against these challenges. Conversely, as its financing business through bank loans proves to be difficult the company's installment of a comprehensive liquidity risk management system offsets bottlenecks from the dealers end.

Market Risk | Change in Demand (MR3)

Local train strikes, natural disaster, developments on the automobile market, consumer disposable income and the diesel emission in 2015 affected the production volumes of vehicle models to fluctuate at some of their plants. The company can mitigate this fluctuation with the use of their several tried-and-tested tools which enables the company to response to changes in demand at the site. The 2015 diesel scandal only proved VW

Figure 30: Risk Matrix



Source: MB analysis

¹² With the exception of Model A3

Group's good branding and loyal customers as it did not have a large impact in the company's sales unit.

Operational Risk | Diesel Emission (OR1)

In 2015, the company recognized provisions coming from the diesel issue mainly from service campaigns, recalls and customers-related measures. The company has initiated internal investigation and has been cooperating with the responsible authorities to clarify the issues.

Operational Risk | R&D (OR2)

Before VW designs and develop its cars, the company identify trends, conducts customers surveys based on customers' requirements in order to detect future trend at an early stage. The company tries to counter the risk that seems impossible to develop to the required standards and regularly compare this with their original target. With their Modular Transverse Toolkit, it enables the company to lessen its development cost and use its capacities with greater flexibility.

Operational Risk | Dependency on Fleet Customer (OR3)

The company's fleet customer registration in Germany rose in 2015 from 13.3% to 14.1% and registrations in Europe also grew compare to previous years. The company's share in the customer segment in Germany was 48.5% in 2015 and 28.9% in Europe. Concerning the diesel scandal, several fleet customers showed concerned but no impact on new vehicle registration was reported. As the company's Group brands are well position in its broad portfolio products and target-group-focused customer care, there is no big threat of default risks at individual fleet customers.

Operational Risk | Personnel & IT (OR4)

One of the main contributions to VW's success is individuals with technical and expertise skills. To achieve its goal in being the top employer worldwide, the company provides training and development opportunities. However, since the scandal in 2015, the company may face challenges in achieving this. In case forced or natural disasters, the company uses firewalls, intrusion prevention systems and dual authentication procedures.

Regulatory and Legal Risk | Environmental Protection (RLR1)

EU regulation concerning CO2 emissions have been placed until 2019 for passenger cars and commercial vehicles and need to abide by all car manufacturers. After the diesel scandal and fuel economy scandal by Mitsubishi, tighter regulation and monitoring will be set and higher penalties may be imposed if manufacturers are not complaint to the set of rules and regulations. In 2015, the legal provision recognized for VW for the case of its diesel issue amounted to €7 billion.

Regulatory and Legal Risk | Litigation (RLR2)

These are legal disputes and proceedings with regards to suppliers, dealers, customers, employees and investors which may lead to payment and other obligations if befallen. The company mitigates this by taking allocating appropriate provision and adequate insurance cover as a precaution.

Financial Risk | Foreign currency and Interest Rate (FR1)

Foreign currency risk is mitigated through natural hedging. The company's flexibility in adapting its production capacity globally and establishing new production capacity in the most attractive regions and obtaining large portion of components helps lessen this type of risk. Furthermore, interest rate risks are mitigated with the use of interest swap, cross currency swaps and other interest rate contracts.

Financial Risk | Liquidity (FR2)

To ensure the company remains solvent the whole time, the company holds sufficient liquidity reserves with the use of credit lines and tried-and-test money market and capital programs. Since the diesel scandal, liquidity risk became a real concern to the company and the downgrading rating of the company will affect the company's borrowings.

8. Financial Analysis

Projected Financial Ratios – Volkswagen AG

	2014	2015	2016F	2017F	2018F	2019F	2020F	2021F
Profitability Ratios								
Gross profit margin	18.0%	15.9%	17.6%	17.6%	18.1%	18.6%	19.1%	19.6%
Operating profit margin	6.3%	-1.9%	0.4%	2.1%	5.1%	6.5%	7.0%	7.5%
Net profit margin	5.5%	-0.6%	1.3%	2.5%	4.7%	5.8%	6.1%	6.5%
Operating ROA	3.8%	-1.1%	0.2%	1.2%	2.8%	3.3%	3.6%	3.8%
ROA	3.3%	-0.4%	0.7%	1.4%	2.6%	3.0%	3.1%	3.3%
ROE	12.3%	-1.5%	3.0%	5.7%	10.2%	11.3%	11.3%	11.4%
Activity Ratios (Operating Efficiency Ratios)								
Fixed asset turnover	0.96	0.93	0.88	0.87	0.85	0.79	0.76	0.72
Total asset turnover	0.60	0.58	0.55	0.55	0.54	0.51	0.51	0.50
Liquidity Ratios								
Current ratio	1.00	0.98	0.98	0.96	0.94	0.91	0.87	0.82
Quick ratio	0.76	0.74	0.77	0.76	0.74	0.71	0.67	0.62
Cash	1.15	1.12	1.21	1.18	1.14	1.10	1.02	0.91
Solvency Ratios								
Debt to equity	2.89	3.33	3.07	3.08	2.93	2.71	2.56	2.42
Total debt (debt ratio)	74.3%	76.9%	75.5%	75.5%	74.6%	73.1%	71.9%	70.8%
Financial leverage	3.89	4.33	4.07	4.08	3.93	3.71	3.56	3.42

Overview

The financial condition of the company in 2015 resulted in a huge step back as a consequence of the defeat software device to manipulate the emission testing. This caused the company's earnings to fall into a negative digit and cost the company billions. However, despite the direct hit on their financials and reputation, the company expects to fully recover by 2018 and foresees itself a positive outlook in the coming years.

Operating Result - Negative financial impact

2015 was a challenging year for VW reflecting a negative impact on their financials as a result of the emission scandal. The low performance in China, Russia and Brazil sales also has a material impact on the company.

Despite the decline in the unit sold in the year end of 2015 compare to previous year, the company generated sales revenue of €213.3 billion growing by 5.4% (2014: €202.5 billion) – Figure 31. This growth was mainly due to improvements in the mix, positive exchange rate effects and good business development in the Financial Service division.

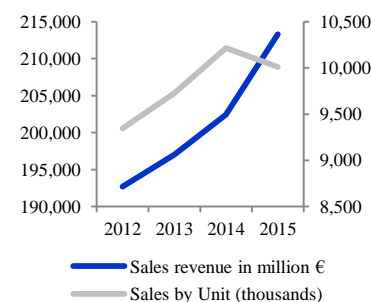
VW revenue consist of sales and services on passenger cars, commercial vehicles, power engineering and financial services – Figure 32. The company's outlook for 2016 is projected to be slower than that in 2015 as overall global growth demand for new vehicles are expected to slow down. Thus, sales revenue is projected to decrease by 1% in 2016 and then later on gradually move in tandem with the industry growth - Figure 33. Sales revenue is anticipated to grow at a CAGR of 2.6% for the projected 6 years.

Cost Cutting difficulty

Several costs were affected by the diesel issue. Cost of sales grew by 8.1% which is attributed mainly to the special items costing €8.5 billion while distribution expenses rose by 15.9% also mainly due to the emission scandal and from the trend in exchange rates. Higher fixed cost amplified to a further €2.6 billion as depreciation and amortization grew as investment and R&D expenses rose. Production of new car models, electrification and digitalization of vehicles, improving efficiency in their engines and development of their toolkits have also affected growth of fixed cost.

Despite the difficulty VW is facing in its current stage it aims to increase its margins by cost cutting. For example a significant cost saving can be yielded through reducing the number of side view mirrors and steering wheels offered or by terminating product variant (e.g. 5 vs 3 door polo). At the same time, the use of their modular transversal toolkit strategy will help reduce fixed cost, further reduction in production cost in spite of the increasing number of model.

Figure 31: Sales Revenue Vs. Sales by Unit



Source: Company data

Figure 32: Sales Revenue Breakdown

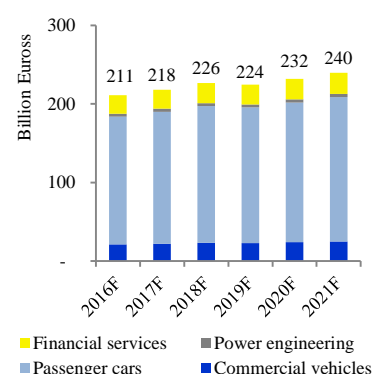
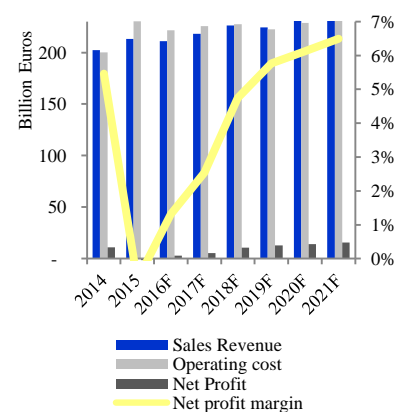
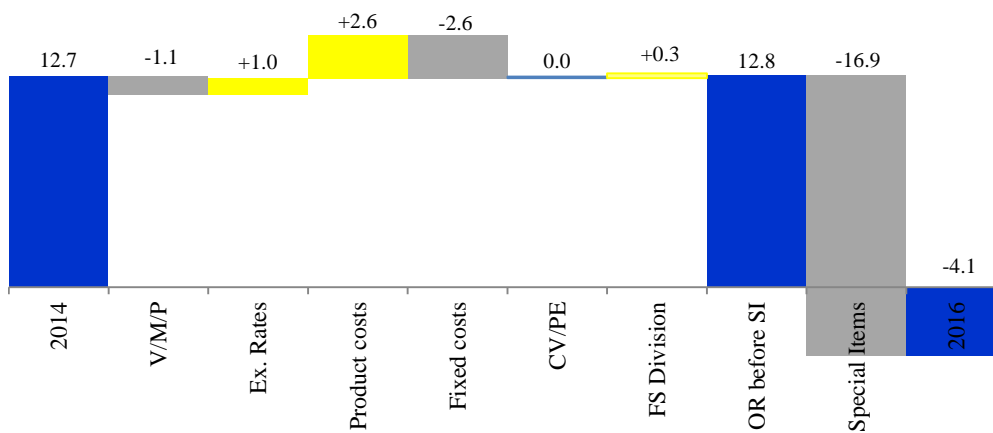


Figure 33: Net Profit and Sales Revenue



Source: Company data and MB estimates

Change in Operating Result (EBIT) in Billion Euros



Note: V/M/P = Volume/Mix/Prices; Ex. rates = exchange rates; CV/PE = Commercial vehicles/Power engineering; FS Division = Financial service division; OP before SI = Operating results before special items. Source: Company data

Special Items Attributed to the Scandal

On September 2015, irregularities in the software used for certain VW Group diesel engine vehicles were discovered and the company reported 11 million vehicles worldwide to be infected. The total cost for special items recognized in 2015 was €16.9 billion of which €16.2 billion were attributed to the diesel issue. These exception items related to the diesel scandal were charged to the technical measures intended to the affected diesel engines, repurchases, customers-related measures and legal risks. The remaining cost came from the restructuring its truck business, passenger cars in South America to enhance competition and the recall and replacement of faulty airbags manufactured and supplied by Takata.

As a result, this led the company's operating profit to fall in the negative figure from €12.7 billion to €-4.1 billion in 2015. However, without the presence of the scandal, operating profit would have reached the similar level as prior record at €12.8 billion and net profit resulting in a positive figure at €11.7 billion compared with the diesel effect at a negative loss of at €1.36 billion.

VW's Without Scandal Effect Vs. With Scandal Effect

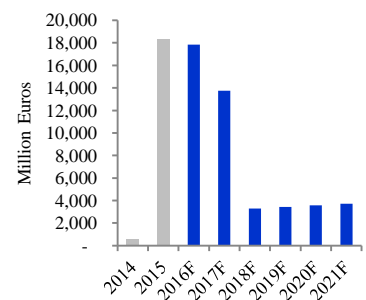
	Without Diesel Scandal Effect				With Diesel Scandal Effect			
	2014	2015	2016F	2021F	2014	2015	2016F	2021F
Sales revenue	202,458	213,292	210,881	239,706	202,458	213,292	210,881	239,706
EBIT	12,697	12,832	13,420	20,281	12,697	(4,069)	931	17,979
Net profit	11,068	11,699	12,140	17,286	11,068	(1,361)	2,773	15,560
Dividend	2,294	2,379	2,709	4,902	2,294	68	128	3,681
Net profit margin	5.5%	5.5%	5.8%	7.2%	5.5%	-0.6%	1.3%	6.5%
ROA	3.3%	3.3%	3.3%	3.9%	3.3%	-0.4%	0.7%	3.3%
ROE	12.3%	13.1%	12.8%	11.4%	12.3%	-1.5%	3.0%	11.4%

Source: Company data and MB estimates

Strong Financial Position

Cash flow from operating generated in 2015 was reported at €13.7 billion representing a 27% increase from last year. This growth was to offset the negative effect of the diesel scandal thus increasing the items in Other Provision from €0.6 billion to €18.3 billion. Provision items related to the scandal were includes legal defense, legal advice, legal dispute and official proceedings. Due to the ongoing case and investigation regarding the diesel issue, Other Provision in 2017YE will be projected high at €12.7 billion and €9.5 billion in 2018YE and gradually decrease as the company is expected to be back at its normal stand and average at €4.8 billion onwards – Figure 34.

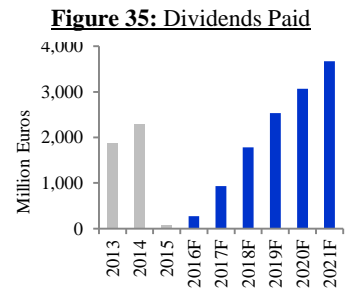
Figure 34: Provisions



Source: Company data and MB estimates

Dividend policy

The company's dividend strategy is set to match their financial strategy ensuring a solid financial foundation. The diesel issue had a huge impact on the dividends distributed to shareholders which recorded at €68 million in 2015, a 97% decrease from last years at €2,294 million. This was to help pay off the cost of the scandal. A dividend distribution ratio of 30% is the ideal ratio the company aims to target thus the projected dividend paid to shareholders is expected to gradually increase until it reaches the target ratio as the remnants of the scandal dies out. – Figure 35.

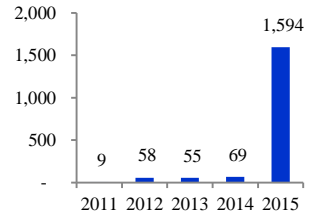


Source: Company data and MB estimates

Other Financial results - Sale of Suzuki Shares

Other financial results jumped from €0.7 billion to €2.8 billion which includes €1.5 billion disposal gain from the sale of shares in Suzuki. The termination of partnership between Suzuki Motor Corporation and VW led VW G to the sale of 19.9% equity investment in Suzuki back to Suzuki, generating the company €1.6 billion of income in the financial result items – Figure 36.

Figure 36: Sales of Suzuki Shares (million Euros)

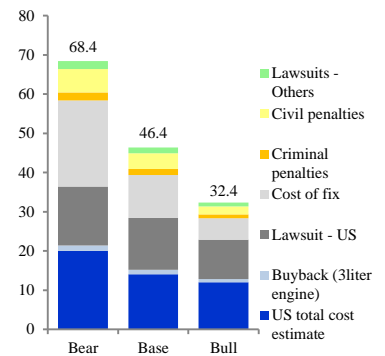


Source: Company data

Overall Overview

Despite the huge impact the diesel scandal had on VW and its negative impact on its financials, the figures still reveals a strong operating business and that the company is still in an excellent shape. Furthermore, its uniqueness in the industry and strong portfolio of its 12 fascinating brands managed to save the company in this difficult phase.

Figure 37: Total Estimate Cost of Emission Scandal (billion Euros)



Source: MB estimates

9. Total Estimated Cost Impact of Emission Scandal

Based on the analysis conducted, we have estimated a full impact of the emission scandal to stretch to a total of €46.4 billion. The entire cost of the diesel issue in America, cost for repairing the defected vehicles, legal suits, civil and criminal penalties have been considered to arriving at these estimated. Two other scenarios have also been assessed in which VW may sit on with a total cost implication of €32.4 billion bull case and €68.4 billion – Figure 37. The company is assumed to feel the burden of the implications in 2016, 2017, and gradually lessen in 2018 and onwards.

Assumptions for estimating the total cost of Emission Scandal

	Bear	Base	Bull
U.S estimated total cost	Unexpected additional cost to total estimated reaching to €20 billion	Cost estimated by US authorities: €14 billion	Unexpected reduction in total estimated cost reaching to €12 billion
Buyback and compensation (3 liter engine in the US)	Total vehicle = 80,000 Compensation average cost per car = €5,000 Buyback average cost per car = €13,000	Total vehicle = 80,000 Compensation average cost per car = €5,000 Buyback average cost per car = €13,000	Total vehicle = 80,000 Compensation average cost per car = €3,000 Buyback average cost per car = €8,000
Lawsuits filed by US states and investors or criminal investigations by the Justice Department	€15 billion	€13.23 billion estimated by the US Justice Department	€10 billion
Cost of fix	Average fixed cost per car is €2000	Average fixed cost per car is €1000	Average fixed cost per car is €500
Potential criminal penalties	€2 billion	€1.5 billion	€1 billion
Potential civil penalties Germany and other countries	€6 billion	€4 billion	€2 billion
Lawsuits filed by regulators and investors	€2 billion	€1.5 billion	€1 billion

Source: Credit Suisse (October 2015 Equity research report) and MB estimates

Breakdown of Potential Cost in relation to the Emission Scandal

On April 2016, VW announced that it will set aside €16.2 to cover the cost of the emission scandal and mid of 2016 numbers have been released in America as a compensation for the diesel issue where total cost was approximate to €14.1 billion – Table 12.

More than half of the total cost comes from the buyback or pay off loans for all vehicles with 2.0 liter engine that have been sold in the U.S. from 2010 to 2015. A compensation of

Table 12: Compensation and Buyback US – 2 Liter Engines Vehicles

U.S estimated total cost (€ billion)	
Buyback/ compensation	9.30
Construction of infrastructure for electric vehicles	1.80
Replacement of old buses	2.43
Other separate settlement for other US states	0.54
Total estimated cost	14.07

Source: MB estimates

Table 13: Compensation and Buyback U.S

Buyback and Compensation - U.S	
Buyback offer	
Ave. Cost (€)	4,500
Vehicle owners	500,000
Total buyback (€m)	2,250
Compensation	
Ave. Cost (€)	14,836
Vehicles	475,000
Total compensation (€m)	7,047
Total (€m)	9,297

Source: MB estimates

an average of €4,500 will be paid out to nearly 500,000 owners and about 475,000 vehicles will be offered buybacks to owner – Table 13. Additional cost of €1.8 billion were placed for the construction of infrastructure to fund electric vehicles and to develop zero-emission ride sharing across the country, and another €2.4 billion for the replacement of old buses and on air cleanup programmes on places that the defected cars have been driven.

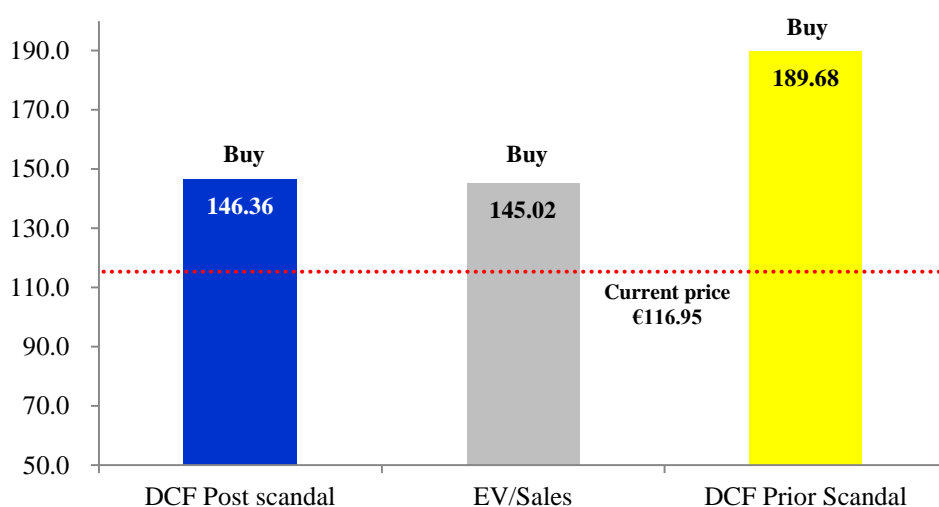
A separate settlement for the other 44 U.S states, the District of Columbia and Puerto Rico has been charged costing at least €0.54 billion. As a result, VW has agreed to pay approximately €9.3 billion to its customers and regulators. This makes the most expensive automotive industry scandal and one of the largest buyback offers in the U.S.

10. Valuation

Valuation Target Price: **€146.36** (2017YE)

Recommendation: **Buy**

Summary Valuation – Target Prices



Source: MB estimates

DCF Valuation Approach: Free Cash Flow to the Firm

Using a discounted cash flow (DCF) valuation method, a target price of €146.36 in 2017YE was reached with an upside potential of 25.1% from its closing price of €116.95 on September 30, 2016 – Table 14. This valuation approach determines the value of a security and cash flows available for distribution to shareholders. Using WACC to discount the FCFF this determined the value of the firm minus the market value of its debt.

Valuation without the emission scandal was also conducted and arrived at a price target of €189.68 (2017YE) representing an upside potential of 62.2% from its closing price of €116.95 on September 30, 2016 and will remain a Buy recommendation – Figure 38.

Although the company distributes dividend annually and follows its dividend policy, a dividend discount model methodology was not used to value it since dividend distribution in 2015 was varied significantly due to the diesel scandal and will still be affected for a few more years until the effect diesel issue fades.

A two-stage FCFF model was used to forecast the company for a period 5 years and a growth rate in the terminal value was assumed. The model was influenced by the following factors:

Sales Revenue

As it is complex to forecast the production vehicles for all 12 brand company's, as well as to allocate an appropriate pricing due to the different class and types of the vehicles, a top down approach was used to forecast the sales of each business segment. Sales forecast was

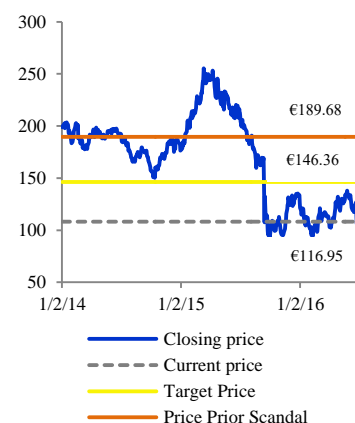
Table 14: DCF Price Target

Price Target	Euro
Terminal value (m)	118,465
PV of terminal value (m)	98,926
NPV of FCFF (m)	24,069
Enterprise value (m)	122,995
Net debt (m)	31,282
Value of equity (m)	91,713
No. of shares outstanding (mn)	501
Equity value per share	183
Large cap discount (%)	20%
Price at the end of 2017	146.36

Note: m = million

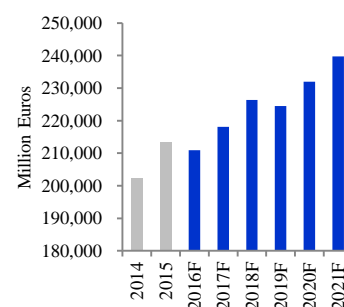
Source: MB analysis and estimates

Figure 38: Target Price With and Without Scandal



Source: Thomson Reuters and MB analysis

Figure 39: Sales Revenue



Source: Thomson Reuters and MB analysis

based on the growth of each segment – Figure 39. However since the scandal, the first two years of sales growth of the company will be lower compared to the industry growth. The following years after that, projected sales will move along the industry growth for the remaining projected years. The Chinese JV was account using an equity method.

Capex and Depreciation & Amortization

Capex of €12.7 billion in 2015 was recognized in 2015 and is projected to grow at an average of 7% annually. A forecast of 8.7% was assumed for the depreciation rate for intangible assets, property, plant and equipment, and investment property. These will be investments attributed for the production facilities and new models, ecological focus on model range, the growing use of electric drives and modular toolkits.

WACC

	Assumption	Description
Risk-free rate (RFR)	0.83%	Germany Bund 30 Year Yield - Source Bloomberg May 13 2016
Country risk premium (CRP) - Germany	0.00%	Aswath Damodaran's calculations as in February 11 2016.
Market risk premium (MRP)	6.25%	Aswath Damodaran's calculations as in February 11 2016.
Beta	1.2	The beta is computed using daily data and through a linear regression between the DAX Index and VW's stock resulting in a beta of 1.2.
Cost of debt	4.38%	Aswath Damodaran's calculations as in January 2016 in Europe for the Auto and trucks and auto part industry
Terminal growth rate	1.0%	Based on the forecasted GDP growth rate for Germany. Source: Trading Economics
Corporate marginal tax rate	25%	Refer to Appendix F: Forecasting Assumptions
Capital structure		The terminal value of 30% equity and 70% debt is considered.

The WACC method was used to calculate the cost of equity or required rate of return of a security. WACC is the weighted average of the after (corporate) tax required rates of return for debt and equity and uses the weights of debt and equity of the company's target capital structure. A risk-free rate (RFR) of 0.83% was assumed based on a 30 year yield German Bund. As Germany is a mature equity market, country risk premium is assumed at 0% and a market risk premium of 6.25%. Levered beta of 1.2 was assumed using daily data and a linear regression between the DAX Index and VW's stock. The cost of debt is fixed at 3.29% and a tax margin of 25% was used. The company is highly leveraged with a debt ratio of 75.3% in 2016 and is assumed to gradually decrease and reach to 70% in 2021.

The capital structure at the terminal period was used to calculate WACC and WACC is time variant towards optimal capital structure. However, due to the uncertainty in the long run in the automotive sector, a 3.7% premium (based on the forward multiple EV/EBITDA) has been added further in the terminal discount rate totaling a perpetuity WACC rate of 8.5% - Table 15.

Terminal Growth Rate Assumptions

Due to the ambiguous automobile sector, a perpetuity growth rate used was based on the GDP growth rate of Germany and is projected to trend around 1% in 2020.

Dividend Policy

The company's dividend strategy matches their finance strategy. The proposed dividend amount reflects the financial management objectives that are to ensure a solid financial foundation as part of the implementation of their strategy. Total dividend amounted to €0.17 billion in 2015 (2014: €2.3 billion) and are distributed to VW shareholders. The company aims to reach a dividend distribution ratio of 30% in the medium term.

Selection of Peers

A three-step method was used to select the most appropriate peers. Companies were screened if both Automotive and Finance division are present, then a further screening of companies having revenue of more than €100 million and finally a profitability comparison was conducted. The ratios considered are ROE, ROA and ROIC. The final peer selections are Daimler, Ford, General Motors, Hyundai and Toyota. – Table 16.

Table 15: WACC Assumptions

COST OF EQUITY	
RFR (risk free rate)	0.8%
CRP (country risk premium)	0.0%
MRP (market risk premium)	6.3%
Beta levered	1.20
Cost of equity [Rf + β(Rm-Rf) + CRP]	8.3%
COST OF DEBT	
Cost of debt	4.4%
Marginal tax rate	25.0%
After-tax cost of debt	3.3%
WACC	
Weight of equity	29.9%
Weight of debt	70.1%
WACC	8.5%

Source: MB analysis and estimates

Table 16: Peer Analysis

	ROE	ROA	ROIC	Peers Checking
Daimler	★	★	★	★
Ford	★	★	★	★
GM	★	★	★	★
Hyundai	★	★	★	★
Toyota	★	★	★	★

Note: ★ = peer; ★ = not peer

Source: Thomson Reuters and MB analysis

Relative Valuation Approach (Multiple Valuations)

Choosing an appropriate multiple valuation aims to solidify and complement the results achieved in the DCF model. The forward multiple EV/SALES realized a target price of €145.02 representing a considerable upside potential of 24.0% from its closing price €116.95 – Table 17. This multiple also indicates a Buy recommendation – Table 18.

The Price to Earnings (P/E) and EV/EBITDA multiples were not used to calculate VW stock value as it would give a distorted value as effect of the diesel issue would have a huge negative impact on the company's earning.

Risks to Price Target

A sensitivity analysis has been conducted to assess the investment risks and its influence on the target price of VW. The main factor tested was the WACC and terminal growth which showed the impact on the target price of VW for every small jump in the variables.

		Changes in terminal growth						
		0.1%	0.4%	0.7%	1.0%	1.2%	1.4%	1.6%
Changes in WACC	146.36							
	7.7%	142.88	149.75	157.20	165.33	171.17	177.38	184.00
	8.0%	136.99	143.35	150.23	157.71	163.06	168.74	174.78
	8.3%	131.53	137.44	143.81	150.71	155.64	160.85	166.38
	8.5%	128.11	133.74	139.81	146.36	151.03	155.97	161.19
	9.5%	113.19	117.70	122.53	127.70	131.35	135.19	139.22
	10.5%	101.15	104.86	108.79	112.98	115.92	118.99	122.20
	11.5%	91.23	94.33	97.61	101.07	103.50	106.02	108.64
	13.0%	79.24	81.69	84.26	86.95	88.82	90.76	92.77

Monte Carlo Simulation

To complement the sensitivity analysis performed above, a Monte Carlo Simulation was performed. The forecasted sales of VW, cost related to the scandal, WACC and terminal growth were the main variables chosen in which the target price may be more susceptible. Results showed a mean price target of €160.46 which gave the same recommendation as the DCF target price of €146.36 to a Buy. – Figure 40.

Table 17: Forward Multiple

EV/S SALES	
VW	0.5
Daimler	0.4
Ford	0.4
GM	0.5
Hyundai	0.7
Toyota	0.8
Average	0.56

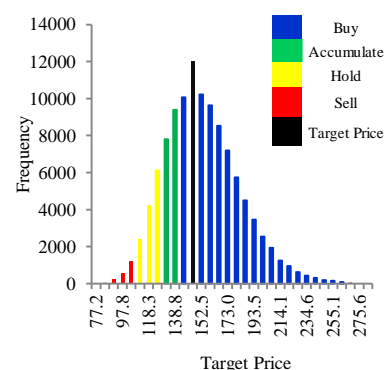
Source: Thomson Reuters and MB analysis

Table 18: EV/SALES – Price Target

Comparable Price Target - EV/SALES	
2017YE	
VW Sales Revenue (€m)	218,127
Average PEERS EV/SALES	0.56
VW EV by PEERS estimate (€m)	122,151
VW Net Debt (€m)	31,282
VW Equity by PEER estimate (€m)	90,869
Shares outstanding (m)	501
Large Cap Discount	20%
Target Price	145.02
Upside	24.0%
Recommendation	Buy

Source: MB estimates and analysis

Figure 40: Monte Carlo Simulation



Source: MB estimates and analysis

Appendix A: Definitions

Aftermarket	The market for spare parts, accessories, and components, especially for motor vehicles.
Commercial vehicles	Light commercial vehicles, heavy trucks, coaches and buses.
Deliveries to customers	Refers to handovers of new vehicles to end customers.
Light commercial vehicles	Vehicles containing more than four wheels for the purpose of carrying goods.
Light vehicles	Passenger cars and light commercial vehicles.
High risk investment	Based on the analysis done, VW is identified to be a high risk investment. This is risk assessment is mainly centered on the intense competition domestically and internationally. Furthermore, the company's recent emission scandal and still ongoing investigation has had the company standing on the edge.
MB Analysis and Estimates	Analysis and estimates conducted by master student, Mary Anne Bolos (MB).
Passenger cars	Motor vehicles with at least four wheels that are used to transport passengers, and comprises of no more than eight seats besides the driver's seat.
Unit Sales	Refers to models sold by VW brand companies.

Analyst Ratings based on Jefferies & Company

Buy	The total forecasted return is expected to appreciate by 20% or more, over the next 12 months. This recommendation refers to buying the security due to the risk of an increase in price.
Add/ Accumulate	The total forecasted return is expected to appreciate by 10-20%, over the next 12 months. This infers that the stock signifies good value but there may be better days to purchase the stock.
Hold/ Neutral	The total forecasted return is expected to change plus or minus 10%, over the next 12 months. This infers that the company is expected to perform in tandem with the market or its competitors thus a recommendation to neither buy nor sell the security is suggested.
Sell	The total forecasted return is expected to decline by more than 10%, over the next 12 months. This recommendation refers to selling the security due to the risk of a decrease in price.

Appendix B: Balance Sheet Statement

B-1: Projected Balance Sheet Statement

<i>in million Euros</i>	2014	2015	2016F	2017F	2018F	2019F	2020F	2021F
NONCURRENT ASSETS								
Intangible assets	59,935	61,147	61,441	62,325	63,347	64,475	65,713	67,027
Property, plant and equipment	46,169	50,171	54,370	58,920	63,851	69,194	74,985	81,260
Lease assets	27,585	33,173	39,893	47,974	57,693	69,380	83,434	100,336
Investment property	485	504	506	514	522	531	542	552
Equity-accounted investments	9,874	10,904	10,956	11,114	11,296	11,497	11,718	11,953
Other equity investments	3,683	974	979	993	1,009	1,027	1,047	1,068
Financial services receivables	57,877	63,185	58,206	60,206	62,489	61,968	64,034	66,162
Other financial assets	6,498	6,730	6,582	6,808	7,066	7,007	7,241	7,482
Other receivables	1,654	1,340	1,431	1,480	1,536	1,523	1,574	1,626
Tax receivables	468	395	448	448	448	448	448	448
Deferred tax assets	5,878	8,026	7,835	7,835	7,835	7,835	7,835	7,835
Total noncurrent assets	220,106	236,548	242,646	258,617	277,093	294,886	318,570	345,748
CURRENT ASSETS								
Inventories	31,466	35,048	31,104	32,422	33,516	33,146	34,046	34,803
Trade receivables	11,472	11,132	11,412	11,788	12,265	12,175	12,507	12,967
Financial services receivables	44,398	46,888	43,193	44,677	46,372	45,985	47,518	49,097
Other financial assets	7,693	10,043	9,822	10,160	10,545	10,457	10,806	11,165
Other receivables	5,080	5,367	5,730	5,927	6,151	6,100	6,304	6,513
Tax receivables	1,010	1,029	1,168	1,168	1,168	1,168	1,168	1,168
Marketable securities	10,861	15,007	10,302	10,656	11,060	10,968	11,333	11,710
Cash, cash equivalents and time deposits	19,123	20,871	32,891	33,471	31,938	29,926	24,193	16,128
Total current assets	131,102	145,387	145,621	150,269	153,015	149,925	147,874	143,551
Total assets	351,209	381,935	388,267	408,886	430,107	444,811	466,445	489,299
EQUITY								
Subscribed capital	1,218	1,283	1,283	1,283	1,283	1,283	1,283	1,283
Capital reserves	14,616	14,551	14,551	14,551	14,551	14,551	14,551	14,551
Retained earnings	71,197	69,039	71,675	76,669	85,826	96,210	107,334	119,203
Other reserves	(2,081)	(4,374)	-	-	-	-	-	-
Equity attr. to VW AG HCI*	5,041	7,560	7,560	7,560	7,560	7,560	7,560	7,560
Equity attr. to VW AG shareholders and (HCI)	89,991	88,060	95,069	100,063	109,220	119,604	130,728	142,597
Noncontrolling interests	198	210	220	230	240	250	260	270
Total Equity	90,189	88,270	95,289	100,293	109,460	119,854	130,988	142,867
NONCURRENT LIABILITIES								
Financial liabilities	68,416	73,292	67,062	69,367	71,997	71,397	73,777	76,229
Other financial liabilities	3,954	5,901	5,901	5,901	5,901	5,901	5,901	5,901
Other liabilities	4,238	4,905	4,929	5,000	5,082	5,172	5,271	5,377
Deferred tax liabilities	4,774	4,433	4,745	4,813	4,892	4,979	5,075	5,177
Provisions for pensions	29,806	27,535	27,667	28,066	28,526	29,034	29,591	30,183
Provisions for taxes	3,215	3,940	3,165	3,210	3,263	3,321	3,385	3,452
Other provisions	15,910	25,170	31,463	36,182	38,715	41,037	43,089	45,244
Total noncurrent liabilities	130,314	145,175	144,931	152,538	158,375	160,841	166,089	171,562
CURRENT LIABILITIES								
Put options and compensation rights	3,703	3,933	3,933	3,933	3,933	3,933	3,933	3,933
Financial liabilities	65,564	72,313	66,166	68,440	71,036	70,443	72,792	75,211
Trade payables	19,530	20,460	19,139	19,805	20,561	20,320	20,793	21,323
Tax payables	256	330	322	326	332	338	344	351
Other financial liabilities	7,643	10,350	10,350	10,350	10,350	10,350	10,350	10,350
Other liabilities	14,143	14,014	14,081	14,284	14,518	14,777	15,060	15,362
Provisions for taxes	2,791	1,301	1,821	1,847	1,877	1,911	1,947	1,986
Other provisions	17,075	25,788	32,235	37,070	39,665	42,045	44,147	46,355
Total current liabilities	130,706	148,489	148,047	156,055	162,272	164,116	169,367	174,870
Total equity and liabilities	351,209	381,935	388,267	408,886	430,107	444,811	466,445	489,299

*hybrid capital investors

Source: Company data and MB estimates

B-2: Common-Size – Projected Balance Sheet Statement

	2014	2015	2016F	2017F	2018F	2019F	2020F	2021F
NONCURRENT ASSETS								
Intangible assets	17.1%	16.0%	15.8%	15.2%	14.7%	14.5%	14.1%	13.7%
Property, plant and equipment	13.1%	13.1%	14.0%	14.4%	14.8%	15.6%	16.1%	16.6%
Lease assets	7.9%	8.7%	10.3%	11.7%	13.4%	15.6%	17.9%	20.5%
Investment property	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%
Equity-accounted investments	2.8%	2.9%	2.8%	2.7%	2.6%	2.6%	2.5%	2.4%
Other equity investments	1.0%	0.3%	0.3%	0.2%	0.2%	0.2%	0.2%	0.2%
Financial services receivables	16.5%	16.5%	15.0%	14.7%	14.5%	13.9%	13.7%	13.5%
Other financial assets	1.9%	1.8%	1.7%	1.7%	1.6%	1.6%	1.6%	1.5%
Other receivables	0.5%	0.4%	0.4%	0.4%	0.4%	0.3%	0.3%	0.3%
Tax receivables	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%
Deferred tax assets	1.7%	2.1%	2.0%	1.9%	1.8%	1.8%	1.7%	1.6%
Total noncurrent assets	62.7%	61.9%	62.5%	63.2%	64.4%	66.3%	68.3%	70.7%
CURRENT ASSETS								
Inventories	9.0%	9.2%	8.0%	7.9%	7.8%	7.5%	7.3%	7.1%
Trade receivables	3.3%	2.9%	2.9%	2.9%	2.9%	2.7%	2.7%	2.7%
Financial services receivables	12.6%	12.3%	11.1%	10.9%	10.8%	10.3%	10.2%	10.0%
Other financial assets	2.2%	2.6%	2.5%	2.5%	2.5%	2.4%	2.3%	2.3%
Other receivables	1.4%	1.4%	1.5%	1.4%	1.4%	1.4%	1.4%	1.3%
Tax receivables	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.2%
Marketable securities	3.1%	3.9%	2.7%	2.6%	2.6%	2.5%	2.4%	2.4%
Cash, cash equivalents and time deposits	5.4%	5.5%	8.5%	8.2%	7.4%	6.7%	5.2%	3.3%
Total current assets	37.3%	38.1%	37.5%	36.8%	35.6%	33.7%	31.7%	29.3%
Total assets	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
EQUITY								
Subscribed capital	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%
Capital reserves	4.2%	3.8%	3.7%	3.6%	3.4%	3.3%	3.1%	3.0%
Retained earnings	20.3%	18.1%	18.5%	18.8%	20.0%	21.6%	23.0%	24.4%
Other reserves	-0.6%	-1.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Equity attr. to VW AG HCI*	1.4%	2.0%	1.9%	1.8%	1.8%	1.7%	1.6%	1.5%
Equity attr. to VW AG shareholders and (HCI)	25.6%	23.1%	24.5%	24.5%	25.4%	26.9%	28.0%	29.1%
Noncontrolling interests	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%
Total Equity	25.7%	23.1%	24.5%	24.5%	25.4%	26.9%	28.1%	29.2%
NONCURRENT LIABILITIES								
Financial liabilities	19.5%	19.2%	17.3%	17.0%	16.7%	16.1%	15.8%	15.6%
Other financial liabilities	1.1%	1.5%	1.5%	1.4%	1.4%	1.3%	1.3%	1.2%
Other liabilities	1.2%	1.3%	1.3%	1.2%	1.2%	1.2%	1.1%	1.1%
Deferred tax liabilities	1.4%	1.2%	1.2%	1.2%	1.1%	1.1%	1.1%	1.1%
Provisions for pensions	8.5%	7.2%	7.1%	6.9%	6.6%	6.5%	6.3%	6.2%
Provisions for taxes	0.9%	1.0%	0.8%	0.8%	0.8%	0.7%	0.7%	0.7%
Other provisions	4.5%	6.6%	8.1%	8.8%	9.0%	9.2%	9.2%	9.2%
Total noncurrent liabilities	37.1%	38.0%	37.3%	37.3%	36.8%	36.2%	35.6%	35.1%
CURRENT LIABILITIES								
Put options and compensation rights	1.1%	1.0%	1.0%	1.0%	0.9%	0.9%	0.8%	0.8%
Financial liabilities	18.7%	18.9%	17.0%	16.7%	16.5%	15.8%	15.6%	15.4%
Trade payables	5.6%	5.4%	4.9%	4.8%	4.8%	4.6%	4.5%	4.4%
Tax payables	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%
Other financial liabilities	2.2%	2.7%	2.7%	2.5%	2.4%	2.3%	2.2%	2.1%
Other liabilities	4.0%	3.7%	3.6%	3.5%	3.4%	3.3%	3.2%	3.1%
Provisions for taxes	0.8%	0.3%	0.5%	0.5%	0.4%	0.4%	0.4%	0.4%
Other provisions	4.9%	6.8%	8.3%	9.1%	9.2%	9.5%	9.5%	9.5%
Total current liabilities	37.2%	38.9%	38.1%	38.2%	37.7%	36.9%	36.3%	35.7%
Total equity and liabilities	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

*hybrid capital investors

Source: Company data and MB estimates

Appendix C: Income Statement

C-1: Projected Income Statement

<i>in million Euros</i>	2014	2015	2016F	2017F	2018F	2019F	2020F	2021F
Sales revenue	202,458	213,292	210,881	218,127	226,400	224,512	231,997	239,706
Cost of sales	(165,934)	(179,382)	(173,847)	(179,821)	(185,509)	(182,839)	(187,774)	(192,816)
Gross profit	36,524	33,911	37,034	38,307	40,891	41,673	44,222	46,890
Distribution expenses	(20,292)	(23,515)	(23,249)	(23,994)	(23,413)	(23,218)	(23,992)	(24,789)
Administrative expenses	(6,841)	(7,197)	(7,170)	(7,416)	(7,349)	(7,288)	(7,531)	(7,781)
Other operating income	10,298	12,905	11,701	12,103	12,562	12,457	12,872	13,300
Other operating expenses	(6,992)	(20,171)	(17,385)	(14,386)	(11,131)	(9,142)	(9,389)	(9,641)
EBIT	12,697	(4,069)	931	4,613	11,560	14,482	16,183	17,979
Financial result	2,097	2,767	2,767	2,767	2,767	2,767	2,767	2,767
Profit before tax	14,794	(1,301)	3,698	7,380	14,327	17,249	18,950	20,746
Income tax income/expense	(3,726)	(59)	(924)	(1,845)	(3,582)	(4,312)	(4,738)	(5,187)
Profit after tax	11,068	(1,361)	2,773	5,535	10,746	12,937	14,213	15,560
Noncontrolling interests	84	10	10	10	10	10	10	10
Volkswagen AG hybrid capital investors	138	212	212	212	212	212	212	212
Volkswagen AG shareholders	10,847	(1,582)	2,551	5,313	10,524	12,715	13,991	15,338
Profit after tax	11,068	(1,361)	2,773	5,535	10,746	12,937	14,213	15,560

Source: Company data and MB estimates

C-2: Common-Size – Projected Income Statement

	2014	2015	2016F	2017F	2018F	2019F	2020F	2021F
Sales revenue	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Cost of sales	82.0%	84.1%	82.4%	82.4%	81.9%	81.4%	80.9%	80.4%
Gross profit	18.0%	15.9%	17.6%	17.6%	18.1%	18.6%	19.1%	19.6%
Distribution expenses	10.0%	11.0%	11.0%	11.0%	10.3%	10.3%	10.3%	10.3%
Administrative expenses	3.4%	3.4%	3.4%	3.4%	3.2%	3.2%	3.2%	3.2%
Other operating income	5.1%	6.1%	5.5%	5.5%	5.5%	5.5%	5.5%	5.5%
Other operating expenses	3.5%	9.5%	8.2%	6.6%	4.9%	4.1%	4.0%	4.0%
EBIT	6.3%	-1.9%	0.4%	2.1%	5.1%	6.5%	7.0%	7.5%
Financial result	1.0%	1.3%	1.3%	1.3%	1.2%	1.2%	1.2%	1.2%
Profit before tax	7.3%	-0.6%	1.8%	3.4%	6.3%	7.7%	8.2%	8.7%
Income tax income/expense	1.8%	0.0%	0.4%	0.8%	1.6%	1.9%	2.0%	2.2%
Profit after tax	5.5%	-0.6%	1.3%	2.5%	4.7%	5.8%	6.1%	6.5%
Noncontrolling interests	0.041%	0.005%	0.005%	0.005%	0.004%	0.004%	0.004%	0.004%
Volkswagen AG hybrid capital investors	0.068%	0.099%	0.101%	0.097%	0.094%	0.094%	0.091%	0.088%
Volkswagen AG shareholders	5.36%	-0.74%	1.21%	2.44%	4.65%	5.66%	6.03%	6.40%
Profit after tax	5.5%	-0.6%	1.3%	2.5%	4.7%	5.8%	6.1%	6.5%

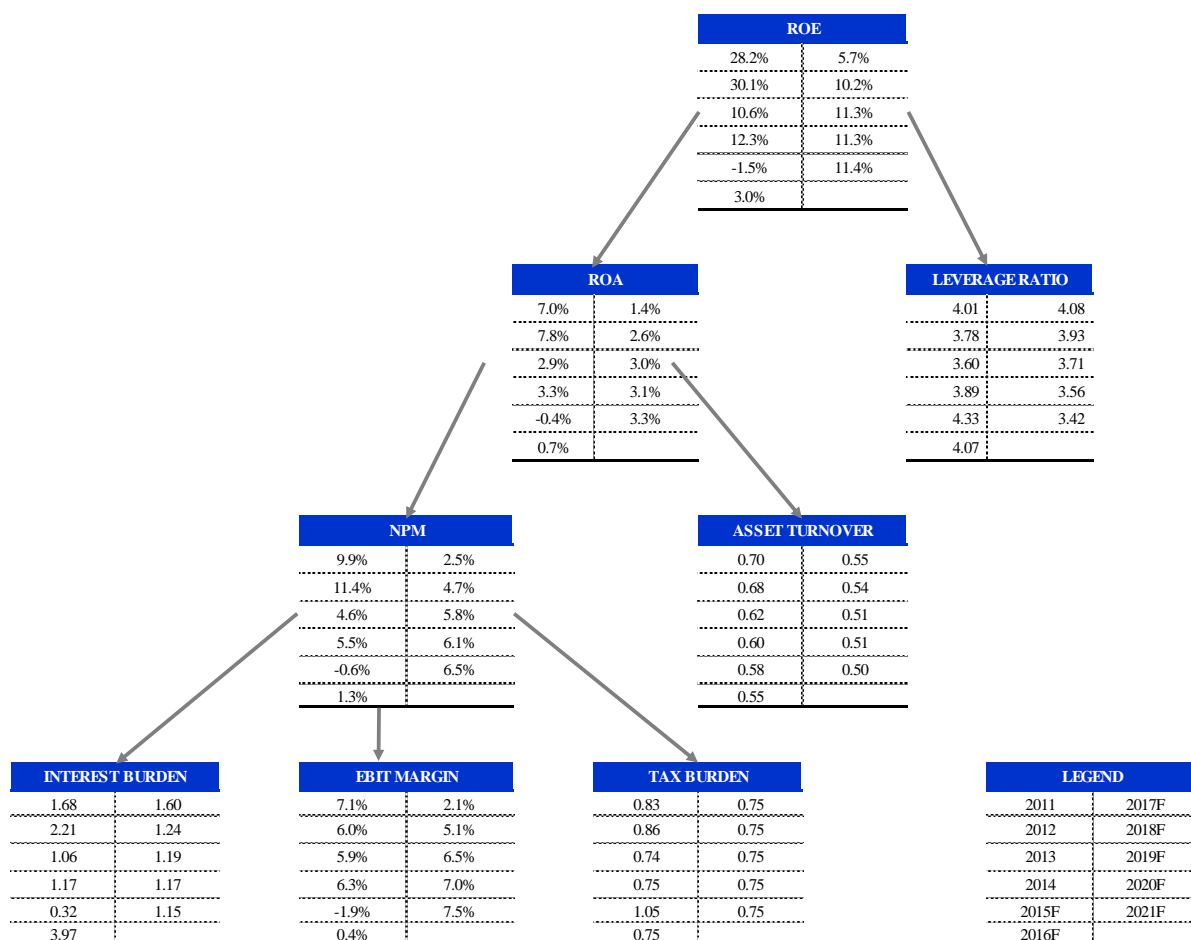
Source: Company data and MB estimates

Appendix D: Projected Cash Flow Statement

<i>in million Euros</i>	2016F	2017F	2018F	2019F	2020F	2021F
CF FROM OPERATING ACTIVITIES						
Net Income	2,773	5,535	10,746	12,937	14,213	15,560
Add: Depreciation and amort. and impairment losses	10,107	10,580	11,098	11,661	12,272	12,933
Change in WC	11,041	(3,168)	(3,252)	1,134	(2,883)	(2,864)
Other provisions	12,740	9,555	5,128	4,703	4,154	4,362
Deferred tax	503	68	79	87	96	102
Cash flows from operating activities	37,164	22,569	23,797	30,522	27,852	30,092
CF FROM INVESTING ACTIVITIES						
CAPEX	(14,601)	(16,022)	(17,059)	(18,141)	(19,311)	(20,533)
Other all other non-current assets	(1,794)	(10,528)	(12,515)	(11,313)	(16,645)	(19,578)
Cash flows from investing activities	(16,395)	(26,550)	(29,574)	(29,454)	(35,956)	(40,111)
CF FROM FINANCING ACTIVITIES						
Equity and reserves	4,374	-	-	-	-	-
Dividends paid	(128)	(531)	(1,579)	(2,543)	(3,078)	(3,681)
Financial loans	(12,376)	4,578	5,227	(1,193)	4,729	4,871
Others	(620)	515	595	656	721	765
Cash flows from financing activities	(8,750)	4,561	4,243	(3,080)	2,371	1,955
Cash and cash equivalents at beginning of period	20,871	32,891	33,471	31,938	29,926	24,193
Net change in cash and cash equivalents	12,020	581	(1,533)	(2,012)	(5,733)	(8,064)
Cash and cash equivalents at end of period	32,891	33,471	31,938	29,926	24,193	16,128

Source: Company data and MB estimates

Appendix E: Du Pont Analysis



Source: MB estimates

Appendix F: Forecasting Assumptions

Items	2016F	2017F	2018F	2019F	2020F	2021F	Description
GENERAL							
Inflation rate	0.5%	1.4%	1.6%	1.8%	1.9%	2.0%	Based on IMF World Economic Outlook (WEO), April 2016
INCOME STATEMENT							
Sales Overview	Using a top down approach, sales revenue is projected based on the forecasted growth of the market segment. Price times volume was not used to calculate this item due to lack of information, the complexity of allocating the most appropriate pricing since each company brand have wide range of vehicles, type, class and other source of revenue such as after sales service, spare parts etc. Therefore to forecast the sales, a breakdown on segment was done.						
Passenger cars segment	-1.7%	3.1%	3.4%	-0.8%	3.0%	3.0%	This includes the development of vehicles and engines, the production and sales of passenger cars, and the genuine parts business. This includes VW Group's individual car brands as well as Ducati's motorcycle brand. In 2016, the company's outlook is not optimistic and expects this to decrease compare to prior year. Thus, this is projected decrease in 2016, then grow in tandem with VW best sales forecasted growth rate from 2017 and onwards (source: Bloomberg).
Commercial vehicles segment	1.0%	3.1%	3.4%	-0.8%	3.0%	3.0%	This includes the development, production and sale of light commercial vehicles, trucks and buses from the VW Commercial Vehicles, Scania and MAN brands, the corresponding genuine parts business and related services. In 2016, the company expects this item to remain unchanged from prior-year. Thus, 2016 is project at a similar level to prior year, then grow in tandem with VW best sales forecasted growth rate from 2017 and onwards (source: Bloomberg).
Power engineering segment	-1.7%	3.1%	3.4%	-0.8%	3.0%	3.0%	This includes the large-bore diesel engines, turbomachinery, special gear units, propulsion components and testing systems businesses. In 2016, the company expects the sales revenue for this segment to be lower compare to prior year. Thus, this is projected decrease in 2016, then grow in tandem with VW best sales forecasted growth rate from 2017 and onwards (source: Bloomberg).
Financial services segment	1.0%	3.1%	3.4%	-0.8%	3.0%	3.0%	This includes dealer and customer financing, leasing, banking and insurance activities, fleet management and mobility offerings. In 2016, the company expects this item to be at a similar level as the prior-year figure. Thus, 2016 is project at a similar level to prior year, then grow in tandem with VW best sales forecasted growth rate from 2017 and onwards (source: Bloomberg).
Cost of Good Sold (COGS)	82.4%	82.4%	81.9%	81.4%	80.9%	80.4%	COGS include interest expense attributable to the financial service business, impairment losses on intangible assets, PPE, lease assets and government grants. Breakdown on COGS was not done due to lack of information provided. This item is projected based on a 5 year historical average as a percentage of sales and to gradually decrease throughout the forecasted year as the company aims improve its cost efficiency and to achieve economies of scale as volume production increases.
Distribution expenses	11.0%	11.0%	10.3%	10.3%	10.3%	10.3%	This item includes nonstaff overheads and personnel cost, depreciation and amortization as well as cost of shipping, advertising and sales promotion to the distribution function. Projected based on a 5 year historical average as a percentage of sales. However, 2016 and 2017 is projected to be higher due to the effect of the diesel issue.

Items	2016F	2017F	2018F	2019F	2020F	2021F	Description
INCOME STATEMENT (CONT'D)							
Administrative expenses	3.4%	3.4%	3.2%	3.2%	3.2%	3.2%	This item includes nonstaff overheads and personnel costs, depreciation and amortization as well as the cost of shipping, advertising and sales promotion to the administrative function. Projected based on a 5 year historical average as a percentage of sales. However, 2016 and 2017 is projected to be higher due to the effect of the diesel issue.
Other operating income	5.5%	5.5%	5.5%	5.5%	5.5%	5.5%	This item includes income from reversal of valuation allowances on receivables and other assets, reversal of provisions and accruals, foreign currency hedging derivatives, FOREX gains, sale of promotional material, cost allocations, investment property, gains on assets disposals and the reversal of impairment losses and miscellaneous. Projected based on a 5 year historical average as a percentage of sales.
Other operating expenses	10.0%	8.0%	6.0%	5.0%	5.0%	5.0%	This item includes income from valuation allowances on receivables and other assets, foreign currency hedging derivatives, FOREX losses, expenses from cost allocations, expenses from termination agreements, losses on disposal of noncurrent assets and miscellaneous. Projected as a percentage of COGS. In 2015 the emission scandal recognize special items and this expenses tripled its cost compared to previous years. In 2016 and 2017, the company is expected to still recognized cost from the scandal and to gradually lessen as the effect of the scandal wears off.
Income tax income/expense	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	The company uses 29.8% as a corporate tax rate (15% for the statutory corporation tax in Germany plus 14.8% for trade tax and solidarity surcharge). However, since the company reconciles the effect of the different tax rate outside of Germany, the tax recorded is lower. Thus, tax rate is assumed to be similar as the rate in 2014 at 25%.
Financial result	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	These are shares of profits and losses from joint ventures and associates, finance cost and other financial results. Projected to be equal to 2015 nominal value
Noncontrolling interests	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	Projected to be equal to 2015 nominal value
Volkswagen AG hybrid capital investors	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	Projected to be equal to 2015 nominal value
BALANCE SHEET							
<i>Assets</i>							
Intangible assets	0.5%	1.4%	1.6%	1.8%	1.9%	2.0%	This comprises of brand names, goodwill, capitalized development cost for products under development and for products currently in used, and other intangible assets. Projected to be equal to 2015 nominal value and adjusted for inflation.
Property, plant and equipment	8.4%	8.4%	8.4%	8.4%	8.4%	8.4%	This item comprises of land and building; technical equipment and machinery; other equipment, operating and office equipment; and payments on accounts and assets under construction. PPE grows at an average of 8.4% annually and is projected to grow at the same rate annually.
Lease assets	20.3%	20.3%	20.3%	20.3%	20.3%	20.3%	Lease assets include assets leased under the terms of operation assets and assets covered by long term buy-back agreements. Lease assets grows at an average of 20.3% annually and is projected to grow at the same rate annually.
Investment property	0.5%	1.4%	1.6%	1.8%	1.9%	2.0%	Projected based to be equal to 2015 nominal value and adjusted for inflation.
Equity-accounted investments	0.5%	1.4%	1.6%	1.8%	1.9%	2.0%	This includes JVs and associates. Projected to be equal to 2015 nominal value and adjusted for inflation.
Other equity investments	0.5%	1.4%	1.6%	1.8%	1.9%	2.0%	Projected based to be equal to 2015 nominal value and adjusted for inflation.

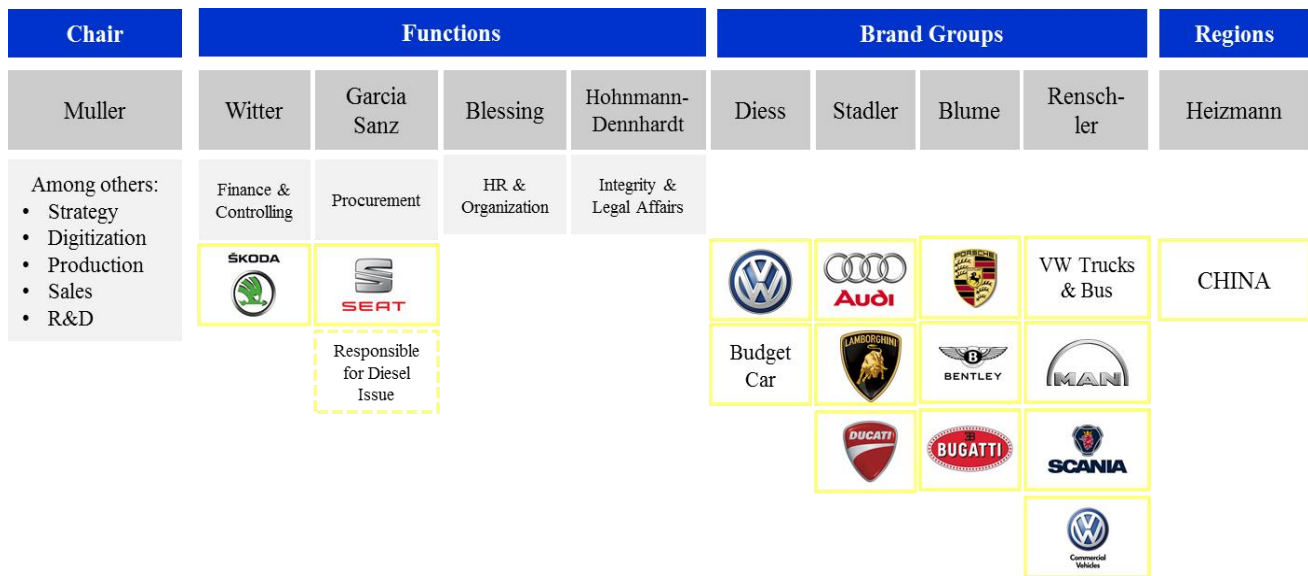
Items	2016F	2017F	2018F	2019F	2020F	2021F	Description
BALANCE SHEET (CONT'D)							
Financial services receivables	48.1%	48.1%	48.1%	48.1%	48.1%	48.1%	These are receivables from customer financing and finance leases (dealer financing and direct banking) contained in financial services receivables. Projected based on a 5 year historical average as a percentage of sales as this item varies close to sales.
Other financial assets	7.8%	7.8%	7.8%	7.8%	7.8%	7.8%	Other financial assets include receivables from related parties. Projected based on a 5 year historical average as a percentage of sales as this item varies close to sales.
Other receivables	3.4%	3.4%	3.4%	3.4%	3.4%	3.4%	These are miscellaneous receivables including assets to fund post-employment benefits. Projected based on a 5 year historical average as a percentage of sales as this item varies close to sales.
Marketable securities	4.9%	4.9%	4.9%	4.9%	4.9%	4.9%	Projected based on a 5 year historical average as a percentage of sales.
Tax assets	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	Tax assets compose of deferred tax assets and tax receivables. Since no sufficient information have been provided in the annual report notes, tax assets is projected to be equal to 2015 nominal value.
Deferred tax assets	82.9%	82.9%	82.9%	82.9%	82.9%	82.9%	Percentage of tax assets
Tax receivables	17.1%	17.1%	17.1%	17.1%	17.1%	17.1%	Percentage of tax assets
Days Sales Outstanding (DSO)	19.8	19.7	19.8	19.8	19.7	19.7	Projected based on a 5 year historical average and is used to calculate the forecasted trade receivables
Days Inventory Outstanding (DIO)	65.3	65.8	65.9	66.2	66.2	65.9	Projected based on a 5 year historical average and is used to calculate the forecasted inventory
Days payable outstanding (DPO)	40.2	40.2	40.5	40.6	40.4	40.4	Based on a 5 year historical average and is used to calculate the forecasted trade payables
Equity							
Subscribed capital	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	Projected to be equal to 2015 nominal value
Capital reserves	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	Projected to be equal to 2015 nominal value
Other reserves	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	Since Other Reserves is a negative value in 2015, it is projected to be zero throughout.
Equity attributable	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	These are equity attributable to Volkswagen AG hybrid capital investors. Projected to be equal to 2015 nominal value
Liabilities							
Provisions for pensions	0.5%	1.4%	1.6%	1.8%	1.9%	2.0%	These are provision for pension recognized for commitments in the form of retirement, invalidity and dependents' benefits payable under pension plans. Projected to be equal to 2015 nominal value and adjusted for inflation.
Other financial liabilities	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	Other financial liabilities include negative fair values of derivative financial instruments, interest payable and miscellaneous liabilities. Projected to be equal to 2015 nominal value.
Other liabilities	0.5%	1.4%	1.6%	1.8%	1.9%	2.0%	These are payments received on account of orders, liabilities relating to taxes, social security and wages and salaries. Projected to be equal to 2015 nominal value and adjusted for inflation.
Other provisions	25.0%	15.0%	7.0%	6.0%	5.0%	5.0%	These include obligations arising from sales, employee expenses, litigation and legal risks. Due to the diesel issue, provision in 2015 increase sharply (grew by 54%) and in 2016 and 2017 provision is assumed at 25% and 15%, respectively due to the anticipated cost. From 2018 and onwards, the cost impact of the diesel issue is expected to lessen and will slightly near to the average growth rate from the past 5 years.

Items	2016F	2017F	2018F	2019F	2020F	2021F	Description
BALANCE SHEET (CONT'D)							
Put options and compensation	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	These are cash settlement offered to MAN shareholders in connection with the control and profit and loss transfer agreement. Projected to be equal to 2015 nominal value.
Financial liabilities	63.2%	63.2%	63.2%	63.2%	63.2%	63.2%	These items include bonds, CP and notes, liabilities to banks, deposits business, loans and misc., bills of exchange, and finance lease liabilities. As no detailed information has been provided in the annual report, this is projected as a percentage of sales assuming that it is linked sales as the company would need to ask for more financing as it increases sales.
Tax Liabilities	0.5%	1.4%	1.6%	1.8%	1.9%	2.0%	Tax liabilities compose of deferred tax liabilities, provision of tax and tax payables. Since no sufficient information have been provided in the annual report notes, tax liability is projected to be equal to 2015 nominal value and adjusted based on inflation.
Deferred tax liabilities	47.2%	47.2%	47.2%	47.2%	47.2%	47.2%	Percentage of tax liabilities
Provision for taxes	49.6%	49.6%	49.6%	49.6%	49.6%	49.6%	Percentage of tax liabilities
Tax payables	3.2%	3.2%	3.2%	3.2%	3.2%	3.2%	Percentage of tax liabilities
CASH FLOW STATEMENT							
Depreciation and amortization - intangible assets, property, plant and equipment, and investment property	8.7%	8.7%	8.7%	8.7%	8.7%	8.7%	Since depreciation and amortization as a percentage of sales is almost the same every year, this item was projected based on the average 5 years as a percentage of sales.
Amortization of development costs	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%	Projected based on the average 5 years as a percentage of sales.
Impairment on equity investments	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	Projected based on the average 5 years as a percentage of sales.
Depr. on lease assets	18.2%	18.2%	18.2%	18.2%	18.2%	18.2%	Projected based on the average 5 years as a percentage of sales.
Dividend distribution ratio	5.0%	10.0%	15.0%	20.0%	22.0%	24.0%	Dividend distribution ratio for 2013 and 2014 was 20% and 21%, respectively. In 2015, the company still managed to distribute dividend despite the loss in earnings. Thus in 2016, the company is still expected to distribute dividend and to gradually increase as the effects of the deisel issue fades and as VW aims to achieve a distribution ratio of 30%, the projected ratio is forecasted to reach that in the future.

Source: Company data and MB estimates and analysis

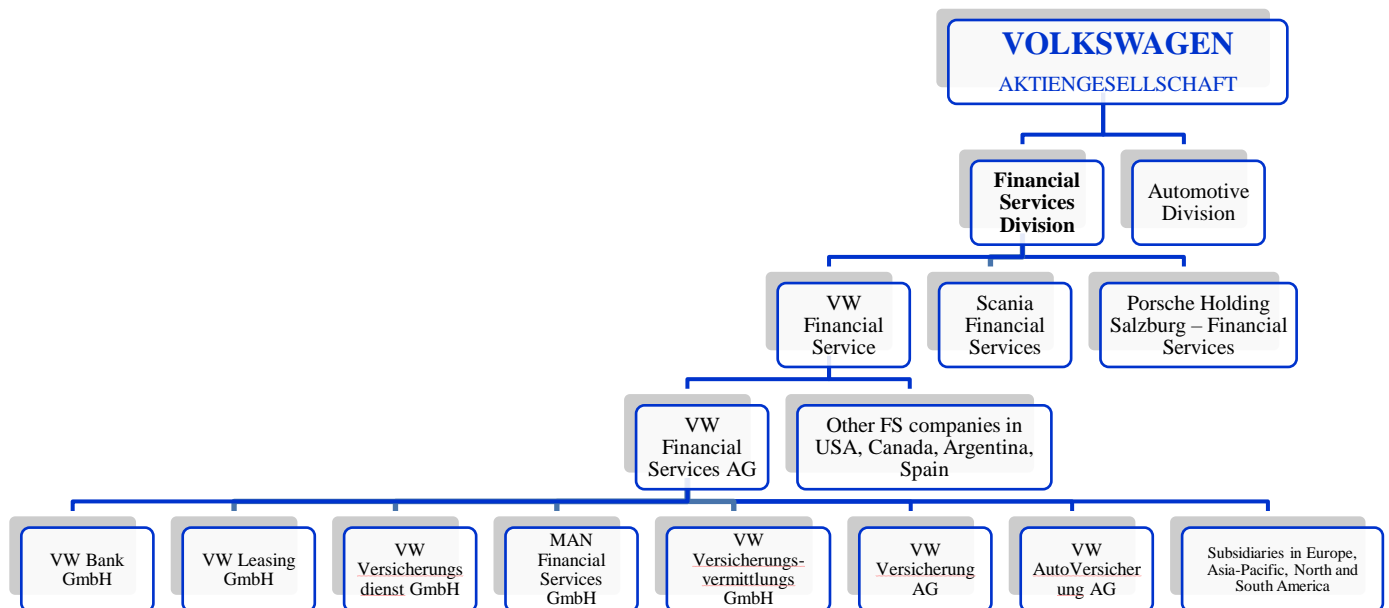
Appendix G: Corporate Structure and Strategy

G-1: Corporate and Leadership Structure



Source: Company data

G-2: Financial Service Division Structure



Source: Company data

G-3: VW's Sustainability Strategy

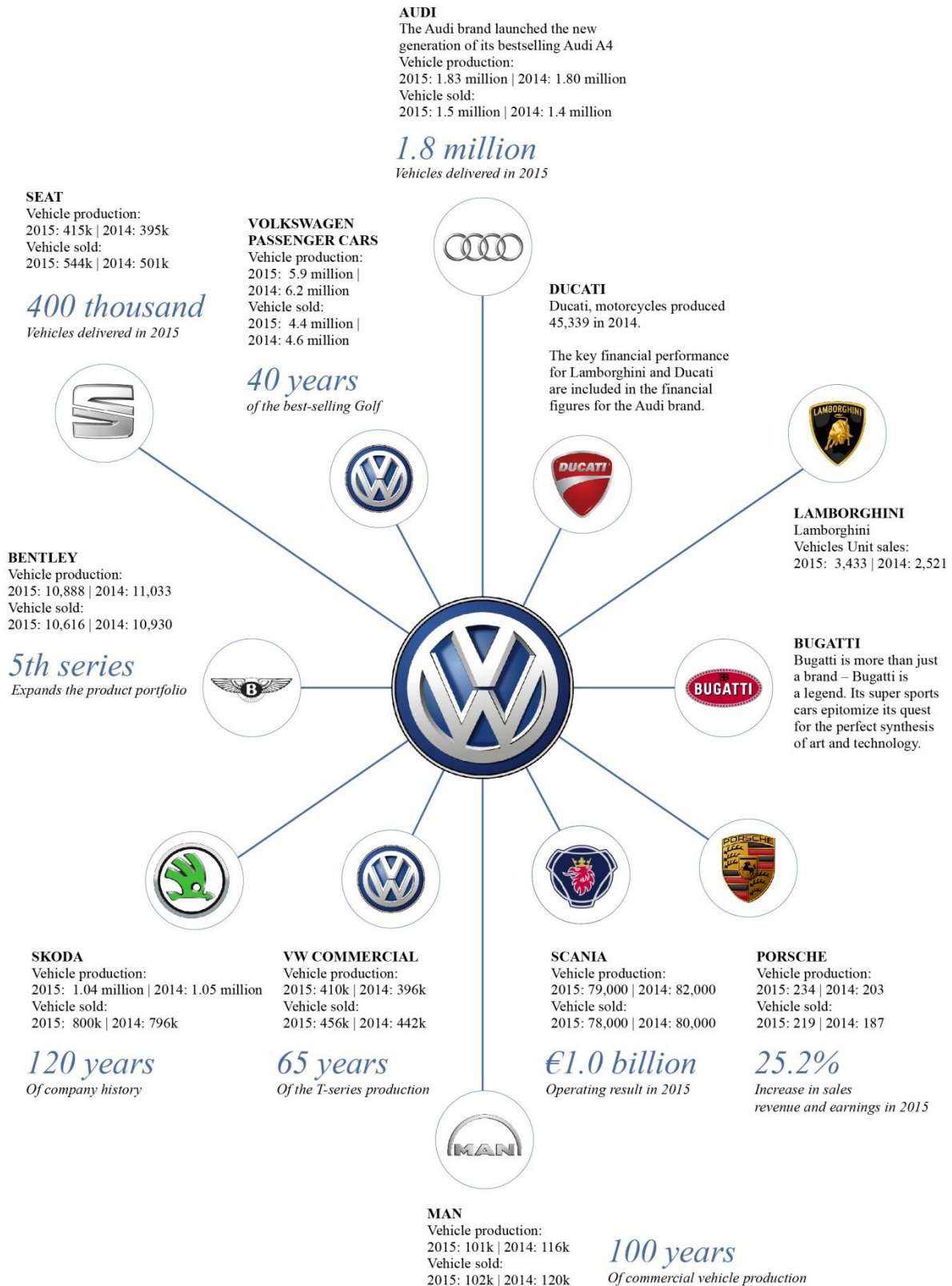
VW's sustainability strategy is line on the company's objectives and is structured based on the economy, people and environment.

ORIGIN OF THE ACTION AREAS FOR VW SUSTAINABILITY STRATEGY				
Climate change	Environmental impacts	Demographic change	Globalization	Digitization
Resource availability	Water availability	Market shifts	Increasing regulation	Economic uncertainty
Mobility	Energy systems	Road safety	Urbanization	Sustainability
Noise	Health	Social uncertainty	Biodiversity	Human rights

VW GROUP'S KEY ACTION AREAS			
Customer satisfaction	Quality	Stability and profitability	Compliance, risk management, CG
Supplier relationships	Attractiveness as an employer	Participation	Training
Corporate responsibility	Intelligent mobility and networking	Health	Environmentally friendly products/ electrification
Climate and environmental protection	Diversity and equality	Resource conservation across the lifecycle	Vehicle safety

Source: Company data

Appendix H: VW's House of Brands



Source: Company data, figure made by MB

Appendix I: Key Personnel Management

I-1: Management Board

VW AG Board of Management consists of nine members and each member is responsible for one or more functions within the VW Group.

Company Management	Members of the Board of Management of VW AG	Appointments*
Matthias Müller	<ul style="list-style-type: none"> · Chairman of the Board of Management of Volkswagen AG (since September 26, 2015) · Group Research and Development, Group Production, Sales and Marketing and Human Resources and Organization. · Member of the Executive Board of Porsche Automobil Holding SE (October 13, 2010) 	
Dr. Herbert Diess	<ul style="list-style-type: none"> · Chairman of the Board of Management of the Volkswagen Passenger Cars brand (July 1, 2015) 	<ul style="list-style-type: none"> · Infineon Technologies AG, Neubiberg
Dr. rer. pol.h.c. Francisco Javier Garcia Sanz	<ul style="list-style-type: none"> · Procurement (July 1, 2001) 	<ul style="list-style-type: none"> · Hochtief AG, Essen · Criteria CaixaHolding S.A., Barcelona
Dr. Christine Hohmann-Dennhardt	<ul style="list-style-type: none"> · Integrity and Legal Affairs (January 1, 2016) 	
Prof. Rupert Stadler	<ul style="list-style-type: none"> · Chairman of the Board of Management of Audi AG (January 1, 2010) 	<ul style="list-style-type: none"> · FC Bayern Munchen AG, Munich
Dr. Karlheinz Blessing	<ul style="list-style-type: none"> · Human Resources and Organization (January 1, 2016) 	
Prof. Dr. rer. pol. Jochem Heizmann	<ul style="list-style-type: none"> · China (January 11, 2007) 	<ul style="list-style-type: none"> · Lufthansa Technik AG, Hamburg
Andreas Renschler	<ul style="list-style-type: none"> · Commercial Vehicles (February 1, 2015) 	<ul style="list-style-type: none"> · Deutsche Messe AG, Hanover
Frank Witter	<ul style="list-style-type: none"> · Finance and Controlling (October 7, 2015) 	<ul style="list-style-type: none"> · LeasePlan Corporation N.V., Amsterdam (Chairman)

*As of December 31 2015 or the leaving date from the Board of Management of VW AG.

Source: Company data

I-2: Committees of the Supervisory Board

Members of the Executive Committee	Members of the Mediation Committee in accordance with the German Stock Corporation Act
<ul style="list-style-type: none"> • Hans Dieter Pötsch (Chairman) • Jörg Hofmann (Deputy Chairman) • Bernd Osterloh • Dr. Wolfgang Porsche • Stephan Weil • Stephan Wolf 	<ul style="list-style-type: none"> • Hans Dieter Pötsch (Chairman) • Jörg Hofmann (Deputy Chairman) • Bernd Osterloh • Stephan Weil
Members of the Audit Committee	Special Committee on Diesel Engines
<ul style="list-style-type: none"> • Dr. Ferdinand Oliver Porsche (Chairman) • Peter Mosch (Deputy Chairman) • Annika Falkengren • Babette Fröhlich 	<ul style="list-style-type: none"> • Dr. Wolfgang Porsche (Chairman) • Babette Fröhlich • Thomas Zwiebler • Olaf Lies • Bernd Osterloh • Dr. Ferdinand Oliver Porsche
Members of the Nominating Committee	
<ul style="list-style-type: none"> • Hans Dieter Pötsch (Chairman) • Dr. Wolfgang Porsche • Stephan Weil 	

Source: Company data

I-3: Supervisory Board (SB)

VW AG Supervisory Board consists of twenty members and follows to the German Co-determination Act.

Members	Dates Appointed to the SB	Members of the SB
Hans Dieter Pötsch	October 7, 2015	<ul style="list-style-type: none"> Chairman Chairman of the Executive Board and Chief Financial Officer of Porsche Automobil Holding SE (October 7, 2015)
Dr. Hussain Ali Al-Abdulla	22-Apr-10	<ul style="list-style-type: none"> Minister of State and Board Member of Qatar Investment Authority
HE Akbar Al Baker	May 5, 2015	<ul style="list-style-type: none"> Minister of State and Group Chief Executive of Qatar Airways
Annika Falkengren	3-May-11	<ul style="list-style-type: none"> President and Group Chief Executive of Skandinaviska Enskilda Banken AB
Dr. Hans-Peter Fischer	1-Jan-13	<ul style="list-style-type: none"> Chairman of the Board of Management of Volkswagen Management Association (VMA)
Uwe Fritsch	19-Apr-12	<ul style="list-style-type: none"> Chairman of the Works Council at the Volkswagen AG Braunschweig plant
Babette Fröhlich	25-Oct-07	<ul style="list-style-type: none"> IG Metall, Department head for coordination of Executive Board duties and planning
Jörg Hofmann	November 20, 2015	<ul style="list-style-type: none"> Deputy Chairman First Chairman of IG Metall
Uwe Hück	1-Jul-15	<ul style="list-style-type: none"> Chairman of the General and Group Works Council of Dr. Ing. h. c. F. Porsche AG
Johan Järvklo	22-Nov-15	<ul style="list-style-type: none"> Chairman of IF Metall at Scania AB
Dr. Louise Kiesling	30-Apr-15	<ul style="list-style-type: none"> Designer and entrepreneur
Olaf Lies	19-Feb-13	<ul style="list-style-type: none"> Minister of Economic Affairs, Labor and Transport for the Federal State of Lower Saxony
Peter Mosch	18-Jan-06	<ul style="list-style-type: none"> Chairman of the General Works Council of AUDI AG
Bernd Osterloh	1-Jan-05	<ul style="list-style-type: none"> Chairman of the General and Group Works Councils of Volkswagen AG
Dr. jur. Hans Michel Piëch	7-Aug-09	<ul style="list-style-type: none"> Lawyer in private practice
Dr. jur. Ferdinand Oliver Porsche	7-Aug-09	<ul style="list-style-type: none"> Member of the Board of Management of Familie Porsche AG Beteiligungsgesellschaft
Dr. rer. comm. Wolfgang Porsche	24-Apr-08	<ul style="list-style-type: none"> Chairman of the SB of Porsche Automobil Holding SE Chairman of the SB of Dr. Ing. h. c. F. Porsche AG
Stephan Weil	19-Feb-13	<ul style="list-style-type: none"> Minister-President of the Federal State of Lower Saxony
Stephan Wolf	1-Jan-13	<ul style="list-style-type: none"> Deputy Chairman of the General and Group Works Councils of Volkswagen AG
Thomas Zwiebler	15-May-10	<ul style="list-style-type: none"> Chairman of the Works Council of Volkswagen Commercial Vehicles

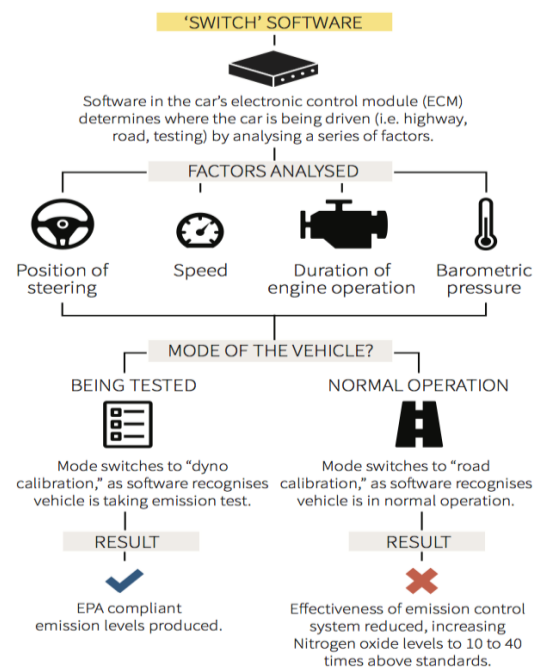
Source: Company data

Appendix J: Diesel Scandal

J-1: VW's Defeat Device Software

VW is responsible for around 11 million vehicles that have injected with the defeat device software enabling these vehicles to emit more pollution than accepted by regulators.

Among the brands infected are Volkswagen, Audi, Skoda, SEAT, and Porsche. The table below shows some of the vehicles affected but are subject to change depending on the findings of the ongoing investigations of the issue



Source: U.S. Environmental Protection Agency
J. Wang, 22/09/2015

REUTERS

J-2: Vehicles Affected by the Defeat Device

Affected Four-Cylinder Diesel Engines (in thousands)

By Brand

VW Passenger Cars	Audi	Skoda	SEAT	VW Commercial Vehicles
5642	2410	1224	695	770

By Region

EU28	USA/Canada	Rest of the World
8494	608	1639

Affected V6 TDI 3.0L Diesel Engines (in thousands)

VW Passenger Cars	Audi	Porsche
34	61	18

Source: Company data

Appendix K: SWOT ANALYSIS

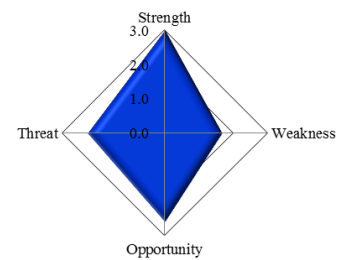
The table below shows a SWOT analysis on VW prior and posts the scandal, to better understand the company's competitive position in the market and where its strength and weaknesses are; and the threats and opportunities presented to it.

K-1: Summary SWOT Analysis

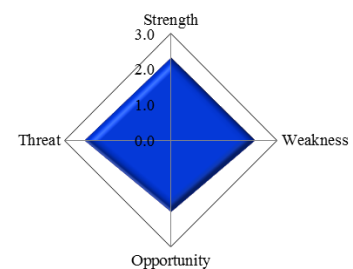
	STRENGTHS	WEAKNESS
Internal Analysis	<ul style="list-style-type: none"> • Reputation, strong brand image, performing brands, broad segment coverage • Global presence and presence in the strongest market - China • Strong financial position and stable shareholder structure • Unique innovation and strict quality orientation • Strong customer confidence • Skilled and high qualified workforce 	<ul style="list-style-type: none"> • Weak presence in the US and India • Most cars are not environmental friendly • Structure, culture and efficiency
External Analysis	OPPORTUNITY	THREATS
	<ul style="list-style-type: none"> • Change in customer preferences • New emerging markets • Decreasing fuel price • New uses for vehicles such as Uber services • Social responsibility - adapting auto vehicle to a friendly environment for the betterment of the environment 	<ul style="list-style-type: none"> • Alternative fuel vehicle • Stricter emission standard regulation • Other stronger and newer brands (e.g., Tesla) • Exchange rates • Increase in prices of raw materials

1-Low 2-Normal 3-High

Prior Scandal



Post Scandal

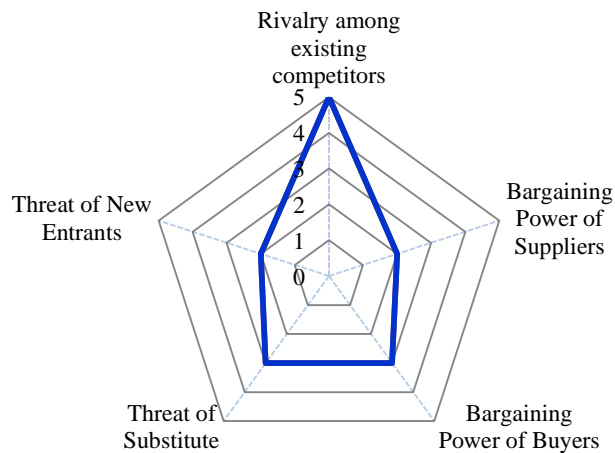
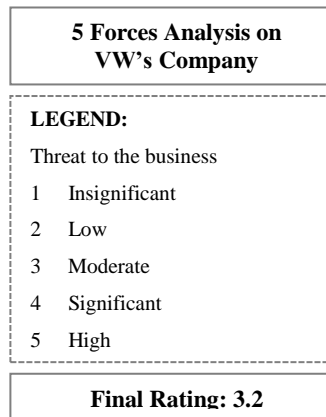


K-2: Detailed Breakdown SWOT Analysis

FACTORS CONSIDERED		RATINGS RESULT	
STRENGTHS RATING	<ul style="list-style-type: none"> Brand image: VW has 12 famous brands Strong global presence. Presence in the largest market: China Good performance of brands Has more than 500k employees to help strengthen its brands Strong financial position Strong expertise in auto manufacturing and R&D Strong ability to compete with the top 5 leading auto companies Good dealership network Strong reputation Has variety of products (passenger cars and commercial vehicles, motorcycles; sports cars, mass cars, premium cars) 	<p>1-Low 2-Normal 3-High</p> <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p>PRIOR SCANDAL</p> </div> <div style="text-align: center;"> <p>POST SCANDAL</p> </div> </div>	
	<ul style="list-style-type: none"> Weak position in the US market (4.8% market share in 2014 and 1.7% in March 2016) Weak position in the Indian market (3% market share) 3 of most of their active brands are not environmental friendly 	<div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p>PRIOR SCANDAL</p> </div> <div style="text-align: center;"> <p>POST SCANDAL</p> </div> </div>	
	<ul style="list-style-type: none"> Changes on customer preference such as to more environmental friendly vehicles Growth in new emerging market Room to grow in the US market New uses for vehicles such as Uber Change auto vehicle for the betterment of the environment Increase demand for bus Low fuel price: Car dependent on fuel will gain more market share. 	<div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p>PRIOR SCANDAL</p> </div> <div style="text-align: center;"> <p>POST SCANDAL</p> </div> </div>	
	<ul style="list-style-type: none"> Alternative vehicle: Ford and Honda already ahead Younger generation drive less New tech market such as Uber may limit market for cars Restrictions imposed by gov. may affect the company Decreasing fuel may limit demand for hybrid cars Increase in raw materials will hamper economies of scales Other strong brand have better access in other markets like India Exchange rate fluctuations threaten Volkswagen's profits if the euro will start appreciating against other currencies 	<div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p>PRIOR SCANDAL</p> </div> <div style="text-align: center;"> <p>POST SCANDAL</p> </div> </div>	

Source: MB analysis

Appendix L: Porter's Five Forces



Rivalry among Existing Competitors | **HIGH**

The global automotive industry is a highly intense market with lots of powerful brands competing to stay on the top and maintain profitable. In established markets such as Western Europe and US, the auto industry growth is slow and companies will face tougher competition as it will need to fight harder to maintain market shares, whereas, for emerging market such as India and China, the industry is booming and auto companies can gain advantage of this opportunity. Rivalry among competitors is further intensified by the high fixed cost in the manufacturing of vehicles, high exit barriers due to high investment cost, and low product differentiation. VW's recent scandal multiplied the pressure the company will face to maintain in the top and will need to provide attractive schemes to their customers and gain back their trust. Based on these factors, rivalry among existing competitors to VW's business is **HIGH**.

Threat of Substitute | **MODERATE**

Bicycles and public transports such as trains are considered as substitutes and the availability of these transports have become a significant threat to VW. Additionally, carpooling is becoming a trend and the accessibility of these modes of transport is more convenient as it requires no maintenance, no storage space, and is a cheaper alternative to purchasing car. However, sometimes these alternatives may not be always available in certain areas and the experience of owning a car is still attractive. By assessing these influences, the threat of substitute to the company is **MODERATE**.

Bargaining Power of Suppliers | **LOW**

Historically, the bargaining power of suppliers is low since product differentiation of suppliers is low making switching cost also low. However, the increasing proportion of supplier's value creation in the automobile is changing and increased from 56% in 1985 to 82% in 2015. There are a huge number of suppliers with huge players such as Robert Bosch GmbH, Denso Corp. and big auto manufacturers have become more dependent on these suppliers, increasing major suppliers bargaining powers. These key determinants, labels the bargaining power of suppliers as **LOW**.

Bargaining Power of Buyers | **MODERATE**

When purchasing a car, buyers look for certain features such as quality, prices and safety making power of buyers stronger as there are several options to choose from. The availability of substitute also influences the power of buyers. Consumer switching cost is also low as there are a great deal well-known brands competing in the market but this maybe offset with the fact that most customers often have brand preference and loyalty. VW was known for its premium pricing strategy and prices averages 10% higher compare to their competitors. Despite this, VW overcomes these trials through good customer relationship and efficient customer service. VW also manages to satisfy their customer by designing and developing vehicles based on their preferences. This rates the bargaining power of buyers on VW's business as **MODERATE**.

Threat of New Entrants | **LOW**

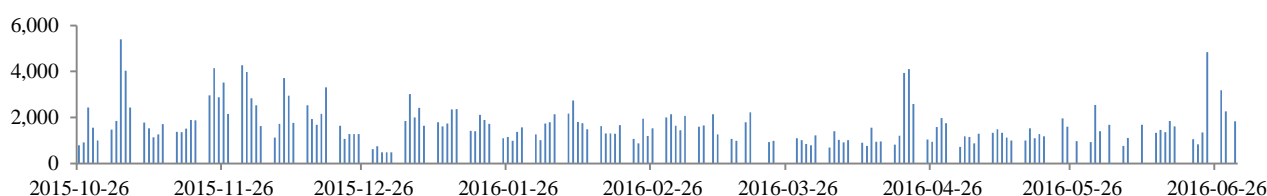
Higher capital requirements are required in this type of business as due to the need in building up new core competencies and shorter innovation cycles. This makes barriers to entry high in the automotive industry especially for new start-up companies. Setting-up an auto business requires high investment, high fixed cost and maintenance cost, and licenses. Additionally, switching cost from one industry to another is also high and stringent regulations make it even more difficult to enter. As for established companies, they enter the auto industry through M&A's, buyouts or strategic partnership. These high barriers of entry positions threat of new entrant to a **LOW** threat.

Appendix M: VW's Share Price

VW share price in Euros and main events



Volume in thousands



Appendix N: Valuation

N-1: Discounted Cash Flow Assumption

1. Weighted Average Cost of Capital (WACC)

The FCFE valuation approach uses the WACC to estimate the value of VW. The expected cost of equity is calculated using the Capital Asset Pricing Model (CAPM): $Re = RFR + \beta * (MRP + CRP)$, “Fama, E.F. and French, K.R. (2004)”.

	Assumption	Description
Risk-free rate (RFR)	0.83%	Germany Bund 30 Year Yield - Source Bloomberg May 13 2016
Country risk premium (CRP) - Germany	0.00%	Aswath Damodaran's calculations as in February 11 2016.
Market risk premium (MRP)	6.25%	Aswath Damodaran's calculations as in February 11 2016.
Beta	1.2	The beta is computed using daily data and through a linear regression between the DAX Index and VW's stock resulting in a beta of 1.2.
Cost of debt	4.38%	Aswath Damodaran's calculations as in January 2016 in Europe for the Auto and trucks and auto part industry
Terminal growth rate	1.0%	Based on the forecasted GDP growth rate for Germany. Source: Trading Economics
Corporate marginal tax τ	25%	Refer to Appendix F: Forecasting Assumptions
Capital structure		The terminal value of 30% equity and 70% debt is considered.

2. Large Cap Discount

To compute the target price, a cap discount of 20% is applied as VW has a market capitalization of €66,275.87million (16th May 2016).

3. Inflation

Items	2016F	2017F	2018F	2019F	2020F	2021F	Source
Inflation rate	0.50%	1.40%	1.60%	1.80%	1.90%	2.00%	Based on IMF World Economic Outlook (WEO), April 2016

N-2: Discounted Cash Flow Analysis

The DCF methodology was used to calculate the target price of VW.

Weighted Average Cost of Capital (WACC)

	2017F	2018F	2019F	2020F	2021F	Terminal Value
COST OF EQUITY						
RFR (risk free rate)	0.83%	0.83%	0.83%	0.83%	0.83%	0.83%
CRP (country risk premium)	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
MRP (market risk premium)	6.25%	6.25%	6.25%	6.25%	6.25%	6.25%
Beta levered	1.2	1.2	1.2	1.2	1.2	1.2
Cost of equity [Rf + β(Rm-Rf) + CRP]	8.33%	8.33%	8.33%	8.33%	8.33%	8.33%
COST OF DEBT						
Cost of debt	4.38%	4.38%	4.38%	4.38%	4.38%	4.38%
Marginal tax rate	25%	25%	25%	25%	25%	25%
After-tax cost of debt	3.29%	3.29%	3.29%	3.29%	3.29%	3.29%
WACC						
Weight of equity	25.1%	26.3%	27.8%	28.9%	29.9%	29.9%
Weight of debt	74.9%	73.7%	72.2%	71.1%	70.1%	70.1%
WACC	4.6%	4.6%	4.7%	4.7%	4.8%	8.5%

Free Cash Flow to the Firm (FCFF)

Assumptions	Terminal
Perpetuity WACC	8.5%
Growth rate	1.00%

	2017F	2018F	2019F	2020F	2021F
FCFF (Euros in million)					
EBIT(1-marginal tax rate)	3,460	8,670	10,862	12,137	13,484
Depreciation	10,580	11,098	11,661	12,272	12,933
Net increase in NWC	(3,168)	(3,252)	1,134	(2,883)	(2,864)
CAPEX	16,022	17,059	18,141	19,311	20,533
FCFF	1,186	5,961	3,247	7,981	8,748

	0	1	2	3	4
Discounted FCFF	1,186	5,701	2,965	6,954	7,263
Cummulative Disc. FCFF	1,186	6,887	9,852	16,806	24,069
Terminal value	98,926	103,400	108,124	113,145	118,465

Enterprise value (in million Euros)	Euros
Terminal value	118,465
PV of terminal value	98,926
NPV of FCFF	24,069
Enterprise value	122,995

Target Price	Euros
Enterprise value (m)	122,995
Net debt (m)	31,282
Value of equity (m)	91,713
No. of shares outstanding (m)	501
Equity value per share	183
Large cap discount	20%
Price at the end of 2017	146.36
Upside	25.1%

Note: m = million

N-2: Relative Valuation (Multiples) for the Next Twelve Month

	EV/SALES	EV/EBITDA	P/E	PRICE/CF	PRICE/BOOK
VW	0.5	3.7	7.1	3.6	0.7
Daimler	0.4	3.3	6.9	4.2	1.0
Ford	0.4	3.6	6.2	4.7	1.3
GM	0.5	2.3	5.3	3.7	1.0
Hyundai	0.7	7.2	5.4	3.9	0.5
Toyota	0.8	6.7	9.4	5.6	0.9
Average	0.56	4.62	6.64	4.42	0.94

Source: Thomson Reuters and MB analysis

EV/Sales multiple was used to value the company as a complement to the DCF method. Forward multiple valuations were applied as a future estimates as it is perceived to be more accurate than historical figures. Price to earnings multiple and EV/EBITDA was not applied as earnings of the company was affected by the emission scandal as well as future earnings. Other multiples were excluded as peers have different strategies and may give bias results.

Comparable Price Target - EV/SALES	
	2017YE
VW Sales Revenue (€m)	218,127
Average PEERS EV/SALES	0.56
VW EV by PEERS estimate (€m)	122,151
VW Net Debt (€m)	31,282
VW Equity by PEER estimate (€m)	90,869
Shares outstanding (m)	501
Large Cap Discount	20%
Target Price	145.02
Upside	24.0%
Recommendation	Buy

Source: Company data and MB estimates

The relative valuation resulted to a target price of €145.02 with an upside potential of 24.0% from the closing price of €116.95 and this supported the DCF target price of €146.36. This concludes that VW is highly undervalued compared to its closing price of €116.95.

N-3: Sensitivity Analysis

Investment ratings based on Jefferies & Company was used as a tool guide for the recommendation of VW.

WACC and terminal growth rate were the most sensitive factors that the company's target price was highly influenced.

		Changes in terminal growth							
		146.36	0.1%	0.4%	0.7%	1.0%	1.2%	1.4%	1.6%
Changes in WACC	7.7%		142.88	149.75	157.20	165.33	171.17	177.38	184.00
	8.0%		136.99	143.35	150.23	157.71	163.06	168.74	174.78
	8.3%		131.53	137.44	143.81	150.71	155.64	160.85	166.38
	8.5%		128.11	133.74	139.81	146.36	151.03	155.97	161.19
	9.0%		120.23	125.25	130.64	136.44	140.56	144.89	149.46
	9.5%		113.19	117.70	122.53	127.70	131.35	135.19	139.22
	10.0%		106.86	110.94	115.29	119.93	123.19	126.61	130.20
	11.5%		91.23	94.33	97.61	101.07	103.50	106.02	108.64

	Buy
	Accumulate
	Hold
	Sell

A sell recommendation would be recommended if WACC rate was changed to 11.5%, a hold rating at 10.0% and accumulate rating at 9.0%. The table below illustrated the change in target price for four variables.

Changes in WACC								
	7.66%	7.96%	8.26%	8.46%	8.96%	9.46%	9.96%	11.46%
DCF fair price	165.33	157.71	150.71	146.36	136.44	127.70	119.93	101.07
Change to initial target	-11.47%	-7.19%	-2.89%	0.00%	7.27%	14.62%	22.04%	44.81%
Recommendation	Buy	Buy	Buy	Buy	Accumulate	Hold	Hold	Sell

Changes in terminal growth							
	0.10%	0.40%	0.70%	1.00%	1.20%	1.40%	1.60%
DCF fair price	128.11	133.74	139.81	146.36	151.03	155.97	161.19
Change to initial target	14.25%	9.44%	4.69%	0.00%	-3.09%	-6.16%	-9.20%
Recommendation	Hold	Accumulate	Accumulate	Buy	Buy	Buy	Buy

Changes in beta							
	0.90	1.00	1.10	1.20	1.60	2.00	2.40
DCF fair price	159.11	154.65	150.40	146.36	131.97	119.89	109.61
Change to initial target	-8.01%	-5.36%	-2.69%	0.00%	10.91%	22.08%	33.53%
Recommendation	Buy	Buy	Buy	Buy	Accumulate	Hold	Hold

Changes in market risk premium							
	3.25%	4.25%	5.25%	6.25%	7.25%	9.25%	11.25%
DCF fair price	172.74	163.05	154.30	146.36	139.12	126.41	115.59
Change to initial target	-15.27%	-10.23%	-5.15%	0.00%	5.20%	15.79%	26.62%
Recommendation	Buy	Buy	Buy	Buy	Accumulate	Hold	Hold

Source: MB estimates

N-4: Monte Carlo Simulation

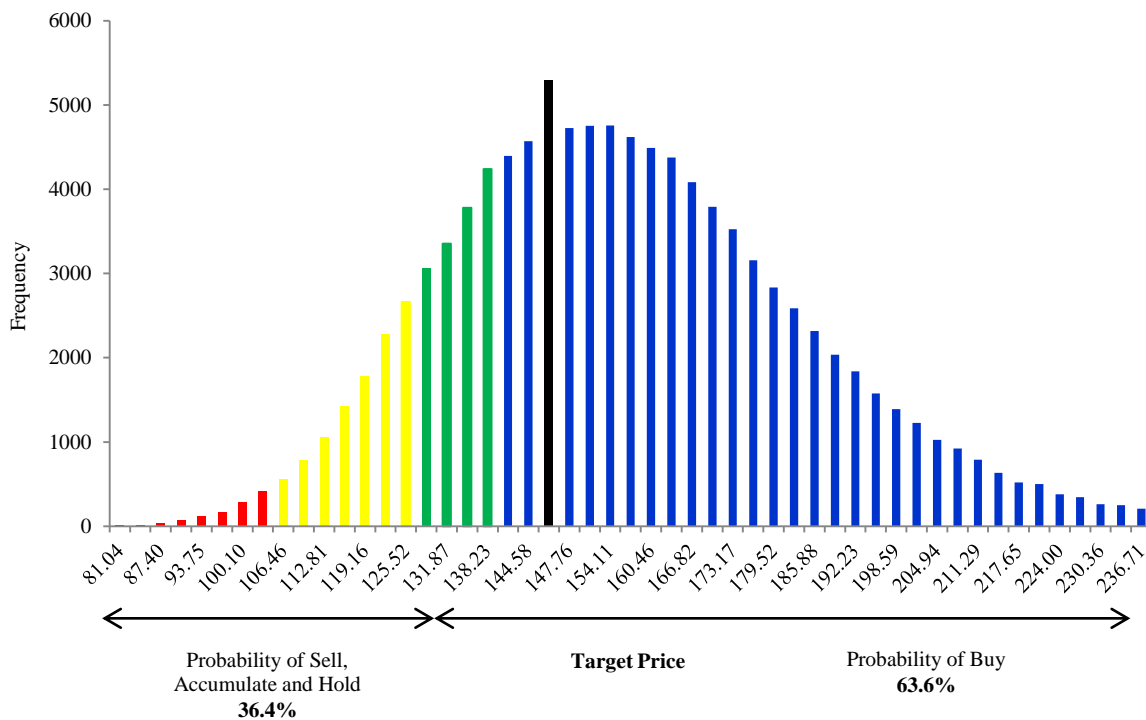
Monte Carlo Simulation was also applied to verify the estimated DCF target price of €146.36 using the software program Oracle Crystal Ball “(Charnes, J., 2012)”.

Three variables were used for computing the Monte Carlo Simulation. The variables considered are WACC, terminal growth rate and the forecasted growth sales for VW. The table below shows the assumptions made for the simulation:

	Mean	Standard deviation	Distribution	Description
Cost - scandal related	5.00%	0.50%	Normal	Checks the sensitivity changes based on the cost that is related to the emission scandal on the target price
WACC	8.50%	0.85%	Normal	Checks the sensitivity changes based on the WACC on the target price
Terminal growth	1.50%	0.15%	Normal	Checks the sensitivity changes based on the terminal growth on the target price
Forecasted sales of VW	3.00%	0.30%	Normal	Checks the sensitivity changes based forecasted sales grow rate of VW on the target price

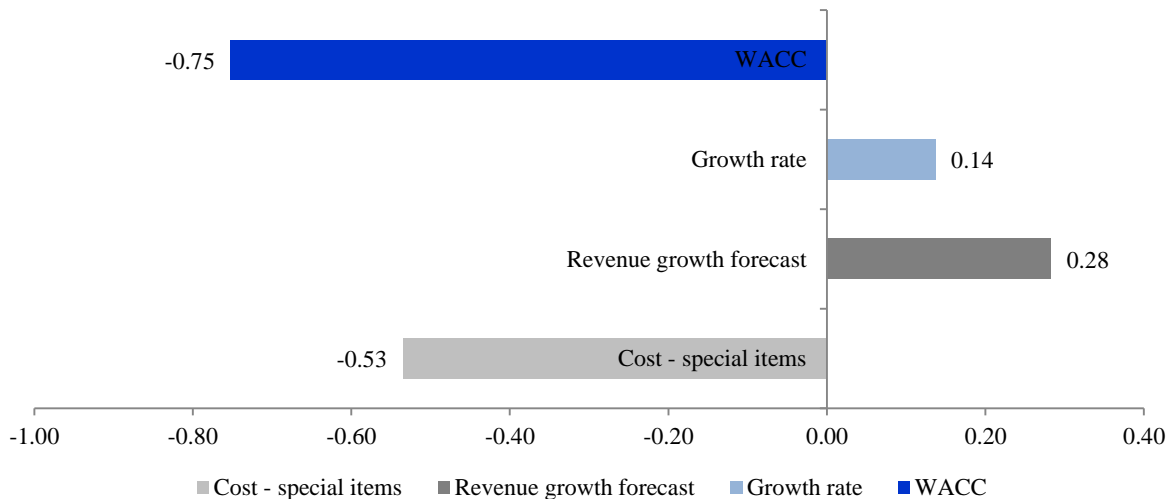
Monte Carlo Statistics		Price (€)		Upside potential
Trials	100,000	Current	116.95	
Base case	146.36	Mean	160.46	37.2%
Mean	160.46	DCF	146.36	25.1%
Median	157.78			
Standard deviation	28.37			
10th percentile	126.74			
90th percentile	197.46			
Upside potential	37.21%			

Using the Monte Carlo Simulation, a mean target price computed was €160.46 which gives the same recommendation as the DCF target price of €146.36 at a BUY recommendation.



Source: MB estimates using Oracle Crystal Ball software

VW price sensitivity distribution



Appendix O: Peer Selection Methodology

The companies were initially pooled from the Automobiles sub-industry for the selection of VW’s regional (10 companies) and international peer (25 companies) based on Bloomberg listing.

Regional Comparable:

A two-step method was used select the list of comparable for VW. The first screening applied for the pooled companies was based on similarity of business structure like VW which comprises both Automotive and Finance division. Second, companies that have sold more than 1 million vehicles worldwide were selected. This left 4 appropriate companies: Renault SA, Peugeot SA, Daimler Ag-Registered Shares, and Bayerische Motoren Werke AG (BMW).

Business structure and Vehicles sold of Regional comparable companies

	Business Structure		Total Vehicles Sold (3 year Average)
	Automotive	Financial Service	
VW	89%	11%	9,932,861
Renault	95%	5%	2,714,077
Peugeot	99.50%	0.50%	2,910,128
BMW	76%	24%	2,109,749
Daimler	88%	12%	2,584,207

Source: Bloomberg

International Comparable:

Since VW operates globally an international comparable was conducted and a three-step method was used to select the most appropriate peers. The first screening applied were for companies that has both Automotive and Finance division, next are companies that have revenue of more than €100 million and lastly a profitability comparison was conducted as the selected companies may achieve different outcome despite its similar business structures and worldwide operation. Thus, profitability ratios were chosen to compare with VW's performance. The ratios considered are ROE, ROA and ROIC.

Comparison of companies ROA in the automotive sector

ROA	2012	2013	2014	2015	Reported Mean	Reported Median	2016F	2017F	Forward Mean	Peers ROA Comparison (at least one blue)
VW	11.40%	4.60%	5.50%	-0.60%	5.20%	5.10%	3.10%	3.40%	3.25%	
Daimler	3.60%	5.30%	5.30%	4.30%	4.60%	4.80%	9.10%	7.00%	8.05%	✓
Ford	3.00%	3.40%	2.30%	3.60%	3.10%	3.20%	4.80%	2.20%	3.50%	✓
GM	3.70%	3.70%	3.00%	4.40%	3.70%	3.70%	5.20%	4.90%	5.05%	✓
Hyundai	7.40%	6.70%	5.20%	4.10%	5.90%	6.00%	3.90%	3.80%	3.85%	✓
Toyota	0.90%	2.90%	6.30%	4.60%	3.70%	3.80%	6.30%	4.30%	5.30%	✓

Note: 5% up and 5% down is considered as an acceptable range

Comparison of companies ROE in the automotive sector

ROE	2012	2013	2014	2015	Reported Mean	Reported Median	2016F	2017F	Forward Mean	Peers ROE Comparison (at least one blue)
VW	30.10%	10.60%	12.30%	-1.50%	12.90%	11.50%	9.40%	10.30%	9.85%	
Daimler	16.60%	17.00%	16.10%	17.30%	16.80%	16.80%	15.20%	14.80%	15.00%	✓
Ford	36.40%	31.30%	18.30%	29.10%	28.80%	30.20%	29.30%	23.80%	26.55%	X
GM	16.60%	13.60%	10.10%	25.70%	16.50%	15.10%	22.30%	19.40%	20.85%	✓
Hyundai	21.10%	17.80%	13.40%	10.70%	15.80%	15.60%	10.10%	9.50%	9.80%	✓
Toyota	2.70%	8.50%	13.70%	13.90%	9.70%	11.10%	13.60%	10.10%	11.85%	✓

Comparison of companies ROIC in the automotive sector

ROIC	2012	2013	2014	2015	Reported Mean	Reported Median	2016F	2017F	Forward Mean	Peers ROIC Comparison (at least one blue)
VW	12.60%	4.50%	5.20%	-0.60%	5.40%	4.90%	4.80%	5.30%	12.60%	
Daimler	7.00%	8.20%	6.30%	6.70%	7.10%	6.90%	8.60%	4.90%	6.75%	✓
Ford	4.90%	8.90%	0.90%	4.90%	4.90%	4.90%	12.60%	11.80%	12.20%	✓
GM	6.60%	5.40%	6.10%	13.50%	7.90%	6.40%	15.10%	14.70%	14.90%	✓
Hyundai	11.50%	9.90%	7.50%	5.80%	8.70%	8.70%	10.00%	12.20%	11.10%	✓
Toyota	0.90%	4.20%	7.00%	7.10%	4.80%	5.60%	6.90%	9.70%	8.30%	✓

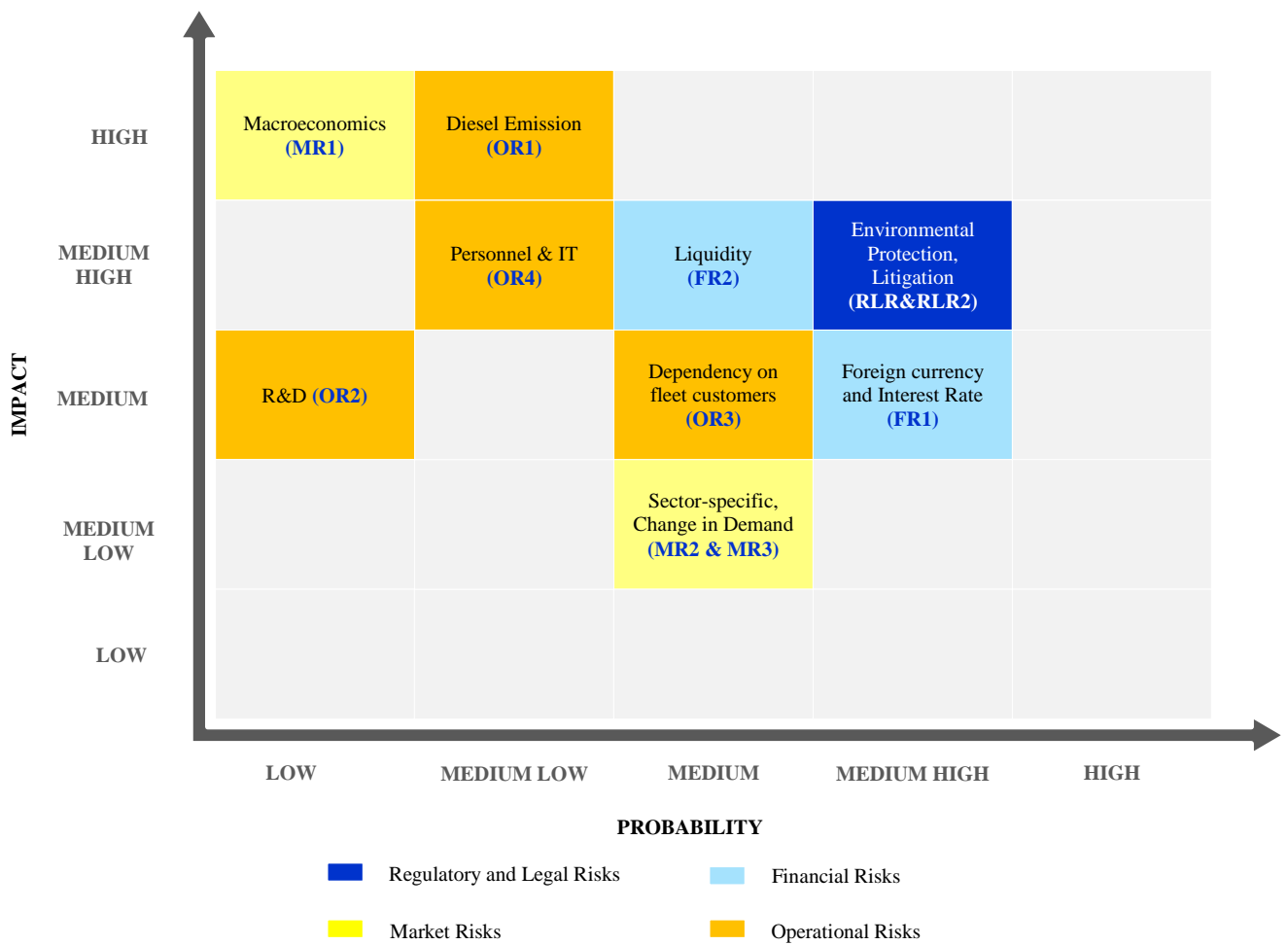
After conducting the profitability comparison, all of the candidate companies are a good fit. The best representatives comparable for VW are as follows:

	ROE	ROA	ROIC	Peers Checking
Daimler	★	★	★	★
Ford	★	★	★	★
GM	★	★	★	★
Hyundai	★	★	★	★
Toyota	★	★	★	★

Note: ★ = peer; ★ = not peer

Source: Bloomberg, Thomson Reuters and MB estimates

Appendix P: Risk Matrix



Source: MB analysis

References

- Bloomberg Markets (2016). Volkswagen AG [Online]. Available from:
<http://www.bloomberg.com/quote/VOW:GR>
- Bloomberg Terminal (2016). Public/Private Company Overviews Database.
- Charnes, J. (2012). *Financial Modeling with Crystal Ball and Excel*, 2nd Ed. New Jersey: John Wiley & Sons
- Damodaran, A. (2016). *Country Risk Premium* [Online]. Available from:
www.stern.nyu.edu/~adamodar/pc/datasets/ctryprem.xls
- Damodaran, A. (2016). WACC [Online]. Available from: www.stern.nyu.edu/~adamodar/pc/datasets/wacc.xls
- Fama, E.F. and French, K.R. (2004). The Capital Asset Pricing Model: Theory and Evidence. *Journal of Economic Perspectives* 18 (3), 25-46
- Geels, F.W., Kemp, R., Dudley, G. and Lyons, G. (2012). *Automobility in Transition? A Socio-technical Analysis of Sustainable Transport*. New York: Routledge
- Gomes, C. (2016). *Global Auto Report*. [Online]. Available from:
http://www.gbm.scotiabank.com/English/bns_econ/bns_auto.pdf
- Jurgens, U. (2002). Corporate governance, innovation, and economic performance: A case study on Volkswagen. *WZB Discussion Paper FS II, 02-205*.
- Kilian, L., and Sims, E.R. (2006). The Effects of Real Gasoline Prices on Automobile Demand: A Structural Analysis Using Micro Data. *Michigan Department of Economics, Working Paper*.
- KPMG's International Cooperative (2016). *Global Automotive Executive Survey 2016* [Online]. Available from:
https://www.kpmg.com/CZ/cs/industry/Automotive/Documents/KPMG_GAES_2016_locked.pdf
- Lin, A-L. (1982). An Analysis of Small Car Sales Across States in the U.S. *Presentation at the Eighth Annual Convention of the Eastern Economics Association*, Washington, D.C.
- Miller, N.H., and Langer, A. (2008). Automobile Prices, Gasoline Prices, and Consumer Demand for Fuel Economy. *Economic Analysis Group Discussion Paper*, EAG 08-11.
- Mogridge, M.J.H. (1989). The Prediction of Car Ownership and Use Revisited: The Beginning of the End?. *Journal of Transport Economics and Policy*, 23(1), 55-74.
- Nieuwenhuis, P., and Wells, P. E. (2003). *The automotive Industry and the Environment: A Technical, Business and Social Future*. Boca Raton, FL: CRC Press.
- Pinto, J. E., Henry, E., Robinson, T. R., Stowe, J.D., and Miller, P.F, Jr. (2015). *Equity Asset Valuation*. 2nd Ed. New Jersey: CFA Institute
- Porter, M.E. (2008). The Five Competitive Forces that Shape Strategy. *Harvard Business Review and Harvard Business School Publishing*, 79-93.

- Prado, S.M. (2009). The European Used-car Market at a Glance: Hedonic Resale Price Valuation in Automotive Leasing Industry. *Economics Bulletin*, 29(3), 2086-2099.
- Reuters (2016). Volkswagen AG (VOWG_p.DE) [Online]. Available from:
http://www.reuters.com/finance/stocks/overview?symbol=VOWG_p.DE
- Rugraff, E. (2012). The New Competitive Advantage of Automobile Manufacturers. *Journal of Strategy and Management*, 5(4), 407 – 419.
- Shende, V. (2014). Analysis of Research in Consumer Behavior of Automobile Passenger Car Customer. *International Journal of Scientific and Research Publications*, 4(2).
- Statista, The Statistics Portal. *Automotive Industry* [Online]. Available from: <https://www.statista.com/>
- Thomson Reuters Eikon Terminal (2016). Private Company Overviews Database
- TNS Sofres (2015). *Global Image and Reputation of the Auto Industry: Frankfurt Motor Show* [Online]. Available from: <http://www.oica.net/wp-content/uploads/Global-image-and-reputation-of-the-auto-industry.pdf>
- Volkswagen (2016). *Investors Relation* [Online]. Available from:
http://www.volkswagenag.com/content/vwcorp/content/en/investor_relations.html
- Volkswagen (2016). *Publication* [Online]. Available from:
<http://www.volkswagenag.com/content/vwcorp/content/de/homepage.html>
- Wilcox, S.E. (2012). Equity Valuation and Inflation: A Review. *The Research Foundation of CFA Institute Literature Review*.