

# POLITECNICO DI TORINO

## Master of Science in Automotive Engineering



### Master Thesis

## **Generation Z cars: new launches registration figures analysis**

### **Supervisor**

Prof. Eugenio Morello

### **Company Tutor**

Giovanni Lissoni (FCA)

Alberto Quaranta

March 2018



*A pessimist sees the difficulty in every opportunity;  
an optimist sees the opportunity in every difficulty.*

Winston Churchill

*This long trip is now coming to the end.*

*To my parents that supported me with all their possibilities*

*advising me in the most important choices.*

*To my sister, mate of quarrels but also laughs.*

*To my classmate, study partner,*

*but most of all life partner Lorenza.*

*To my hairy brothers Asso, Artù and my hairy sister Ariel,*

*that supported me in the most intense study phases.*

*To my professor Eugenio Morello and my FCA tutor Giovanni Lissoni.*

*To all my FCA colleagues and in particular to “NAFTA & CM Team”*

*for having welcomed me as part of the team since the first day.*

*A special thanks to all the people that made it possible.*



## Table of contents

Table of figures .....	7
List of Tables .....	12
List of abbreviations .....	13
Abstract .....	14
1. Automotive field and model launch .....	16
2. Automotive market .....	21
2.1 Market Regions .....	22
2.2 Automotive segmentation .....	24
2.2.1 Overview .....	24
2.2.2 Euro-standard car segmentation.....	25
2.3 Car Manufacturers.....	37
2.3.1 FCA (Fiat Chrysler Automobiles) .....	39
2.3.2 Volkswagen AG.....	45
2.3.3 PSA Group.....	47
2.3.4 Renault-Nissan-Mitsubishi Alliance.....	49
2.3.5 Toyota Group.....	50
2.3.6 Suzuki .....	50
2.3.7 Tata Group .....	51
2.3.8 Daimler AG.....	51
2.3.9 BMW Group .....	52
2.3.10 Hyundai Motor Group.....	53
2.3.11 Ford Motor Company .....	54
3. Sales curve analysis in the launch period .....	55
3.1.1 Seasonality .....	56
3.1.2 Market share.....	58
3.1.3 Number of competitors .....	59
3.1.4 Brand market share .....	60
3.1.5 “Net coefficient” and its normalized factor .....	61



3.1.6	Number of registrations in first 18 months .....	63
3.1.7	Growth slope and the “Rim spokes” .....	64
4.	The “segment Garage” and the clusters analysis .....	69
5.	Specificities in the “segment Garage” .....	80
5.1	Downward concavity launch data .....	81
5.2	A Segment .....	95
5.3	B Segment vs. L0 Segment .....	104
5.4	C Segment and its undisputed leader .....	108
5.5	D Segment collapse: Spanish case of Audi A4 .....	120
5.6	Melfi plant .....	126
6.	What about the future .....	136
6.1	Conjoint analysis .....	136
7.	Conclusions .....	138
	Appendix 1 – FCA group models .....	141
	Bibliography .....	146



## Table of figures

Figure 1 Graph of number of models per segment in 5MM from 2001 to 2017 .....	17
Figure 2 Graph of number of models per segment in 5MM from 2001 to 2017 normalized to 100 in 2001 .....	18
Figure 3 Launch process schedule .....	20
Figure 4 Worldwide production plant sites.....	22
Figure 5 World economic Regions .....	23
Figure 6 EMEA 5MM.....	24
Figure 7 A-Segment 2001-2017 trend 5MM .....	25
Figure 8 B-Segment 2001-2017 trend 5MM .....	26
Figure 9 C-Segment 2001-2017 trend 5MM .....	26
Figure 10 D-Segment 2001-2017 trend 5MM .....	27
Figure 11 E-Segment 2001-2017 trend 5MM.....	27
Figure 12 G-Segment 2001-2017 trend 5MM .....	28
Figure 13 H-Segment 2001-2017 trend 5MM .....	28
Figure 14 I0-Segment 2001-2017 trend 5MM.....	29
Figure 15 I1-Segment 2001-2017 trend 5MM.....	29
Figure 16 I2-Segment 2001-2017 trend 5MM.....	29
Figure 17 I3-Segment 2001-2017 trend 5MM.....	30
Figure 18 L0-Segment 2001-2017 trend 5MM.....	30
Figure 19 L1-Segment 2001-2017 trend 5MM.....	31
Figure 20 L2-Segment 2001-2017 trend 5MM.....	31
Figure 21 PU-Segment 2001-2017 trend 5MM .....	32
Figure 22 Segments weight in Italy .....	33
Figure 23 Segments weight in France.....	34
Figure 24 Segments weight in Germany.....	34
Figure 25 Segments weight in Spain .....	35
Figure 26 Segments weight in UK.....	36
Figure 27 Increase of models in I-Segments in 5MM in the new millennium .....	36
Figure 28 FCA group's brands .....	40
Figure 29 Fiat brand.....	40



Figure 30 Fiat Professional brand .....	41
Figure 31 Jeep brand.....	41
Figure 32 Alfa Romeo brand .....	42
Figure 33 Lancia brand .....	42
Figure 34 Abarth brand.....	43
Figure 35 Maserati brand .....	43
Figure 36 Chrysler brand .....	43
Figure 37 Dodge brand .....	44
Figure 38 Ram brand .....	44
Figure 39 SRT brand.....	44
Figure 40 MOPAR brand.....	44
Figure 41 Teksid brand .....	44
Figure 42 Comau brand .....	45
Figure 43 Magneti Marelli brand .....	45
Figure 44 Volkswagen Group brands .....	46
Figure 45 PSA Group brands.....	47
Figure 46 Nissan-Renault-Mitsubishi Alliance brands.....	49
Figure 47 Daimler AG automotive brands.....	52
Figure 48 BMW Group brands .....	53
Figure 49 Example seasonality .....	56
Figure 50 Correlation actual vs. estimate values .....	57
Figure 51 Example seasonality graph .....	58
Figure 52 Example market share trend in UK market .....	59
Figure 53 Example number of competitors' graph .....	60
Figure 54 Example volume trend.....	64
Figure 55 "Rim spokes" macro areas .....	65
Figure 56 I3 Segment in Italy "Rim spokes" with the growth lines on models analysed..	65
Figure 57 Example Nissan Qashqai in Germany - Concavity and peak.....	68
Figure 58 Concavity-peak month correlation: identification of the six areas.....	69
Figure 59 Graph of weighted country trend line concavity and peak month.....	71
Figure 60 Markets volume launch trend line .....	72
Figure 61 Graph of weighted brand trend line concavity and peak month in the 5MM....	73





Figure 62 Groups volume launch trend line .....	74
Figure 63 Graph of weighted segment trend line concavity and peak month in the 5MM	75
Figure 64 Segments volume launch trend line .....	76
Figure 65 Jeep Renegade deseasonalized monthly volume .....	84
Figure 66 Jeep Renegade launch period seasonality in Italy .....	84
Figure 67 I0 Segment in Italy trend with temporary location of Jeep Renegade .....	85
Figure 68 Italy - Jeep Renegade comparison parameters graph .....	87
Figure 69 Italy - Jeep Renegade normalized "Net coefficient" .....	89
Figure 70 Jeep New Cherokee deseasonalized monthly volume .....	90
Figure 71 Jeep New Cherokee launch period in Spain seasonality .....	91
Figure 72 I2 Segment in Spain trend with temporary location of Jeep New Cherokee .....	91
Figure 73 Spain - Jeep New Cherokee comparison parameters graph .....	93
Figure 74 Spain - Jeep New Cherokee normalized "Net coefficient" .....	95
Figure 75 A Segment market share in the 5MM .....	96
Figure 76 A Segment - number of model commercialized from 2001 to 2017 .....	96
Figure 77 Graph of comparison among average seasonality coefficient and years values	97
Figure 78 Actual volume versus estimated volume using average monthly seasonality ...	98
Figure 79 A segment in Italy trend with temporary location of Fiat 500 and Fiat Panda (3 <sup>rd</sup> series) .....	98
Figure 80 Fiat 500 deseasonalized monthly volume .....	99
Figure 81 Fiat Panda (3 <sup>rd</sup> series) deseasonalized monthly volume .....	100
Figure 82 Graph of ratio between actual and "theoretical" market share .....	102
Figure 83 Graph of ratio between actual and brand market share .....	102
Figure 84 Graph of normalized "Net coefficient" for Fiat 500 and Fiat Panda (3 <sup>rd</sup> series) .....	103
Figure 85 Graph of number of models in B Segment .....	105
Figure 86 Graph of number of models in L0 Segment .....	105
Figure 87 B Segment 2001-2017 trend 5MM .....	106
Figure 88 L0 Segment 2001-2017 trend 5MM .....	107
Figure 89 Graph of B and L0 segments volume peak months in 5MM .....	108
Figure 90 Golf external shape evolution in the 7 series .....	109
Figure 91 Graph of number of models in C Segment .....	109



Figure 92 Graph of C segment registrations in the 5MM from 2001 to 2017 .....	110
Figure 93 Germany - C Segment registrations trend with temporary location of Volkswagen Golf V, VI and VII.....	111
Figure 94 Graph of deseasonalized volume with peak month location of Golf V, VI and VII .....	113
Figure 95 Seasonality coefficients in Germany in the launch period of Golf V.....	114
Figure 96 Seasonality coefficients in Germany in the launch period of Golf VI .....	115
Figure 97 Graph of Volkswagen Golf V, VI and VII average ratios coefficients .....	116
Figure 98 Normalized "Net coefficient" in the launch phase for Golf V .....	118
Figure 99 Normalized "Net coefficient" in the launch phase for Golf VI.....	118
Figure 100 Normalized "Net coefficient" in the launch phase for Golf VII.....	119
Figure 101 D Segment registrations yearly volume in the 5MM .....	120
Figure 102 D Segment number of models .....	121
Figure 103 Graph of market share in the launch phase of Audi A4 (3 <sup>rd</sup> series) in Spain	123
Figure 104 Graph of market share in the launch phase of Audi A4 (4 <sup>th</sup> series) in Spain	124
Figure 105 Graph of market share in the launch phase of Audi A4 (5 <sup>th</sup> series) in Spain	124
Figure 106 Graph - Audi A4 (3 <sup>rd</sup> , 4 <sup>th</sup> and 5 <sup>th</sup> series) volume per month cleared by seasonality and cyclic component with second degree trend line.....	125
Figure 107 Graph of the trend of number of models in I0 Segment in 2001-2017 period .....	127
Figure 108 Graph - Volume of I0 segment in the 5MM cleared by cyclic component...	128
Figure 109 Fiat 500X and Jeep Renegade volume trend lines concavity-peak month correlation .....	130
Figure 110 Graph of normalized "Net coefficient" of Jeep Renegade and Fiat 500X in France.....	133
Figure 111 Graph of normalized "Net coefficient" of Jeep Renegade and Fiat 500X in Germany.....	133
Figure 112 Graph of normalized "Net coefficient" of Jeep Renegade and Fiat 500X in Italy .....	134
Figure 113 Graph of normalized "Net coefficient" of Jeep Renegade and Fiat 500X in Spain .....	134



Figure 114 Graph of normalized "Net coefficient" of Jeep Renegade and Fiat 500X in UK .....	135
Figure 115 Fiat 500 .....	141
Figure 116 Fiat Panda .....	141
Figure 117 Fiat Punto.....	141
Figure 118 Fiat 500L .....	141
Figure 119 Fiat 500X .....	142
Figure 120 Fiat Tipo .....	142
Figure 121 Fiat 124 Spider .....	142
Figure 122 Fiat Fullback.....	142
Figure 123 Fiat Doblò .....	142
Figure 124 Fiat Qubo .....	143
Figure 125 Jeep Wrangler.....	143
Figure 126 Jeep Grand Cherokee.....	143
Figure 127 Jeep Cherokee.....	143
Figure 128 Jeep Compass .....	143
Figure 129 Jeep Renegade .....	144
Figure 130 Alfa Romeo MiTo .....	144
Figure 131 Alfa Romeo Giulietta .....	144
Figure 132 Alfa Romeo Giulia .....	144
Figure 133 Alfa Romeo Stelvio .....	144
Figure 134 Alfa Romeo 4C.....	145
Figure 135 Lancia Ypsilon.....	145
Figure 136 Maserati brand models .....	145



## List of Tables

Table 1 Number of models in 5MM from 2001 to 2017 .....	17
Table 2 2017 EU + EFTA groups ranking.....	37
Table 3 2017 EU + EFTA brands ranking .....	38
Table 4 Example brand market share.....	61
Table 5 I3 "spokes" equations in Italy .....	66
Table 6 Brand peak volume month in the 5MM.....	82
Table 7 Jeep models volume peak month in 5MM.....	83
Table 8 Jeep Renegade in Italy launch volume data.....	83
Table 9 Italy - Jeep Renegade market share data.....	87
Table 10 Jeep New Cherokee in Spain launch volume data.....	90
Table 11 Spain - Jeep New Cherokee market share data.....	93
Table 12 Italy - Fiat 500 market share data .....	101
Table 13 Italy - Fiat Panda (3 <sup>rd</sup> series) market share data.....	101
Table 14 B and L0 segments volume peak months in 5MM .....	108
Table 15 Volkswagen Golf V, VI and VII launch volume data .....	113
Table 16 Volkswagen Golf V, VI and VII market share data .....	117
Table 17 Spain - Audi A4 (3rd, 4th and 5th series) market share and volume data .....	122
Table 18 Spain - Audi A4 (3rd, 4th and 5th series) trend line equation and concavity...	125
Table 19 Cumulative volume comparison between Fiat 500X and Jeep Renegade .....	129
Table 20 Ratio of model market share and "theoretical" one for Fiat 500X and Jeep Renegade.....	129
Table 21 Ratio of model market share and brand one for Fiat 500X and Jeep Renegade .....	129
Table 22 Normalized "Net coefficient" of Jeep Renegade and Fiat 500X in the 5MM ..	132



## List of abbreviations

<b>5MM</b>	Five Major Markets (France, Germany, Italy, Spain and UK)
<b>J1</b>	Job 1
<b>SUV</b>	Sport Utility Vehicle
<b>MPV</b>	Multi-Purpose Vehicle
<b>2WD</b>	2 Wheel Drive
<b>4WD</b>	4 Wheel Drive
<b>RHD</b>	Right Hand Drive
<b>LHD</b>	Left Hand Drive
<b><math>MMC_t(12)</math></b>	Centred Mobile Mean based on a cyclic period of 12 months
<b><math>MM_t(12)</math></b>	Mobile Mean based on a cyclic period of 12 months
<b><math>S_t</math></b>	Seasonality coefficient
<b><math>E_t</math></b>	Estimated values (using the average seasonality coefficients)
<b><math>R_t</math></b>	Monthly registrations in a specific segment
<b><math>x_{net}</math></b>	“Net coefficient”
<b><math>n_c</math></b>	Number of competitors (number of models in a specific segment)
<b>%<i>brand</i></b>	Market share of the brand
<b>%<i>model</i></b>	Market share of the model
<b><math>TC_{x_{deseason}}</math></b>	Trend&Cycle component



## Abstract

Generation Z (also known as Gen Z, iGeneration, Post-Millennials, or Homeland Generation) is the demographic cohort after Millennials. Currently, there are numerous additional competing names used relating to them in the media. There are no precise dates for when this cohort starts or ends, but in this thesis, it is used to refer to new arrivals from January 2001 up to December 2017.

Commonly the term is used to refer to demographic conditions, and in particular it is used by marketers to identify the specific class of customers born in the new millennium.

Generation Z is part of a group that is global, social, visual and technological. They are the most connected, educated and sophisticated generation ever. They are the up-agers, with influence beyond their years. They are the tweens, the teens, the youth and young adults of our global society. They are the early adopters, the brand influencers, the social media drivers, the pop-culture leaders, they don't just represent the future, they're creating it.

Gen Z have been born into the crisis period of terrorism, the global recession and climate change. They are predicted to spend their young adult years in a time of economic and social renewal. They are the students of today and university graduates, employees and consumers of tomorrow.

Looking at these characteristics, it is possible to notice that the current world is dominated by changes, renewals and it is also valid in automotive field. It is the reason of the title of this project work, that aims at identifying some trend and KPIs able to describe such a revolutionary marketplace.

This thesis aims at studying how the different actors played in the different market scenarios trying to set a possible future analysis of the main roles and strategies that led to each specific result.

Since it is the result of a six months internship in the Supply Chain Management department of FCA the scope of the work is to analyse the group's brands historical launches data and the major competitors' ones both in terms of volume and market share.

This thesis focuses on a critical operation for the success of a company such as the new model launches, described in Chapter 1.



In Chapter 2 the “stage” of the analysis is described starting from the market regions (with a focus on the EMEA market and in particular on the 5MM), up to the main “actors” subdivided by brand, passing through the European standard car segmentation.

The analysis procedure described in Chapter 3, was applied to 128 launches of different vehicles, of which 70 completely new models and 58 vehicles of series higher than 1 consisting in renewals of existing models.

The launch phase analysed is considered of 18 months starting from the first “relevant month”, consisting in the period in which the vehicles start to be delivered to final customers trying to exclude in this way the registrations for the press and the dealer showrooms.

The analysis of the volume will be the starting point to define the trend curve identifying its concavity, the possible “peak month” or the slope in the case of linear trend.

The analysis of the market share instead, will be extended to the identification of pure behaviour, trying to clear data from the crowding of the markets and the driving power of the brands.

These analyses will be used to identify the “common points” in terms of brand, segment and market (Chapter 4).

The different indexes obtained will be analysed “per families” with the purpose to identify the specific element that can be considered as characteristic and that can be used as starting point of a deeper investigation using the conjoint analysis.

In particular in Chapter 5 some specific segment or automotive group are considered, and some “actors” are compared or analysed in detail according to the procedure described in Chapter 3. The output of this section is a database (the “segment Garage”) with all the details in each segment, that aims at setting itself as a first approach to a possible future study. In fact, Chapter 6 looks at possible suggestions about the follow up of the thesis, providing a rough description of the conjoint analysis.



## 1. Automotive field and model launch

During the new millennium, the competitive reality of the automotive industry is changing; companies across the regional and volume spectrum have adopted a portfolio of manufacturing concepts derived from both mass and lean production concepts, and to compare the different results it is necessary to consider the complexities induced by the different ownership structures and increase of international collaborations.

During the whole automotive life, the basis of competition has shifted from cost-leadership during the first phases of Ford's original mass production, to multiple configurations, to diversification through leadership in design, technology and manufacturing excellence (Toyota strategy), and to mass customization, which is the current competitive battlefield. The automotive industry is undergoing a period of complete change: there had been both record profits and bankruptcy of global suppliers and manufacturers, some of the largest industry mergers and de-mergers, and an ever-increasing global demand for automobiles, mainly due to emerging markets.

Over the years, there have been several revolutions in the manufacturing footprint that has shaped the industry's structure as it is today. As demand in the established regions has been stagnating, there have been several investments in emerging markets that now can be considered as a reality (e.g. China).

Furthermore, the implosion of traditional vehicle segments, in favour of cross-over and niche vehicles has completely modified automaker strategies.

The traditional segments of small cars (B-segment, e.g. Punto), compact cars (C-segment, e.g. Golf and Tipo), family cars (D-segment, e.g. Giulia), and executive class (E-segment, such as Maserati Ghibli) have been joined by SUVs. In quantitative terms, this trend can be easily seen (without considering the H and PU segments) in Table and Figure 1.





Table 1 Number of models in 5MM from 2001 to 2017

Segment	A	B	C	D	E	I (total)	L (total)	Total
2001	16	35	41	41	25	42	45	245
2002	17	38	37	41	23	44	46	246
2003	18	39	38	39	23	44	44	245
2004	20	37	40	40	22	47	47	253
2005	21	40	39	37	21	52	51	261
2006	21	43	40	36	22	60	51	273
2007	18	45	44	35	25	70	48	285
2008	21	46	44	37	23	74	48	293
2009	21	47	48	38	22	79	51	306
2010	23	43	46	38	21	85	50	306
2011	27	45	48	38	21	84	48	311
2012	28	41	47	38	20	80	47	301
2013	27	40	48	37	23	82	45	302
2014	27	37	54	38	19	80	44	299
2015	27	31	53	35	20	89	39	294
2016	25	30	54	34	19	99	38	299
2017	25	30	53	35	15	100	35	293

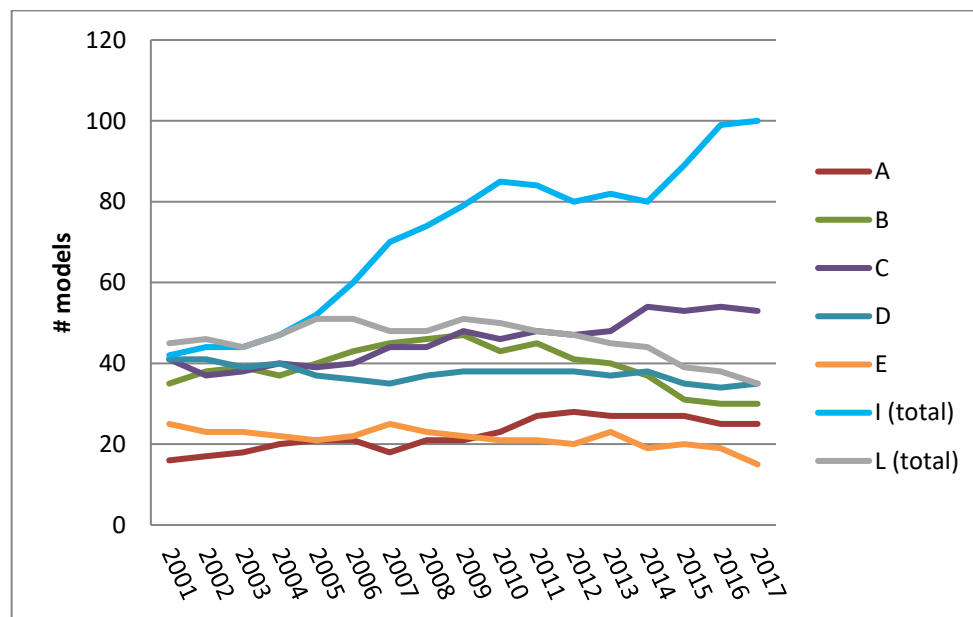
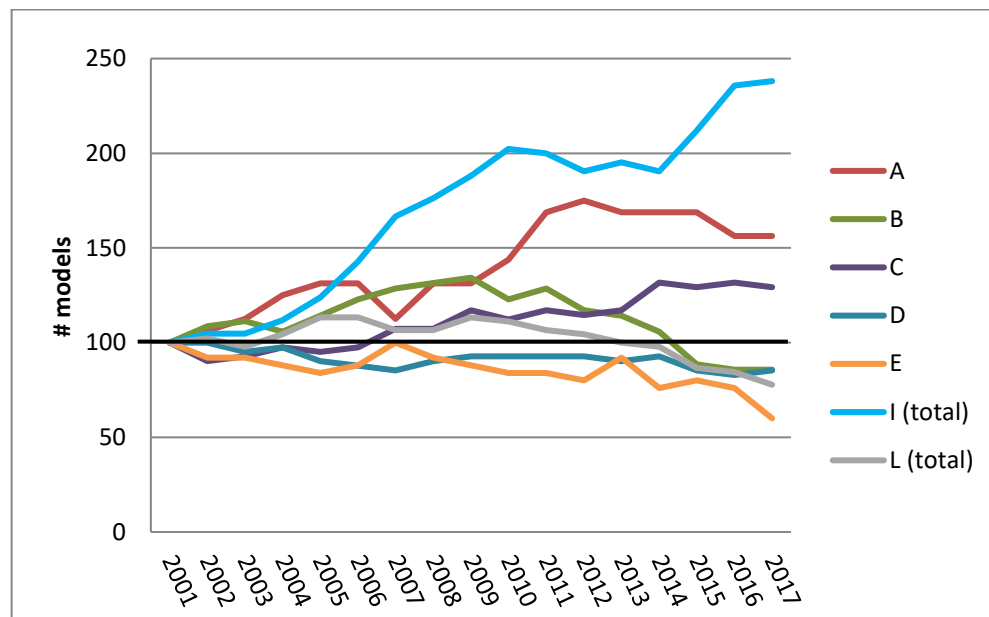


Figure 1 Graph of number of models per segment in 5MM from 2001 to 2017

In order to compare the different segments in the proper way it is possible to look at Figure 2, where the number of models per segment is normalized as if in 2001 they were all at 100; it allows to set the segment at the same level at the starting point and analyse how they behaved in the studied period.



**Figure 2 Graph of number of models per segment in 5MM from 2001 to 2017 normalized to 100 in 2001**  
The only segments that were able in the last sixteen years to improve their “population” were mainly the SUVs one (I0, I1, I2 and I3) and among the smallest ones, A and C.

The increase in model range is followed by a general shortening of product life cycles.

Both the increase in model range and the reduction of life cycles have a strong impact on the economies of scale that can be achieved. The volume sold per model has been drastically reduced over time, which gives the manufacturers less and less opportunity to recover the development costs. As a reaction, manufacturers are trying to increase the component sharing and platform usage across as many models as much as possible. This is the case of Fiat 500X and Jeep Renegade that being part of the same group, share the platform and most of the components.

This development is, and perhaps will be, a major challenge for vehicle manufacturers. While the large players are currently working on leveraging their resources across their brands, for smaller companies this is not so easy.

Another critical aspect is the inability to adjust capacity to demand, creating overcapacity. The main consequence of the overcapacity is that manufacturers have growing inventories of unsold cars and are obliged to employ sales incentives to maintain their market share. Producers are trying to become more responsive to customer needs and avoid all the costs that currently cut their profitability.



While Henry Ford founded the industry on the idea of making vehicles as efficiently and inexpensively as possible, this push approach is no longer exploitable in the current saturated markets, where brands should deal with more and more demanding customers.

The raise of market requests in terms of customization obliged carmakers to increase year over year the number of possible trim packages<sup>1</sup> and models.

Furthermore, during the period analysed in this project work (2001-2017), as stated before the automotive scenarios changed and brands had to face with the boost of SUVs.

This complete revolution in the marketplace obliged carmakers to launch new models to face two main effects:

- maintain the position in terms of market share in the traditional segments that were losing more and more appreciation, trying to keep their sales dynamic;
- get the new opportunities offered by a developing set of segments (such as the I ones) that was changing, offering more and more splitting and potential volumes.

The launches of new models or new versions of existing models must be balanced to get the perfect trade-off between technological innovation and brand credibility; introducing new solutions on the vehicles is like a magnet for potential customers, but on the other hand buyers are investing money in the car and too frequent renovations mean higher depreciation and consequently the brand loses credibility from customer point of view.

Automakers furthermore have to balance the possibility to share as much as possible between different models and try to expand the business in the most attractive and developing segments.

In the future, the possible electrification of the majority of the brands' portfolio will strength the importance of being successful starting from the first launches. Failing in the first phases of a possible revolution of the industry can be a complete bloodshed for a carmaker, also bringing it to bankruptcy.

Launching a new model or just a new version is a critical process that is analysed from several points of view considering both the internal and the external influencing factors and it involves all the departments of a carmaker.

---

<sup>1</sup> Trim package is a set of accessories used by carmakers to get manufacturing and marketing simplicity. It is usually identified with alphanumeric lettering on various exterior locations on automobiles manufactured internationally starting from mid of 1970s.

The launch process, as mentioned before, involves several members and it begins more than 12 months before the Job 1<sup>2</sup>.

It can be subdivided into three phases:

- definition: it involves the supply chain and the manufacturing in the definition of the date of Job1, the production ramp up and the product grid in terms of trim and options;
- planning: this phase is characterized by the definition of material requirement and set-up of the systems;
- execution: it consists of final approval to produce by all the departments involved, J1 execution (in Figure 3 it is considered scheduled in month N), the confirmation of the feasibility of the launch phase and the definition of launch date in the different markets involved.



**Figure 3 Launch process schedule**

The success or not in terms of registrations, can be considered as a consequence of the activities in the back of the scenes described just above and of the rival strategy to obscure the new vehicle launch.

---

<sup>2</sup> In the auto industry the term “Job 1” is used to denote the first car of a new model that comes off the assembly line. It’s the time when all the work to create the right product and the right process is placed together to start the production.



## 2. Automotive market

Automotive industry is a capital-intensive business which involves several companies and organizations in the design, development, manufacturing, marketing and sales of the final product. In 1808 François Isaac de Rivaz designed the first car powered by an internal combustion engine fuelled by hydrogen.

In 1870 Siegfried Marcus built the first gasoline powered combustion engine, which he placed on a pushcart; Marcus created the two-cycle combustion engine. The car's second incarnation in 1880 introduced a four-cycle, gasoline-powered engine, an ingenious carburettor design and magneto ignition. He created an additional two models further refining his design with steering, a clutch and brakes.

The four-stroke petrol (gasoline) internal combustion engine that still constitutes the most prevalent form of modern automotive propulsion was patented by Nikolaus Otto. The similar four-stroke diesel engine was invented by Rudolf Diesel. The hydrogen fuel cell, one of the technologies hailed as a replacement for gasoline as an energy source for cars, was discovered in principle by Christian Friedrich Schönbein in 1838. The battery electric car owes its beginnings to Ányos Jedlik, one of the inventors of the electric motor, and Gaston Planté, who invented the lead-acid battery in 1859.

In 1885, Karl Benz developed a petrol or gasoline powered automobile. This is also considered to be the first "production" vehicle as Benz made several other identical copies. The automobile was powered by a single cylinder four-stroke engine.

Ford Motor Company's Model T became the first mass-produced automobile in 1908, focusing on affordability for the average consumer. By 1927 Ford produced over 15,000,000 Model T automobiles characterized by the only one black external colour.

Currently the automotive sector is characterized by the reduction race of fuel consumption and emissions through alternative propulsion systems and aerodynamics.

It is a fundamental pillar of the global economy, since it is one of the most important sector by revenue. It is contributing roughly to the 3% of the global GDP output, with peaks up to 6% in emerging markets.

The world's automobile industry made over sixty-six million cars, vans, trucks and buses in 2005. These vehicles are essential to the working of the global economy and to the world's citizens.

This level of output is equivalent to a global turnover of €1.9 trillion. If vehicle manufacturing was a country it would be the sixth largest economy in the world.

Building sixty-six million vehicles requires the employment of more than eight million people directly in making the vehicles and the parts that go into them. This is over five percent of the world's total manufacturing employment. In addition to these direct employees, about five times more are employed indirectly in related manufacturing and service provision, such that an estimated more than 50 million people earn their living from cars, trucks, buses and coaches.

Considering the productions plants directly involved in the manufacturing of vehicles, it is possible to consider more than 750 sites distributed worldwide as in Figure 4.



Figure 4 Worldwide production plant sites

## 2.1 Market Regions

Automotive industry is present worldwide with many different players. Carmakers currently have plants in all the continents and the competition has increased year over year. Furthermore, customers are heterogeneous and it is important to identify some common aspects to be able to attract them.

To be more focused on each of market peculiarities it is useful to divide the world in different macro areas.

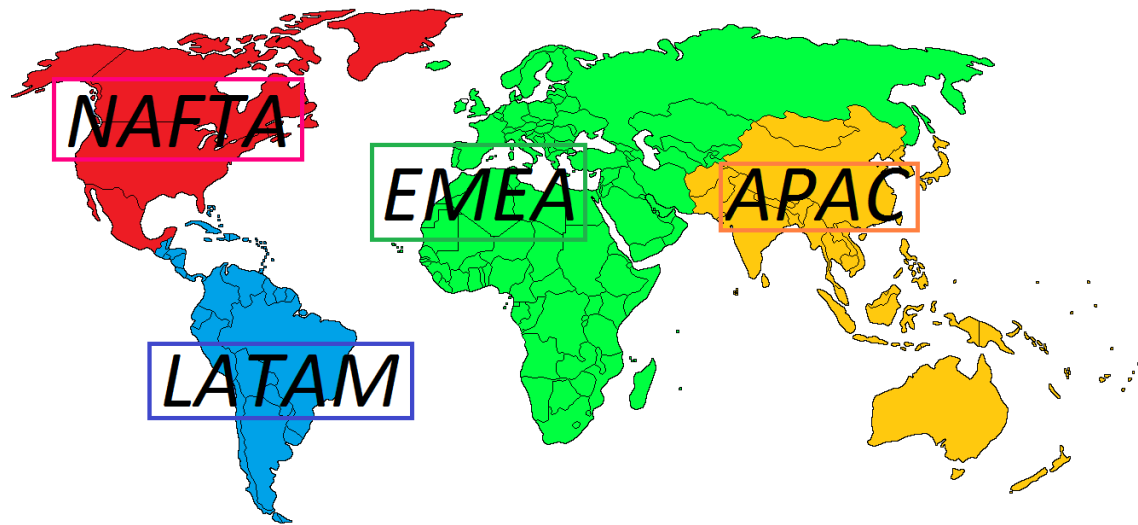


Figure 5 World economic Regions<sup>3</sup>

In Figure 5 the four economic macro areas are graphically described, identifying the Regions:

- NAFTA: acronym of “North American Free Trade Agreement”, it is a free trade agreement signed in 1994 by USA, Canada and Mexico; the aim was to remove barriers to trade and investment between member states to strengthen their economic growth and to create job opportunities.
- EMEA: acronym of “Europe, Middle East and Africa”, it is the geographic assignment used mainly in the economic and industrial area to describe all European and African nations, extended to Iran and Russia.
- LATAM: acronym of “LATin America”, it is a group of countries and dependencies in the Americas mainly of Spanish and Portuguese origins; it consists in nineteen sovereign states and covers the area from Mexico to the southern tip of South America, including Caribbean.
- APAC: acronym of “Asia PACific”, it is the part of the world in or near the Western Pacific Ocean. It includes most of Asia and Oceania.

These areas are used by institutions and governments, as well as in marketing and business. This thesis focuses on EMEA region, and in particular on the 5MM (acronym of “5 Major Markets”) that are Italy, Germany, France, Great Britain and Spain, graphically localized in Figure 6.

---

<sup>3</sup> Drawing made on hand by the author, just for graphical purpose, some imperfection in the borders are possible.

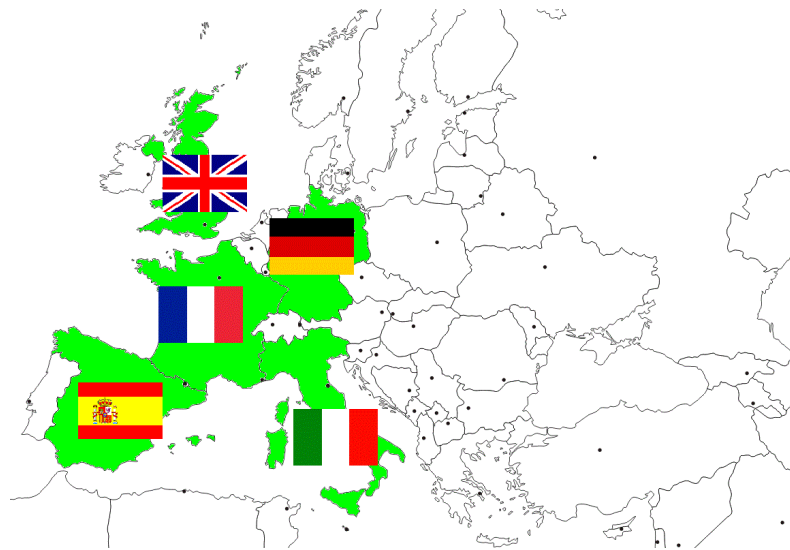


Figure 6 EMEA 5MM

## 2.2 Automotive segmentation

### 2.2.1 Overview

For many years private and public organizations, besides national governments developed different automotive classification methods, in order to establish a simple subdivision of the automobiles in macro categories.

The main purpose of these segments is to support car description and legislative regulations; for these reasons they are differentiated mainly according to:

- dimensions;
- body type;
- price.

These groups however are not unique and can vary a lot country by country; it may happen that in some situations it can bring to misunderstanding due to overlapping of limits among the characteristics considered. Even the European Community in the various terms and documents released several grouping methods that can led to discordant classifications.

In general vehicles can be grouped in various way according to different evident items such as body type, number of doors, seats place or more technical ones such as carb weight, price or maximum engine power.

The United States Environmental Protection Agency (US EPA) designed a nine-level classification to compare, without possible misunderstanding, the fuel economy of similar



vehicles; these groups have been obtained according to technical specifications such as internal volume and the trunk capacity.

In 2011 European Community had introduced an automotive segmentation by letters, in groups differentiated mainly according to dimensions, body type and price.

This subdivision in the EMEA market, unlike what happens in NAFTA market, has no formal or regulatory role.

This work will focus on the models launch of the FCA products and main competitor's products divided by segment according to European classification (used by the FCA systems, solving possible ambiguous situations) that will be discussed deeply in Section 2.2.2.

### 2.2.2 Euro-standard car segmentation

It is a nine-levels classification by letters defined by the European Commission:

- A segment (mini cars): it represents the first segment and includes cars whose length is lower than 3,8 m.

This segment trend can be considered quite constant, with a smooth increase of volume in the last 5 years mainly due to the customers' attention to the maintenance and fuel costs of the vehicle.

Volumes are quite small with the exception of Italy that can be considered the market that draws the entire segment.

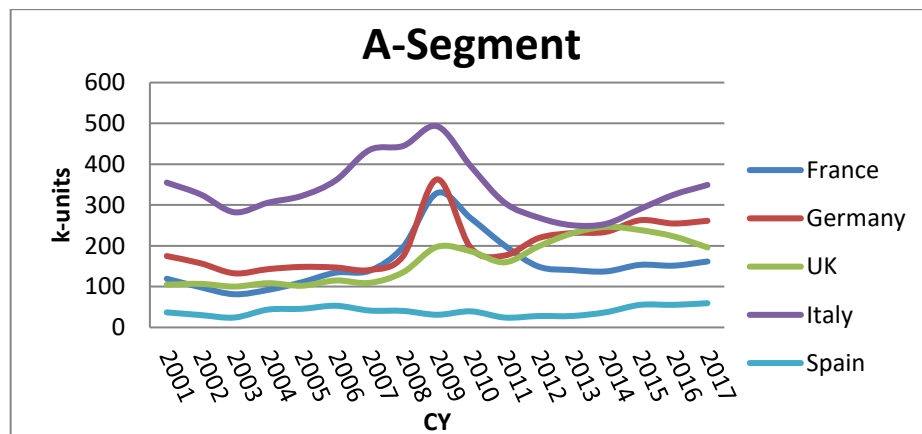


Figure 7 A-Segment 2001-2017 trend 5MM

- B segment (small cars): it includes vehicles whose length is included between 3,8 m and 4,2 m.

Together with D-Segment, in the recent years they are characterized by a decreasing trend influenced by the sales explosion of SUV vehicles.

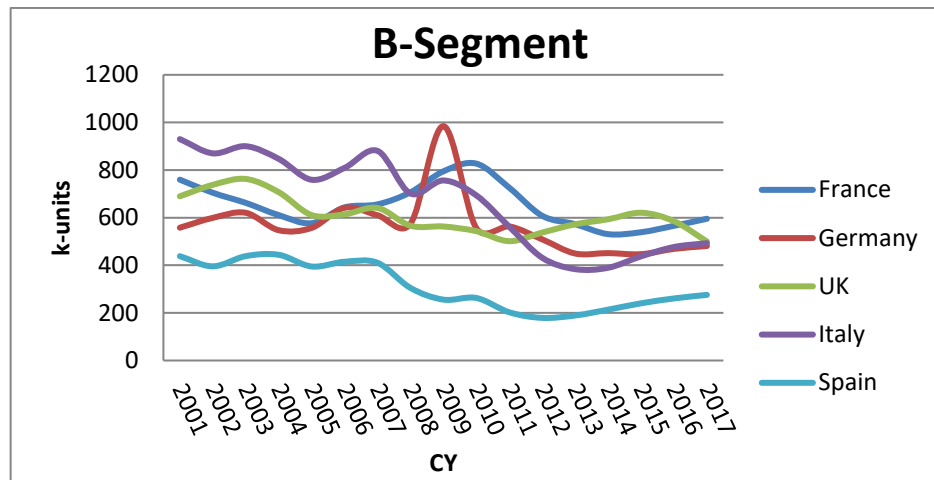


Figure 8 B-Segment 2001-2017 trend 5MM

- C segment (compact cars): it includes vehicles whose length is included between 4,2 m and 4,6 m.

Currently it is the most important segment by volume, with a stable trend and Germany and UK that drive the industry.

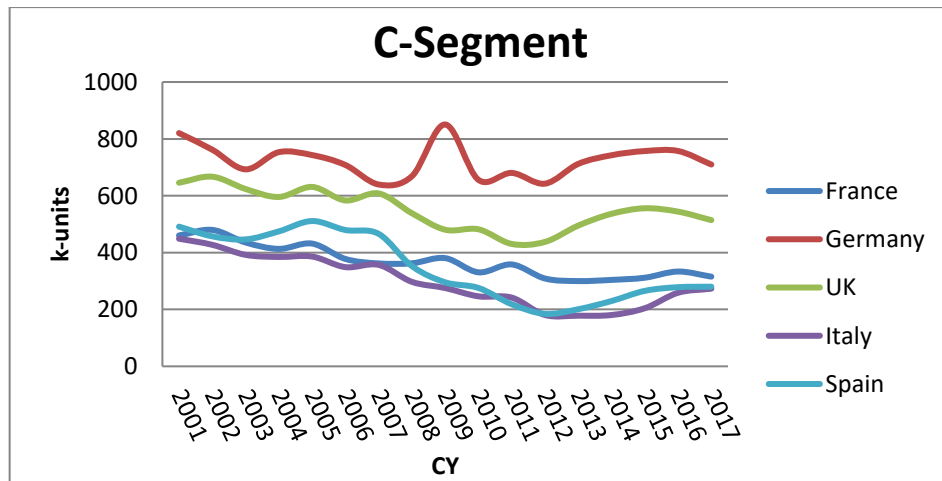


Figure 9 C-Segment 2001-2017 trend 5MM

- D segment (mid-size cars): specs and trim-levels vary a lot in these cars; the compact executive cars generally have a sporty drive and are very driver-orientated, while large family cars or mid-size cars are oriented towards every-day use for transporting people and goods. As with E-segment cars, they can come in several body-types, coupés being common with the compact executive cars, and station wagons for practical family-use.

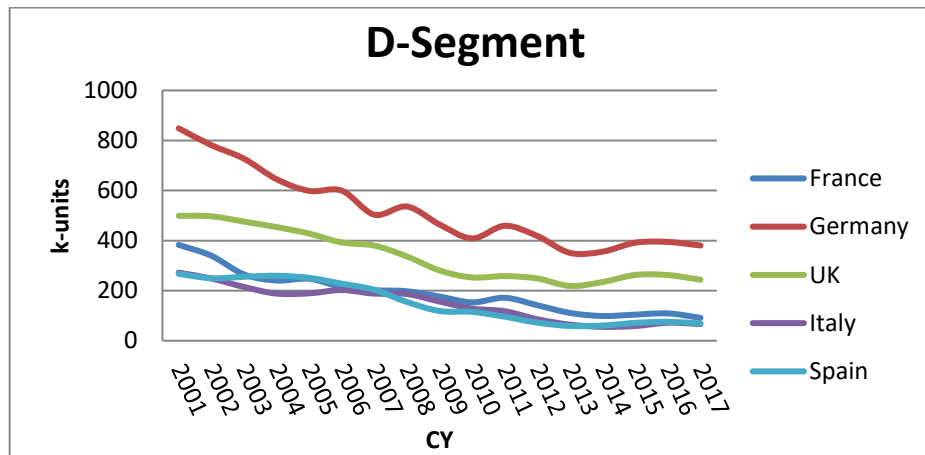


Figure 10 D-Segment 2001-2017 trend 5MM

- E segment (full-size cars): these cars are usually denoted for their length (equal to or above 5 m) and luxury interior styling. Body types can vary a lot and include sedans, wagons and hatchbacks. Being large, they are also often used as taxis in certain countries.

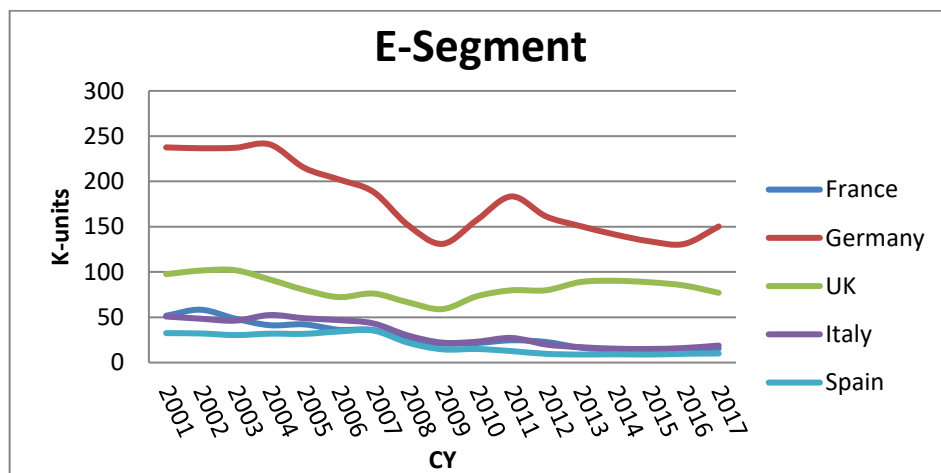


Figure 11 E-Segment 2001-2017 trend 5MM

- G segment (luxury cars): Usually the vehicles are large and have four-doors, but in more recent years, coupés and convertibles have started to emerge.

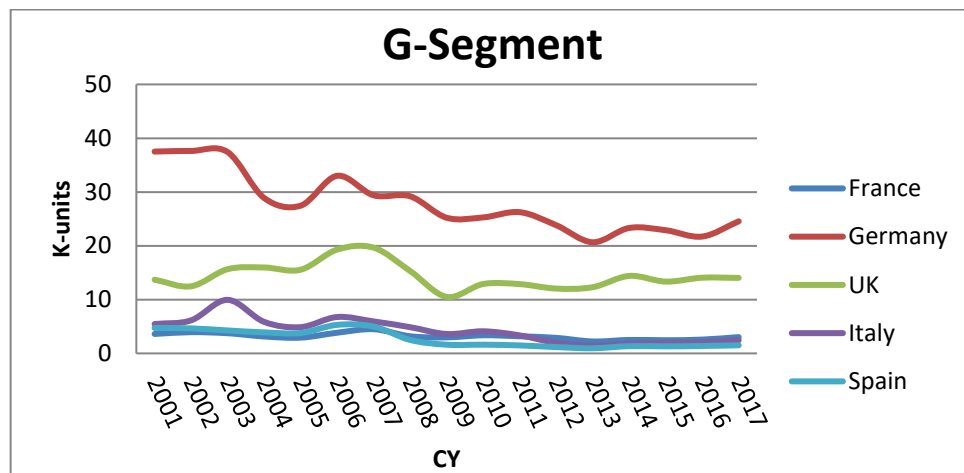


Figure 12 G-Segment 2001-2017 trend 5MM

- H segment (specialty cars): it represents a niche market and it includes all the spider and coupé specific series.

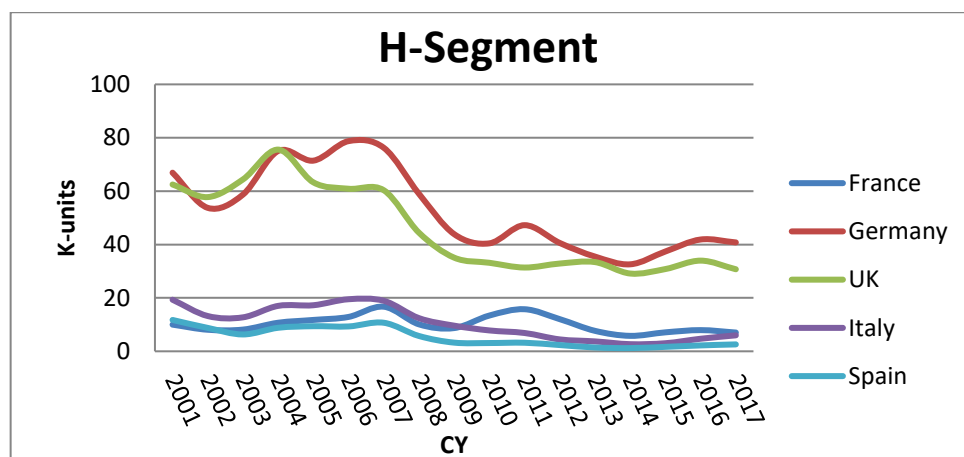


Figure 13 H-Segment 2001-2017 trend 5MM

- I segment (Sport Utility Vehicles): it includes all the SUV and the off-road vehicles. It is becoming an interesting segment due to its rise of market share during the last years. Due to its interesting positioning, it can be split in:
  - I0 (small)

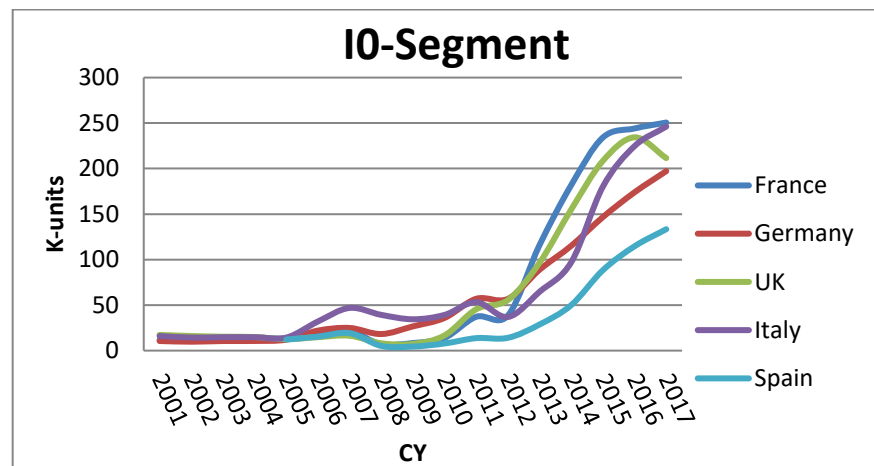


Figure 14 I0-Segment 2001-2017 trend 5MM

- I1 (compact)

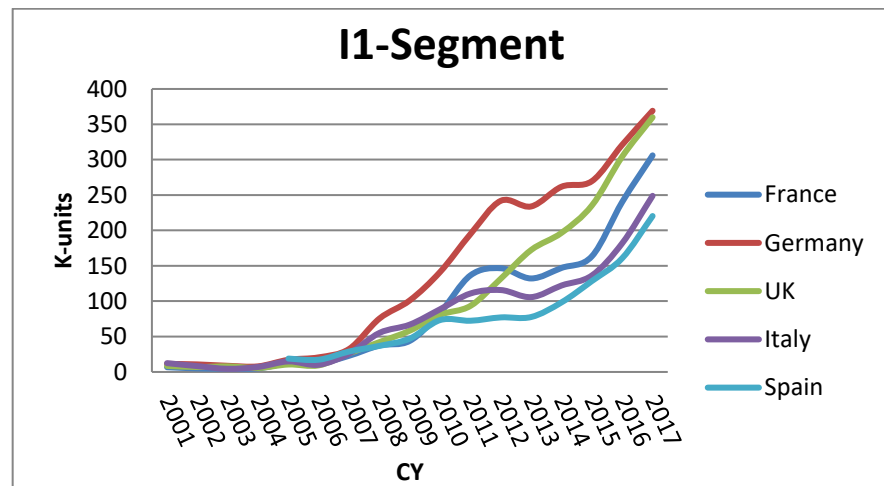


Figure 15 I1-Segment 2001-2017 trend 5MM

- I2 (mid-sized)

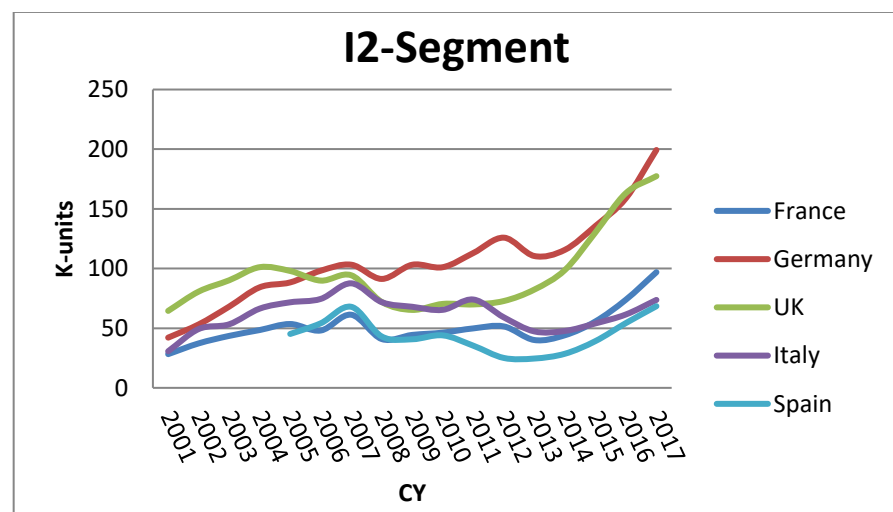


Figure 16 I2-Segment 2001-2017 trend 5MM

○ I3 (full-sized)

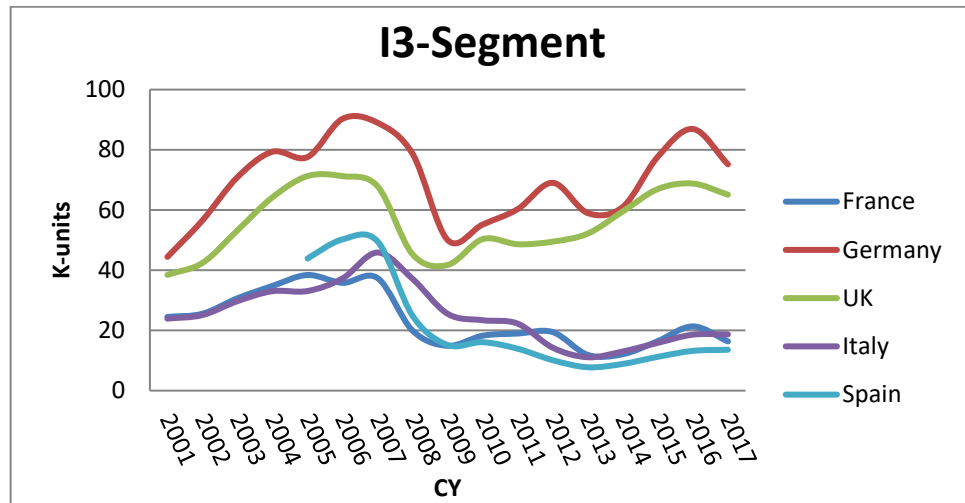


Figure 17 I3-Segment 2001-2017 trend 5MM

- L segment (Multi-Purpose Vehicles): These vehicles are commonly used for multi-tasking, in particular those models with removable (or folding flat) seats to transport also objects. Over the decades, they have gained popularity with large families mainly due to sliding doors that increase accessibility and to big roominess for the seats. Luxury MPVs have also emerged. It can be split in:

- L0 (small): as can be noticed in Figure 18, this segment suffered the explosion of I0-Segment of the last 10 years; this is due to the similar price range of products and the similar age range of potential customers.

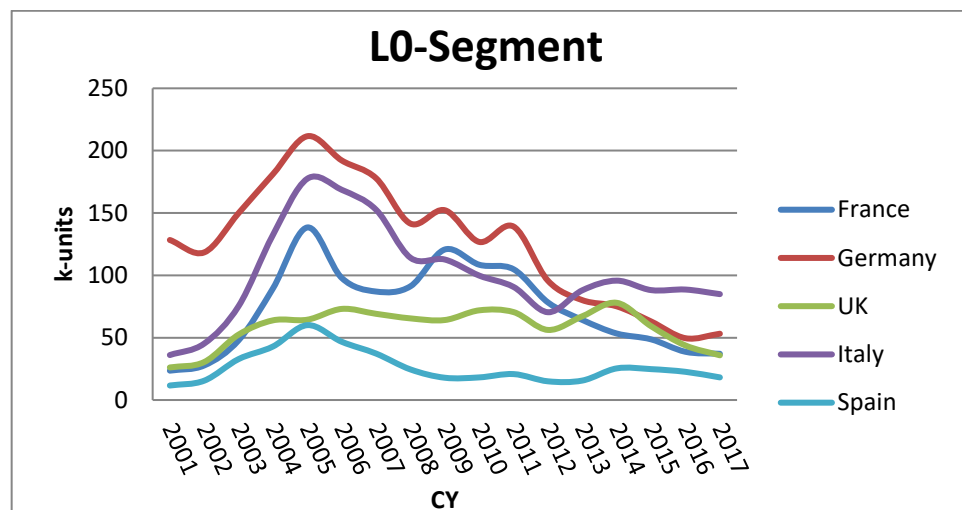


Figure 18 L0-Segment 2001-2017 trend 5MM

○ L1 (compact)

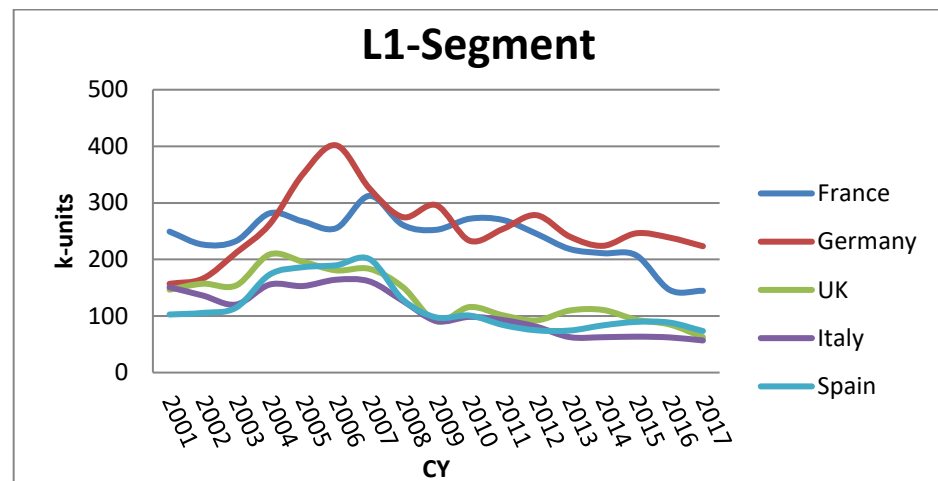


Figure 19 L1-Segment 2001-2017 trend 5MM

○ L2 (mid-full-sized)

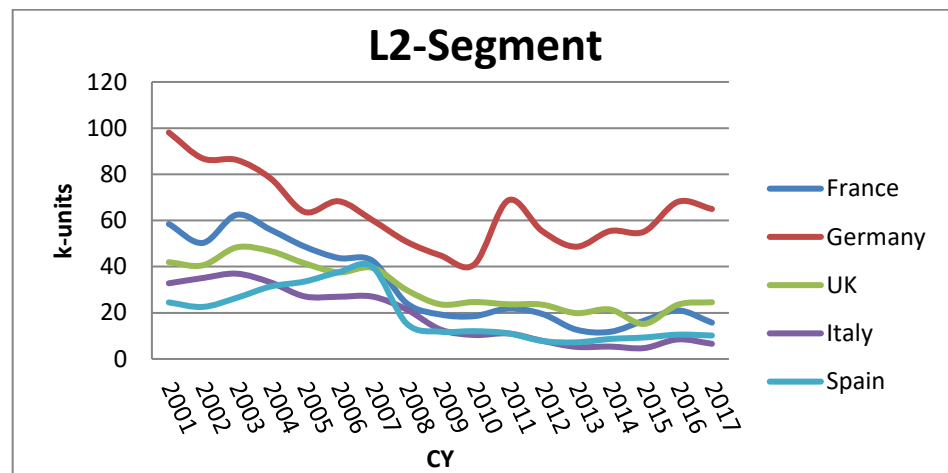


Figure 20 L2-Segment 2001-2017 trend 5MM

- PU segment (pick-up vehicles): it can be considered a niche segment with stable registrations over years.

In the recent years, as can be noticed in Figure 21, sales are starting to emerge pointing out the attention on UK market where they are almost tripled in the last decade.

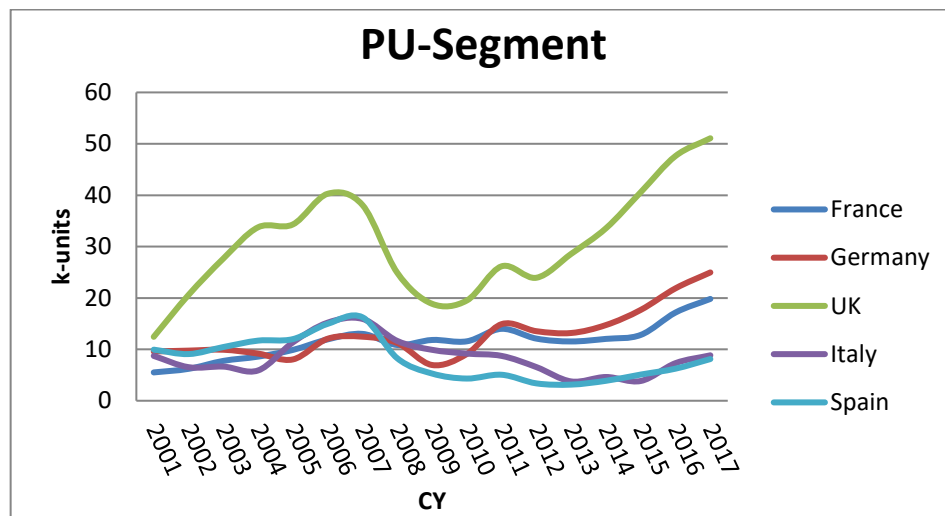


Figure 21 PU-Segment 2001-2017 trend 5MM

- S segment (sport cars): the trend of this segment has not been analyzed due to the not relevant volumes compared to the other segments.

This analysis focuses on the most relevant segment from an historical and volume point of view. Segment G, H, PU and S are not considered due to non-relevant volume and highly variable demand.

In Germany it is possible to notice a general peak of registration in 2009 due to government incentives, developed to react the worldwide crisis that affected the industry in 2008; this is visible mainly in segments A, B and C as in graphs of Figure 7, Figure 8 and Figure 9.

In France in 2009 the government offered one thousand euro for the substitution of old and polluting cars again to react to the automotive sales collapse; it is possible to notice the peak of registrations mainly in segments A and B as in Figure 7 and Figure 8.

### Segmentation in the 5MM

Considering the five Major Markets analyzed, the segments have a different impact on each market.

To better understand this behavior, the “weight” of the segments in each country has been analyzed in terms of percentage of cars sold per year.

To improve the comprehension of the charts from Figure 22 to Figure 26, some segments were grouped in “families” as:

- I segment: it includes all the SUV vehicles (I0, I1, I2 and I3);
- L segment: it includes all the multipurpose vehicles (L0, L1 and L2);



- Minor segments that include E-segment, G-segment and H-segment, gathered due to the small volumes registered in the years.

In Italy A-Segment represented an important portion of the industry in the last 17 years with a quite constant trend.

It clearly appears the smooth increase of “weight” of the I-Segments with a reduction of D-Segment and in the B-Segment even more.

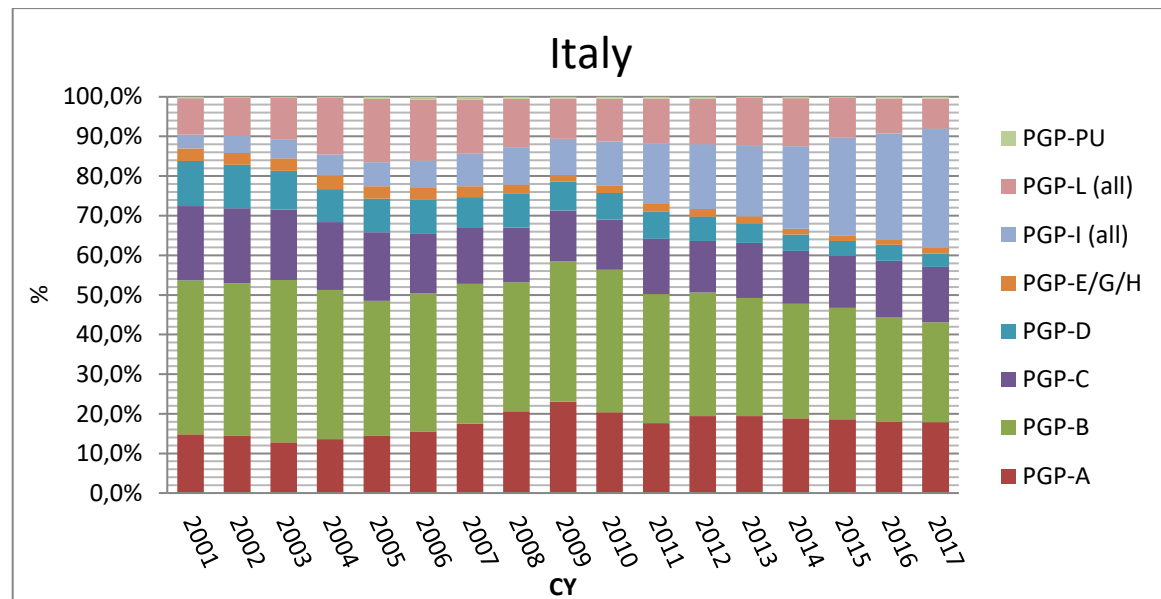


Figure 22 Segments weight in Italy

In France the increase of popularity of I-Segments has been steeper, since it started later respect to the other markets. In this case the weight got by the SUVs has been kept mainly from the L-Segment.

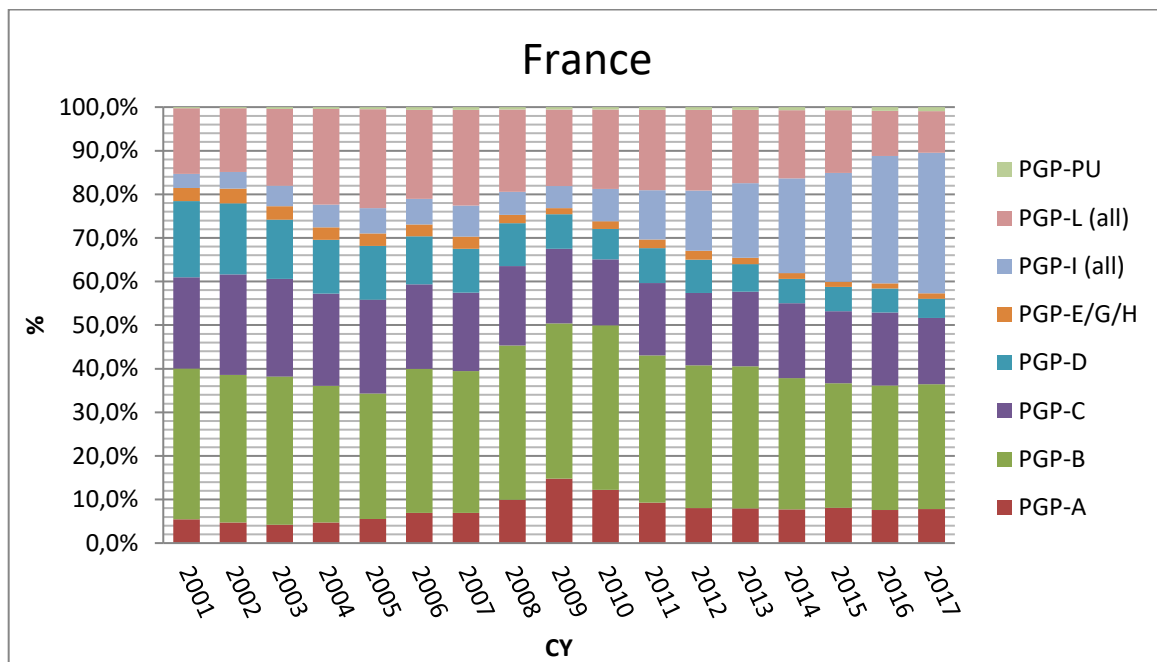


Figure 23 Segments weight in France

Germany represents a more stable market, in which it is possible to notice a smooth increase of the I-Segments and a reduction of “weight” of D-Segment.

It is historically characterized by the appreciation by customers of highest segments, both “normal” cars and SUVs.

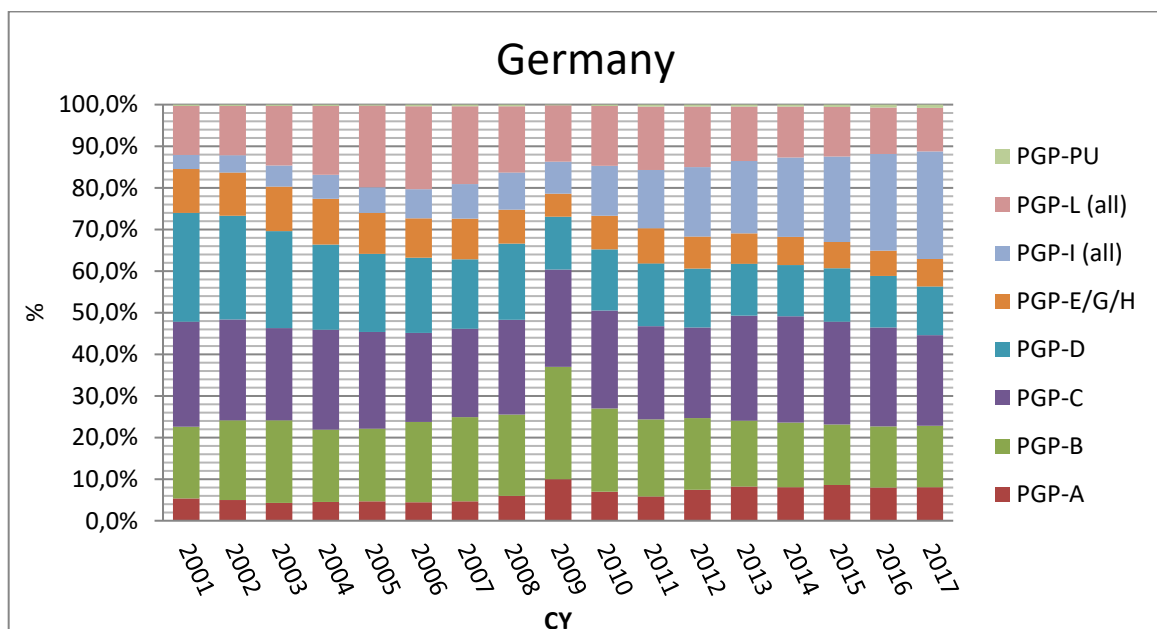


Figure 24 Segments weight in Germany



In Spain the economic crisis had the biggest impact, with a reduction of the importance of the highest segments; these segments were substituted in the first period by L-Segments and later by the I-Segments, as in all the 5MM.

In this graph for Spain the I-Segments start in 2005, due to a lack of information in the company system before that year.

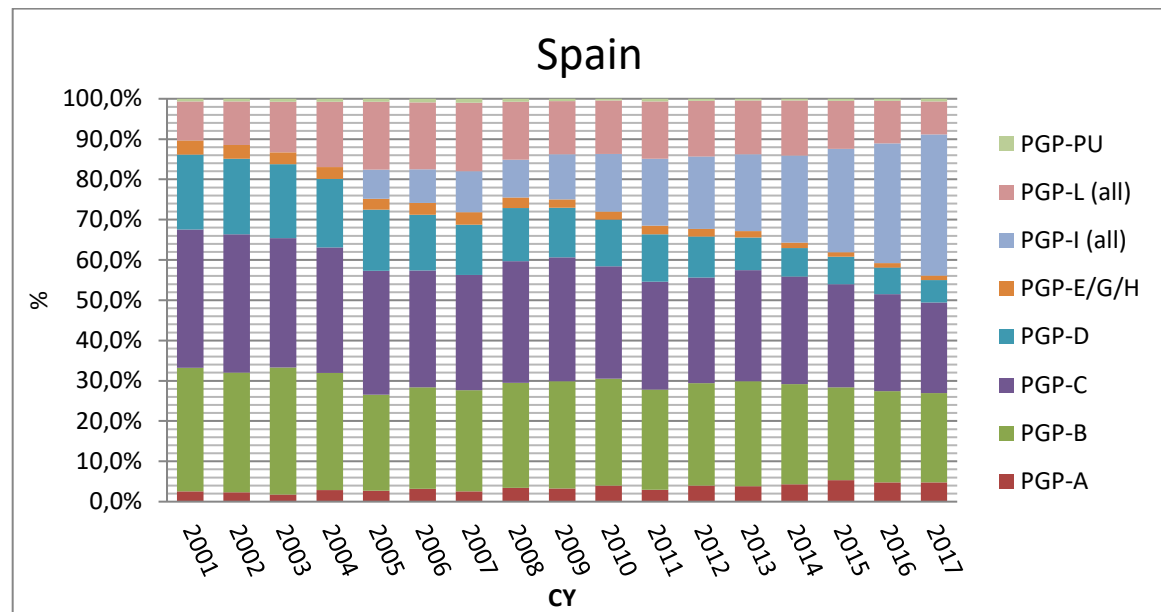


Figure 25 Segments weight in Spain

In UK can be interesting to appreciate a bigger importance of PU-Segment respect to the other countries and a quite stable behaviour with the exception of D-Segment that has been affected by a decrease year over year of the share.

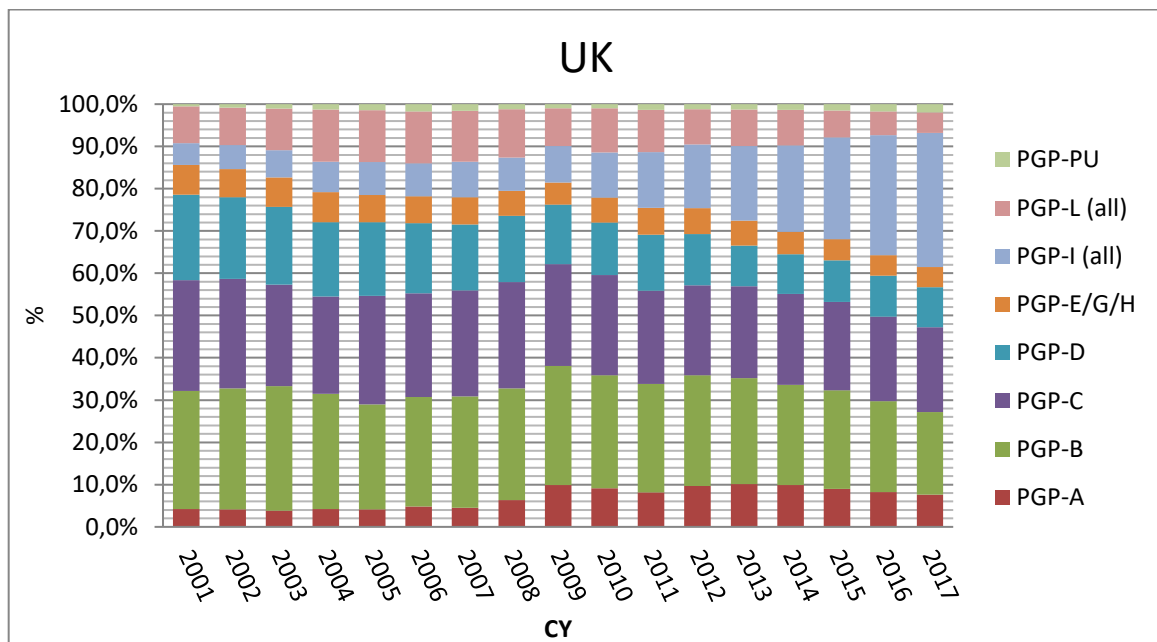


Figure 26 Segments weight in UK

From a general point of view, it is possible to underline 2 main concepts:

- SUV segment is one of the most attractive due to its continuous expansion and this is also confirmed by the increase of competitors and models; the latter rose up from 42 in 2001 up to 100 in 2017. The computations to get the table in Figure 27 will be analysed in Section 3.1.3.

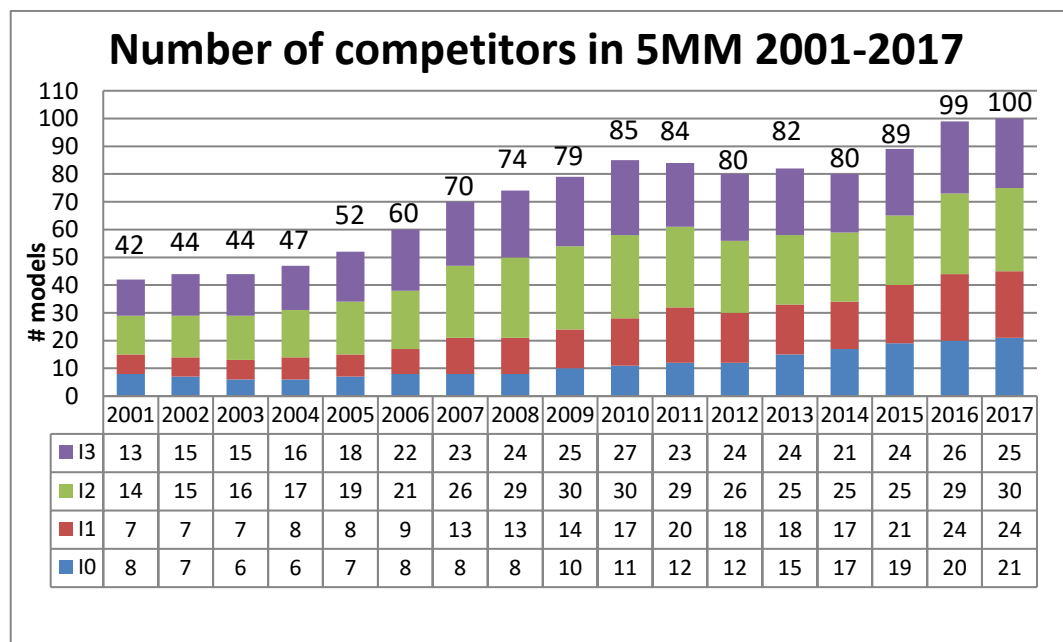


Figure 27 Increase of models in I-Segments in 5MM in the new millennium

- L-Segments were a growing industry up to the Great Recession of 2006, when they started a decline phase;
- The economic crisis influenced mainly the highest segments (D, E, G and H).

## 2.3 Car Manufacturers

Every year the industry scenario changes, with the major car manufacturers fighting to get few points in the market share and try to improve their ranking.

In Table 2 is reported the European (EU + EFTA) car manufacturer groups ranking relative to CY2017<sup>1</sup>.

Table 2 2017 EU + EFTA groups ranking

Sales 2017			
#	Group	Sales	mkt share %
1	VW Group	3717566	23,78%
2	PSA Group	1885553	12,06%
3	RENAULT Group	1628472	10,42%
4	FCA Group	1044714	6,68%
5	BMW Group	1042580	6,67%
6	FORD	1031957	6,60%
7	DAIMLER	992528	6,35%
8	TOYOTA Group	717849	4,59%
9	GM	600904	3,84%
10	NISSAN	566191	3,62%
11	HYUNDAI	523258	3,35%
12	KIA	472125	3,02%
13	VOLVO CAR CORP.	303312	1,94%
14	SUZUKI	244877	1,57%
15	MAZDA	231925	1,48%
16	JAGUAR LAND ROVER Group	221039	1,41%
17	HONDA	140343	0,90%
18	MITSUBISHI	114182	0,73%
	<b>Total EU &amp; EFTA</b>	<b>15631687</b>	

Since many groups are made up of several automakers, it can be interesting to analyse the ranking of the single brands in 2017<sup>4</sup>.

<sup>4</sup> New passenger vehicle registration data about 2017 released by the ACEA.



Table 3 2017 EU + EFTA brands ranking

Sales 2017			
#	Group	Sales	mkt share %
1	VOLKSWAGEN	1706369	10,92%
2	RENAULT	1150498	7,36%
3	FORD	1031957	6,60%
4	PEUGEOT	925113	5,92%
5	MERCEDES	893574	5,72%
6	BMW	827137	5,29%
7	AUDI	826370	5,29%
8	FIAT	779534	4,99%
9	SKODA	705421	4,51%
10	GM	600904	3,84%
11	CITROEN	569728	3,64%
12	NISSAN	566191	3,62%
13	HYUNDAI	523258	3,35%
14	DACIA	472800	3,02%
15	KIA	472125	3,02%
16	SEAT	400968	2,57%
17	Opel (PSA)	344848	2,21%
18	VOLVO CAR CORP.	303312	1,94%
19	SUZUKI	244877	1,57%
20	MAZDA	231925	1,48%
21	MINI	215443	1,38%
22	LAND ROVER	151566	0,97%
23	HONDA	140343	0,90%
24	MITSUBISHI	114182	0,73%
25	JEEP	108655	0,70%
26	SMART	98954	0,63%
27	ALFA ROMEO	85691	0,55%
28	PORSCHE	73456	0,47%
29	JAGUAR	69473	0,44%
30	TOYOTA	67351	0,43%
31	LANCIA/CHRYSLER	60805	0,39%
32	DS	45864	0,29%
33	LEXUS	44339	0,28%
	<b>Tot EU + EFTA</b>	<b>15631687</b>	

The Volkswagen Group easily remained Europe's largest car manufacturer despite losing market share for the second consecutive year in 2017. The Volkswagen Group increased sales by 2.1% but market share shrank to 23.8% in 2017 – a percentage point lower than in 2015.

The PSA Group regained second place at the expense of Renault. PSA Group sales went up 28% but this gain is somewhat artificial as Opel sales were included since August 2017.



Nonetheless, both Peugeot and Citroen improved sales above market average. In contrast, DS sales were down by 30% – no brand performed worse in Europe in 2017.

Although the Renault Group sank back to third place, both Renault and Dacia brands outperformed the broader market.

The FCA Group moved ahead of BMW with Fiat, Jeep and Alfa Romeo increasing sales, while Lancia/Chrysler sales were lower. Alfa Romeo was the best-performing brand in Europe in 2017.

The BMW Group increased sales below market average with both BMW and Mini brands underperforming.

The Daimler Group had another strong year with Mercedes Benz sales up 6% but Smart sales down 6%.

The Toyota Group had a good year with Toyota branded cars increasing sales by around 80,000 cars – no other brand added more cars in 2017.

In the analysis, the cars are considered divided by segment and country.

In order to identify the considered models firstly were identified the FCA cars and secondly all those vehicles with a significant market share in their segment.

For all the models that are in the market from a lot of years were considered - when possible - the series launched starting from January 2001 up to December 2017. It allows to identify possible common trends between series following the first of different models and brands. The main brands are analyzed in the following chapters, with a description of the considered models divided by segment. In particular the analysis was applied to 128 different models considered or as a new series or as a completely new vehicle.

### **2.3.1 FCA (Fiat Chrysler Automobiles)**

FCA is an Italian-controlled global automaker ranked eighth in the world in 2016 (about 4.8 million cars sold).

The group was established in 12th October 2014 by merging Fiat S.p.A. into a new holding company, Fiat Chrysler Automobiles (FCA). The holding company is listed on the New York Stock Exchange and Borsa Italiana in Milan.

FCA's mass-market brands operate through two main subsidiaries: FCA Italy (previously Fiat Group Automobiles) and FCA US (previously Chrysler LLC).

The company's portfolio includes automotive brands Abarth, Alfa Romeo, Chrysler, Dodge, Fiat, Fiat Professional, Jeep, Lancia, Maserati, Ram Trucks and SRT. Up to 2016



Ferrari was part of the group and was then separated by a restructuring that established Ferrari NV as a new holding company. FCA also owns industrial subsidiaries Comau, Magneti Marelli, Mopar and Teksid.



FCA operates in four regions: NAFTA, LATAM, APAC and EMEA.

FCA in numbers can be represented as 1 group present in more than 40 Countries and 140 Markets with 162 Plants and 87 R&D centers. The group has more than 231 thousand employees. About the economics the Group had a revenue of 110 billion of euros in the 2016 with more than 4.8 million of vehicle sold.

*Fiat*



FIAT (Italian acronym: Fabbrica Italiana Automobili Torino), was founded in 1899 in Turin as company for vehicles production, then developed its business in different sectors becoming the most important industrial and financial private Italian industrial group and the first Italian Holding.

During its history Fiat entered different businesses such as telecommunications, railways, military and home appliances.



Now its business varies from mini to medium vehicle segments. The brand identity focuses on flexibility, easiness, affordability and efficiency.

The main models analyzed in the following chapter are reported here below divided by segment:

- **A segment:** Panda and 500
- **B segment:** Punto
- **C segment:** Bravo, Stilo and Tipo
- **D segment:** Croma
- **L0 segment:** Idea, 500L, 500Living
- **L1 segment:** Multipla
- **L2 segment:** Ulysse
- **I0 segment:** Sedici and 500X
- **I2 segment:** Freemont

### *Fiat professional*



Figure 30 Fiat Professional brand

Fiat professional represent the Fiat division that produces LCV. Founded in 2007 it substituted the Fiat Veicoli Commerciali - Fiat LCV.

It produces and commercialize Ducato, Fiorino, Doblò, Fullback, Talento and all the van versions of Fiat models (e.g. Punto Van, Panda Van).

### *Jeep*



Figure 31 Jeep brand

Jeep is a brand of American automobiles; its current product range consists solely of sport utility vehicles and off-road vehicles, but has also included pickup trucks in the past. The original Jeep was the prototype Bantam BRC developed by USA army. Willys MB (then commercialized as Jeep) went into production in 1941 specifically for the military, arguably making them the oldest four-wheel drive mass-production vehicles now known as SUVs. The Jeep became the primary light 4-wheel-drive vehicle of the United States Army and the Allies during World War II, as well as the postwar period. The term became common worldwide in the wake of the war. Many explanations of the origin of the word jeep have proven difficult to verify. The most widely held theory is that the military



designation GP (for Government Purposes or General Purpose) was slurred into the word Jeep. In 1987 it became part of Chrysler Group. It is now a globally recognized brand focused on SUV and off-road vehicles market.

The main models analyzed in the following chapter are reported here below divided by segment:

- **I0 segment:** Renegade
- **I1 segment:** Patriot, Compass and New Compass
- **I2 segment:** New Cherokee and Wrangler
- **I3 segment:** Grand Cherokee

### *Alfa Romeo*



Figure 32 Alfa Romeo

Alfa Romeo is an Italian car manufacturer focused on sporty vehicles. Founded in Milan in the 1910 as ALFA (Italian acronym “Anonima Lombarda Fabbrica Automobili”) in 1918 it changed its name in ALFA ROMEO after the acquisition of the company by Nicola Romeo. During its history the brand took part to several competitions, being World Champions of the first two editions of Formula 1 competition. In 1986 it became part of “Alfa-Lancia Industrial”, controlled by FIAT and then Fiat Group.

Nowadays with the launch of the new models it is trying to re-establish itself as a premium brand, with the “Driving Pleasure” as first proposition.

The main models analyzed in the following chapter are reported here below divided by segment:

- **B segment:** MiTo
- **D segment:** 159 and Giulia
- **I2 segment:** Stelvio

### *Lancia*



Figure 33 Lancia brand

Lancia is one of the most ancient Italian automotive manufacturer, founded in 1906 in Turin by Vincenzo Lancia focusing in luxury vehicle. In 1969 the Company was acquired by Fiat and then in 1986 it became part of the Alfa-Lancia industrial controlled by Fiat and then Fiat Group. In 2011 Lancia models were linked to Chrysler ones after the Fiat-Chrysler alliance; the 2 brands shared some models up to



2014, when FCA decided to focus the brand on small segment cars targeted toward Italian market.

The main models analyzed in the following chapter are reported here below divided by segment:

- **B segment:** Ypsilon
- **L2 segment:** Phedra

### *Abarth*



Figure 34 Abarth brand

Founded by Carlo Abarth and Guido Scagliarini in 1949, it was born as sport stable specialized in production of small series sport vehicle and exhaust system. In 1971 was sold to Fiat, and became the Fiat Group's racing department. On 1 October 1981, Abarth & C. ceased to exist and was replaced by Fiat Auto Gestione Sportiva, a division of the parent company specialized in the management of racing

programs. In 2007 Abarth was re-established as an independent company owned 100% by Fiat Group Automobiles.

Now it is specialized in performance modification for on-road sports. Actual models modified by Abarth are 500, 500C and 124 Spider.

### *Maserati*



Figure 35 Maserati brand

Founded in Bologna in 1914 by Alfieri Maserati, now based in Modena. During its history it took part to several automotive competitions. In the sixties it became one of the most prestigious car maker. In 1993 the Fiat Group acquired Maserati by De Tomaso.

It is now a globally recognized brand focused on luxury, sport and style cast exclusive cars.

In the following analysis Ghibli (**E segment**) and Levante (**I3 segment**) have been considered.

### *Chrysler*



Figure 36 Chrysler brand

Founded in 1925 by Walter Chrysler, it is an American car company. It is the first brand which introduced the wind tunnel for the automotive design. In the 2009 Chrysler Group became

part of the Fiat Group.

Now it aims to create vehicles with distinctive design, intuitive innovation and technology.



### *Dodge*



Figure 37 Dodge brand

Founded In 1914 as Dodge Brothers Motor Vehicle Company by the Dodge Brothers, they were already present on the market as supplier of

parts and assemblies for automakers based in Detroit. In 1928 the company was acquired by Chrysler Group.

The first vehicle was placed as a competitor of Ford model T with better performances. Then it became iconic for its Muscle cars. Now it offers vehicles with very high performances as well as lower-priced variants of Chrysler's vehicles.

### *RAM*



Figure 38 Ram brand

Formally known as Ram Truck Division, it is a brand of light to mid-weight commercial vehicles established in 2009 as a division of Dodge brand. Its logo was originally Dodge logo. Ram brand concentrate on "Real Truck Customers" rather than casual truck buyer who buy trucks for image or style.

### *SRT*



Figure 39 SRT brand

SRT (acronym of Street Racing Technology) was born in 2002 as a division of Chrysler brand, focused on the development of sport kit for vehicles of the carmaker. In

2012 it became carmaker with the launch of the new SRT Viper, and in 2014 it was re-consolidated under Dodge brand.

### *Mopar*



Figure 40 MOPAR brand

Acronym of MOtor PARTs, it is the parts, service and customer care authorized division of FCA.

This term was first used in 1920, and in the Sixties and Seventies was linked to Muscle car of Chrysler group.

### *Teksid*



Figure 41 Teksid brand

Teksid, originally called "Fiat Ferriere", is an Italian company specialized in the production of iron and castings for the



automotive industry. Currently it has seven plants and it operates on two different lines: cast iron and aluminum.

### **Comau**



Figure 42 Comau

Acronym of CONsorzio MACchine Utensili, it is an integrated company specialized in industrial automation founded in 1973. Currently it includes 35 operative centers, 15 manufacturing plants and 5 innovation centers worldwide. The company offers complete and comprehensive solutions, services, products and technologies to meet specific manufacturing needs.

### **Magneti Marelli**



Figure 43 Magneti Marelli brand

Magneti Marelli was founded in 1919 as F.I.M.M. (Fabbrica Italiana Magneti Marelli) as a joint venture between FIAT and Ercole Marelli. It currently deals with intelligent systems for active and passive vehicle safety as well as powertrain systems. Business lines include automotive lighting systems, body control systems, powertrain control systems, electronic instrument clusters, telematics systems, and computers, suspension systems and components, exhaust systems, and motorsport, wherein Magneti Marelli develops specific electronic systems for Formula One, Motorcycle Grand Prix and the World Rally Championship.

## **2.3.2 Volkswagen AG**

The Volkswagen Group with its headquarters in Wolfsburg, Germany is one of the world's leading manufacturers of automobiles and commercial vehicles and the largest carmaker in Europe.

Volkswagen was founded in 1937, to manufacture the car which would become known as the Beetle. The company's production grew rapidly in the 1950s and 1960s, and in 1965 it acquired Auto Union, which subsequently produced the first post-war Audi models. Volkswagen launched a new generation of front-wheel drive vehicles in the 1970s. Volkswagen acquired a controlling stake in SEAT in 1986, making it the first non-German marque of the company, and acquired control of Skoda in 1994, of Bentley, Lamborghini and Bugatti in 1998, Scania in 2008 and of Ducati, MAN and Porsche in 2012. The company's operations in China have grown rapidly in the past decade with the country becoming its largest market.

On 18 September 2015, The US EPA announced that Volkswagen had installed a "defeat device" software code in the diesel models sold in the US from 2009 to 2015. The code was intended to detect when an emissions test was being conducted, and altered emissions controls for better compliance.

In 2016, Volkswagen Group announced a corporate "Strategy 2025" that aims to offer 20 new electric cars or plug-in hybrid models by 2020 and 30 all-electric models by 2025.

It owns more than 120 plants worldwide and includes 12 brands: Volkswagen, Audi, Seat, Skoda, Bentley, Bugatti, Lamborghini, Porsche in car field; Ducati in motorcycle field; Scania and Man in the commercial vehicle field.



Figure 44 Volkswagen Group brands

### *Volkswagen*

The Volkswagen brand stands for innovative, high-quality and reliable cars; among the models Beetle and Golf are the two most famous.

The main models analyzed in the following chapter are reported here below divided by segment:

- **A segment:** Up!
- **B segment:** Polo
- **C segment:** Golf
- **L1 segment:** Golf Plus and Touran
- **I1 segment:** Tiguan
- **I3 segment:** Tuareg



### ***Audi***

Part of Volkswagen Group since 1965, the company operates in more than 100 markets. The company sees itself as a provider of sustainable, individual, premium mobility, delighting customers across the globe with its digital products and services.

The main models analyzed in the following chapter are reported here below divided by segment:

- **B segment:** A1
- **D segment:** A4
- **E segment:** A6 and A7

### ***Porsche***

The main models analyzed in the following chapter are reported here below divided by segment:

- **I3 segment:** Cayenne

### **2.3.3 PSA Group**

Groupe PSA is a French multinational manufacturer of automobiles and motorcycles sold under the Peugeot, Citroën, DS, Opel and Vauxhall brands.



Figure 45 PSA Group brands

The group was founded in 1976 when Peugeot acquired the majority of stakes of Citroën founding the PSA (Peugeot Société Anonyme).

DS is the premium brand of Groupe PSA. The DS marque was first announced in early 2009 by Citroën as a premium sub-brand added to certain models. Since 2015 (and since 2012 in China), the Citroën branding has been dropped from the DS line models, and DS has continued as a standalone premium brand.

In 2017, Groupe PSA agreed to buy Opel and its English sister brand Vauxhall and their European auto lending business from General Motors, with the idea to transform the company into an electric-car-only brand using the platform of the Opel Ampera-e for a wide range of models.





### ***Peugeot***

Stimulating and rewarding driving, a sleek design and uncompromising quality are the brand's commitment to its customers.

The main models analyzed in the following chapter are reported here below divided by segment:

- **A segment:** 107 and 108
- **B segment:** 207 and 208
- **C segment:** 307 and 308
- **I0 segment:** 2008

### ***Citroën***

Founded in 1919, Citroën was one of the early pioneers of the aerodynamic automobile design, which helps to reduce fuel consumption and to improve high-speed performance, by reducing wind resistance.

The main models analyzed in the following chapter are reported here below divided by segment:

- **A segment:** C1
- **C segment:** C4
- **L0 segment:** C3 Picasso
- **L1 segment:** C4 Picasso

### ***Opel***

Founded in 1862 in Germany by Adam Opel, its current brand identity focuses on quality, technology and innovation at accessible price.

The main models analyzed in the following chapter are reported here below divided by segment:

- **B segment:** Corsa
- **D segment:** Insignia
- **L0 segment:** Meriva
- **I0 segment:** Mokka



### 2.3.4 Renault-Nissan-Mitsubishi Alliance

Originally known as the Renault–Nissan Alliance, Renault and Nissan became strategic partners in 1999, and control ten major brands: Renault, Nissan, Mitsubishi, Infiniti, Renault Samsung Motors, Dacia, Alpine, Datsun, Venucia, and Lada.



Figure 46 Nissan-Renault-Mitsubishi Alliance brands

The Alliance adopted its current name in September 2017, one year after Nissan acquired a controlling interest in Mitsubishi and subsequently making Mitsubishi an equal partner in the Alliance. The three companies are joined together through a cross-sharing agreement. The group is the world leader in electric vehicles.

#### *Renault*

The main models analyzed in the following chapter are reported here below divided by segment:

- **A segment:** Twingo
- **B segment:** Clio
- **I0 segment:** Captur
- **I1 segment:** Kadjar
- **L0 segment:** Modus
- **L2 segment:** Espace

#### *Nissan*

The main models analyzed in the following chapter are reported here below divided by segment:

- **B segment:** Micra
- **I0 segment:** Juke
- **I1 segment:** Qashqai
- **I2 segment:** X-Trail

#### *Dacia*

The main model analyzed in the following chapter is reported here below divided by segment:

- **I1 segment:** Duster



### 2.3.5 Toyota Group

Founded in 1937 as Toyota Motor Co. Ltd, the first vehicle landed in Europe (in particular in Malta) in the summer of 1960. Currently the group operates in several manufacturing and business activities such as marine, biotechnology and industrial equipment.

Toyota is the world's market leader in sales of hybrid electric vehicles, one of the largest companies to encourage the mass-market adoption of hybrid vehicles across the globe, and the first to commercially mass-produce and sell such vehicles, with the introduction of the Toyota Prius in 1997.

The corporate started a project, called Lexus, to develop a new premium sedan, which began in 1983 and culminated in the launch of the Lexus LS in 1989. Subsequently, the division added sedan, coupé, convertible and SUV models. Lexus did not exist as a brand in its home market until 2005, and all vehicles marketed internationally as Lexus from 1989 to 2005 were released in Japan under the Toyota brand and an equivalent model name.

#### *Toyota*

Leader in sales of Hybrid vehicles, its current vision focuses on safety, quality, durability and environmental performance.

The main models analyzed in the following chapter are reported here below divided by segment:

- **A segment:** Aygo
- **B segment:** Yaris
- **C segment:** Auris
- **I2 segment:** Rav4

### 2.3.6 Suzuki

Suzuki Motor Corporation is a Japanese multinational corporation that manufactures automobiles, four-wheel drive vehicles, motorcycles, all-terrain vehicles, outboard marine engines, wheelchairs and a variety of other small internal combustion engines.

Founded in 1909 as Suzuki Loom Works in Japan, its business boomed as Suzuki built weaving looms for Japan's giant silk industry. Despite the success of looms, Suzuki believed that its business would benefit from diversification and it began to look at other products. Based on consumer demand, the company decided that building small cars would



be the best choice. The project began in 1937, and within two years Suzuki had completed several compact prototype cars.

The main model analyzed in the following chapter is reported here below divided by segment:

- **I0 segment:** Sx4

### **2.3.7 Tata Group**

Tata Group is an Indian multinational conglomerate holding company headquartered in India. It was founded in 1868 and gained international recognition after purchasing several global companies. It is one of India's largest conglomerates and it includes Tata Motors. In 2008 the group bought an important European corporate from Ford such as Jaguar Land Rover starting a complete restyle of the whole portfolio.

#### ***Jaguar***

Luxury vehicle brand of the Jaguar Land Rover, it was founded in 1922, originally making motorcycle sidecars before developing bodies for passenger cars.

The aim of this brand is a mix between performances, innovative design and luxury.

The main model analyzed in the following chapter is reported here below divided by segment:

- **E segment:** Xf

#### ***Land Rover***

Car brand that specializes in four-wheel-drive vehicles, the Land Rover name was originally used by the Rover Company for the Land Rover Series, launched in 1948.

Currently the brand focuses on design, adventure and off-road.

The main model analyzed in the following chapter is reported here below divided by segment:

- **I3 segment:** Discovery

### **2.3.8 Daimler AG**

Daimler AG is a German multinational automotive corporation, headquartered in Germany. The group was the result of an Agreement of Mutual Interest signed in 1924 between Benz & Cie (founded 1883 by Karl Benz) and Daimler Motoren Gesellschaft (founded 1890 by Gottlieb Daimler and Wilhelm Maybach). Both companies continued to manufacture their separate automobile and internal combustion engine brands until 1926, when Benz & Cie.

and Daimler Motoren Gesellschaft AG formally merged—becoming Daimler-Benz AG—and agreed that, thereafter, all the factories would use the brand name of Mercedes-Benz on their automobiles.

Currently the group owns or has shares of different companies involved in the manufacturing of cars, buses, trucks and motorcycle.

In the automotive field it includes brands as Mercedes-Benz, AMG, Smart and Maybach.



Figure 47 Daimler AG automotive brands

### ***Mercedes-Benz***

Mercedes-Benz traces its origins to Karl Benz's creation of the first petrol-powered car, financed by Bertha Benz and patented in January 1886. The Mercedes automobile was first marketed in 1901 by Daimler Motors Corporation.

Starting from 2010 it is directly involved in Formula 1 championship.

The main models analyzed in the following chapter are reported here below divided by segment:

- **C segment:** A-Class
- **E segment:** E-Class
- **I3 segment:** GLE
- **L1 segment:** B-Class

### **2.3.9 BMW Group**

BMW (Bayerische Motoren Werke) is a Germany-based company which currently produces automobiles and motorcycles, but produced also aircraft engines until 1945.

The company was founded in 1916 and has its headquarter in Munich. Automobiles are marketed under the brands BMW (with sub-brands BMW M for performance models and BMW i for plug-in electric cars), Mini and Rolls-Royce. Motorcycles are marketed under the brand BMW Motorrad.



Figure 48 BMW Group brands

### ***BMW***

The main models analyzed in the following chapter are reported here below divided by segment:

- **C segment:** Series 1
- **E segment:** Series 5
- **I2 segment:** X3
- **I3 segment:** X5

### ***Mini***

Bought in 1994 by BMW from British Aerospace, in 2001 the first model was launched with a design like the old model of 1959. The idea was to recreate an icon in the B segment. The main model analyzed in the following chapter is reported here below divided by segment:

- **I0 segment:** Countryman

### **2.3.10 Hyundai Motor Group**

The group was formed through the purchase of 51% of South Korea's second-largest car company, Kia Motors with the luxury subsidiary Genesis Motor, by Hyundai Motor Company in 1998. The Hyundai Kia Automotive Group also refers to the group of affiliated companies interconnected by complex shareholding arrangements, with Hyundai Motor Company. Currently it represents the largest car manufacturers in South Korea.

### ***Hyundai***

Hyundai Motor Company was established in 1967 from the Hyundai Engineering and Construction Company. The company's first model, the Cortina, was released in cooperation with Ford Motor Company in 1968.

In the last years they focused on long lasting warranty, and a European design of the new models.



The main models analyzed in the following chapter are reported here below divided by segment:

- **A segment:** I10
- **I1 segment:** Tucson and Ix35

### ***Kia***

Kia was founded in December 1944 as Kyungsung Precision Industry, a manufacturer of steel tubing and bicycle parts. In 1998 was acquired by Hyundai due to a brand crisis.

The main model analyzed in the following chapter is reported here below divided by segment:

- **I1 segment:** Sportage

### **2.3.11 Ford Motor Company**

The Ford Motor Company (commonly referred as "Ford") is an American multinational automaker. It was founded by Henry Ford and incorporated on June 16, 1903. The company sells automobiles and commercial vehicles under the Ford brand and most luxury cars under the Lincoln brand. Ford also owns Brazilian SUV manufacturer, Troller, and Australian performance car manufacturer FPV. In the past, it has also produced tractors and automotive components.

Ford introduced methods for large-scale manufacturing of cars and large-scale management of an industrial workforce using elaborately engineered manufacturing sequences typified by moving assembly lines; by 1914, these methods were known around the world as Fordism.

The main model analyzed in the following chapter is reported here below divided by segment:

- **D segment:** Mondeo
- **L1 segment:** C-Max
- **L2 segment:** Galaxy and S-Max



### 3. Sales curve analysis in the launch period

The analysis aims at evaluating the volume and market share curves of the first 18 months of sales of new models launched from 2001 up to 2017.

The number of registrations considered refers to ACEA and ANFIA data.

ANFIA (Associazione Nazionale Fra le Industrie Automobilistiche), the Italian national association of automotive manufacturers, was established in 1912 and is the reference for the members on all issues (from technical, economic, fiscal and legislative to qualitative and statistical) regarding the mobility of people and goods.

It has the task of gathering data and information, providing official statistical data for the industry.

ANFIA publishes a yearly report, which is one of the fundamental references for statistical data on motoring in Italy and Europe.

The role of ACEA (Association des Constructeurs Europeen d'Automobile) in the European Union is similar to that of ANFIA in Italy; the major vehicle manufacturers with headquarters in Europe are associated with ACEA.

This association represents European manufacturers in the European Union under several activities, setting up research groups, supporting manufacturers with objective data and creating new legislative proposals in the fields of mobility, safety and environmental protection.

The market analysed are the five Major Markets -5MM- that are Italy, Germany, Spain, France and UK.

The key models analysed are the FCA Group models and those of the main competitors, subdivided by segment, with the aim to identify some common trends for each brand and segment.

Considering a generic brand x in a generic segment 1 the main factors analysed are:

- seasonality;
- number of competitors;
- brand market share;
- number of registrations in first 18 months of each model;
- the not-seasonal volume;
- the market share and its comparison with a theoretical value and the brand value.

### 3.1.1 Seasonality

The seasonality has been considered per each segment and each market considering all the registrations and computing the centred moving average on yearly basis  $MMC(12)$  as:

$$MM_t(12) = \frac{R_{t-5} + R_{t-4} + \dots + R_t + \dots + R_{t+5} + R_{t+6}}{12}$$

$$MMC_t(12) = MM_t(2) = \frac{MM_{t-1}(12) + MM_t(12)}{2}$$

Where  $R_t$  are the registration in the segment 1 at the month  $t$ ,  $MM_t(12)$  is the moving average with cycle of 12 months.

The Seasonality is computed as the ratio between the actual registrations at month  $t$  and the centred moving average based on 12 months at month  $t$ :

$$S_t = \frac{R_t}{MMC_t(12)}$$

The Seasonality values are plotted as in the graph of Figure 49 that refers to the segment I0 in the Italian market:

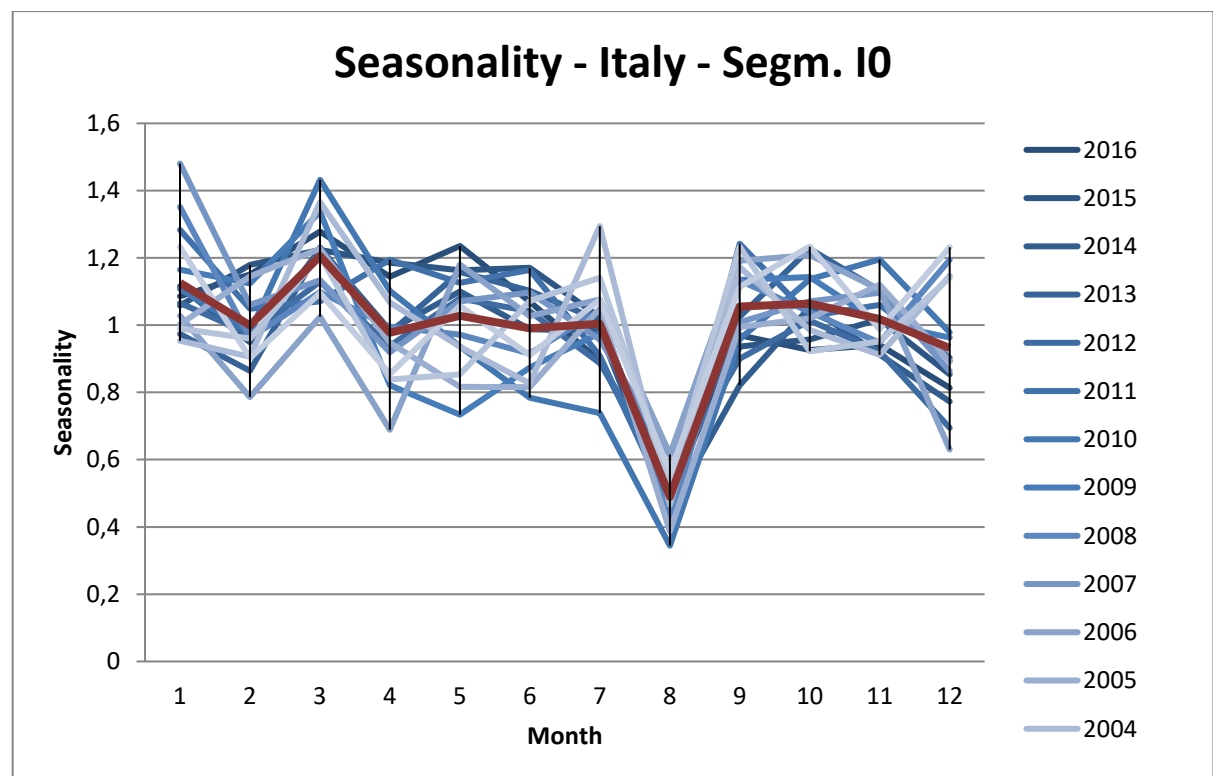


Figure 49 Example seasonality



It is possible to notice that year over year the values of Seasonality have a quite wide range of variability that in certain cases can go from values lower than zero to values higher than zero.

In order to check the variability of the Seasonality, the Estimate value has been computed as:

$$E_t = MMC_t(12) * \bar{S}_t$$

where  $\bar{S}_t$  is the average value of the Seasonality at month t.

The correlation between the Estimate and the Actual values has been verified plotting the values in a graph with the linear trend, as in Figure 50:

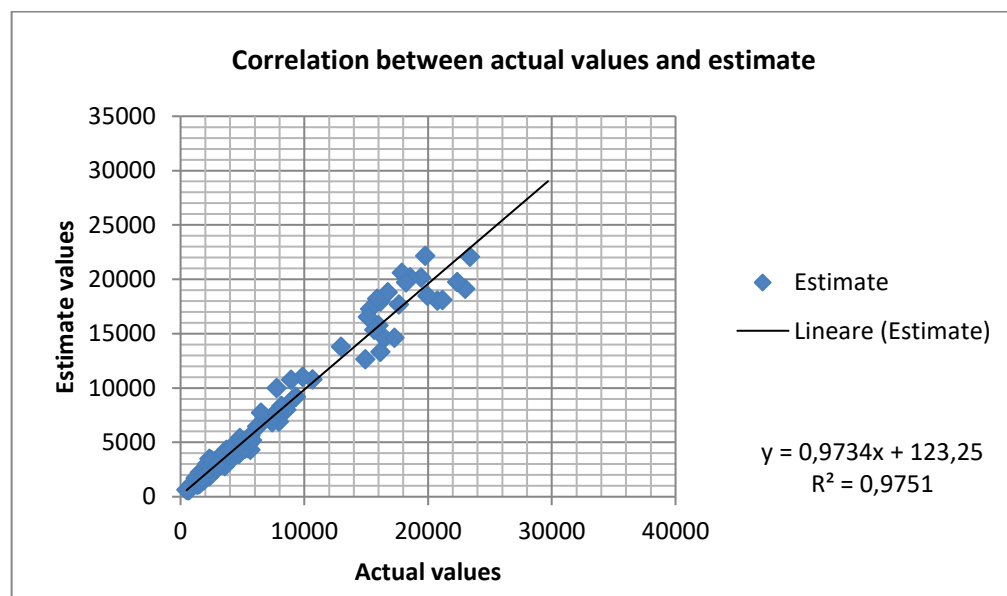


Figure 50 Correlation actual vs. estimate values

It is possible to notice that for values lower than 10.000 units the correlation is quite good, while for higher values it becomes less accurate, due to the high variability of Seasonality year over year, confirming the results of the previous graph.

Due to these reasons, the analysis considers the Seasonality values in the specific period of time when the models were launched. In this way the variability due to change of the market is overcome.

The complete trend of Seasonality for the segment I0 in the Italian market is reported in the graph (Figure 51):

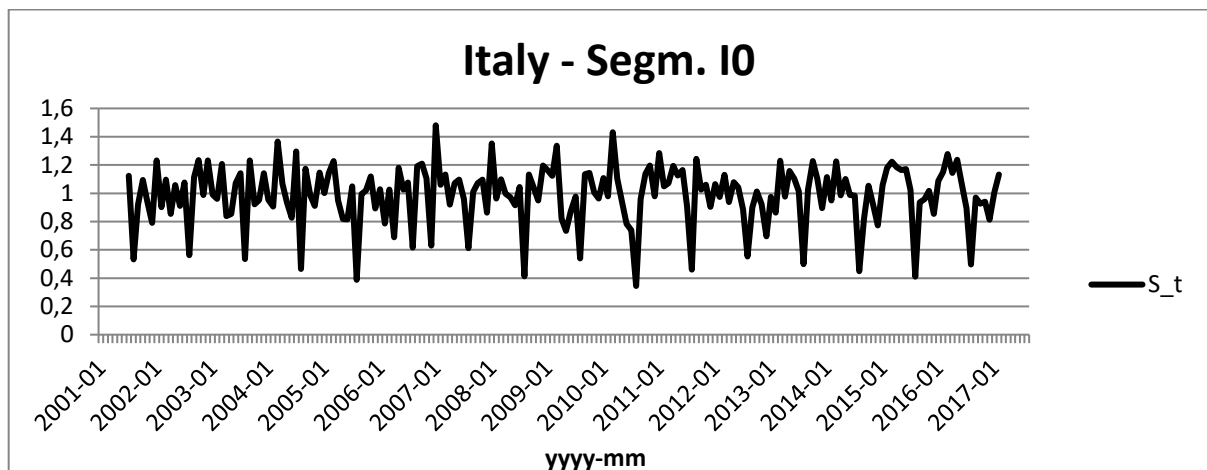


Figure 51 Example seasonality graph

The same procedure was repeated for all the 5MM, and the different results will be analysed segment by segment in the different markets.

### 3.1.2 Market share

This analysis aims at identifying the trend of the market share of each model in its launching phase, trying to identify the specific characteristics.

Market share represents the percentage of an industry or market's total sales that is earned by a particular company or model over a specified time period. Market share is calculated by taking the model's sales over the period and dividing it by the total sales of the industry over the same period. This metric is used to give a general idea of the size of a company or model in relation to its market and its competitors. Increasing market share is one of the most important objectives of business.

The main advantage of using market share as a measure of business performance is that it is less dependent upon macro environmental variables such as the state of the economy or changes in tax policy.

Market share is said to be a key indicator of market competitiveness that is, how well a firm is doing against its competitors.

Market share is a measure of the consumers' preference for a product over other similar products. A higher market share usually means greater sales, lesser effort to sell more and a strong barrier to entry for other competitors.

In this analysis the market share has been considered relative to the segment and to the specific country.

In Figure 52 the example of Jeep Renegade market share trend in UK market.

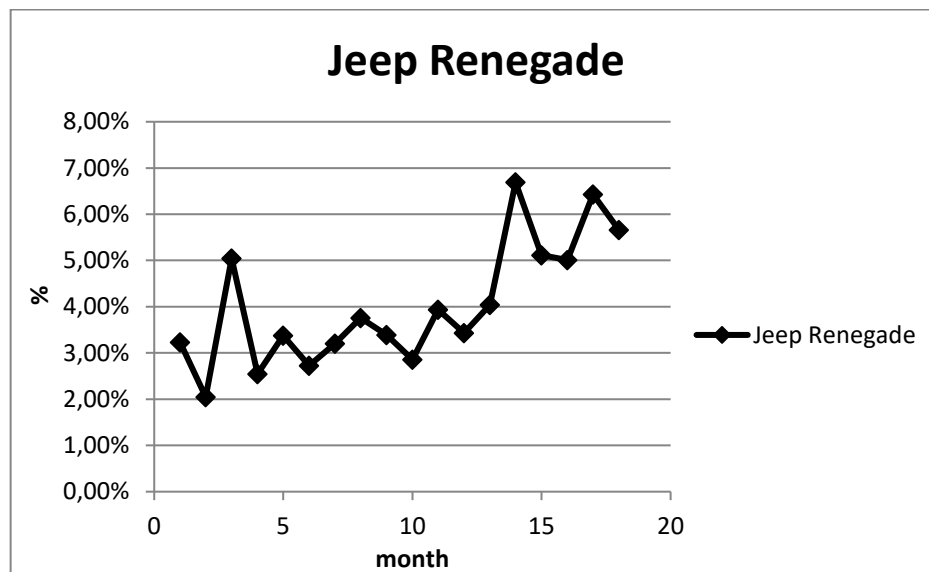


Figure 52 Example market share trend in UK market

This value is analysed in terms of trend in the first 18 months of sales and it is related also to the brand and “theoretical” value both as delta and as ratio.

The comparison with the brand market share is used to filter the weight of the company on the model results; the result underlines the result of a vehicle above or below its brand strength.

The “theoretical” value is computed considering the number of competitors in the market and it is used to analyse the performance of the model respect to the minimum value it should have if no competition occurs.

### 3.1.3 Number of competitors

The number of competitors are computed considering the models in a specific segment per month in all the five Major Markets.

The number of competitors is computed as a generic value for all the markets to standardize the analysis.

In order to consider just the models with a considerable position in the market, a threshold of 10 units/month in all the 5MM was introduced; it allows to consider just the ones that are on the market, excluding the launching and finished models.

In the analysis this parameter has been considered as the maximum of the quarter for the whole period; the choice of this period is mainly due to the subdivision of the results of the industry.

The result for the I0 segment can be seen in the graph of Figure 53 considered on a yearly base, while all the other segments will be analysed in the following chapter:

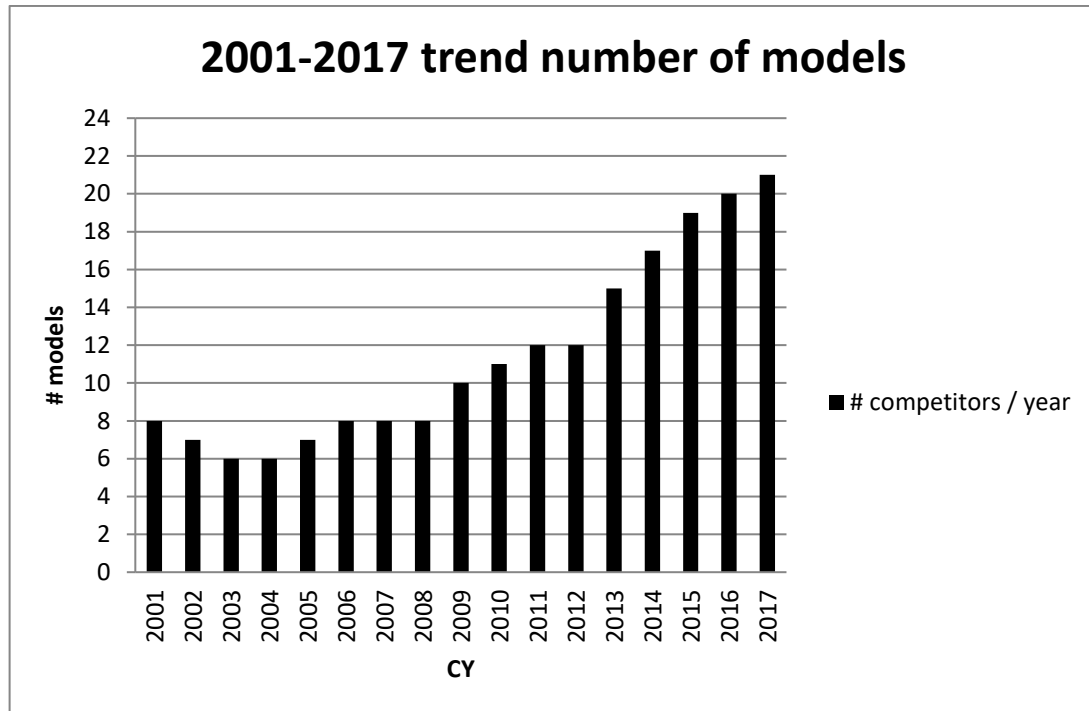


Figure 53 Example number of competitors' graph

This parameter is used in order to compute a theoretical market share, simulating a condition in which the market is equally divided among the different actors, as:

$$mkt\%_{th} = 1/n_c$$

where  $n_c$  is the number of competitors as number of different models in the segment.

It is used to compare the actual result of different models, both as ratio and as difference versus the theoretical value. The expected result is to compare the market shares in different period of time with a different number of models available in the marketplace. As the number of competitors increases, it becomes more difficult to get a high market share since the competition becomes stronger.

### 3.1.4 Brand market share

The brand market share was considered in order to try to limit the weight of the brand on the result of the models.

It was computed considering the average value of market share of every brand in each single market. It is the mean of the share in all the segments where the brand is present; in



this way the brand strength is considered just according to its positioning and not as an overall value for the whole industry.

To better understand this concept, it could be helpful to explain an example, considering two different brands A and B in the generic market \$\$\$ and three segments 1,2 and 3:

Table 4 Example brand market share

Market \$\$\$		Segment		
		1	2	3
Brand	A	x		x
	B	x	x	x

The “x” represents the presence of the brand in that segment, with a specific market share. The strength of brand A is computed as the mean between its market shares in segments 1 and 3, so the segments where it is present.

Consequently, for brand B it is the mean between the values in segments 1, 2 and 3.

This value is used to compare the actual results of each single model both as ratio and as difference versus the brand value.

### 3.1.5 “Net coefficient” and its normalized factor

The analysis of the pure market share considers just the strength of a model without considering the internal and external influencing factors. They can be split between random and peculiar components. The former must be treated specifically and they cannot be predicted, while the latter can be used to clear data and obtain a “net coefficient”.

This thesis does not analyse economic factors changes such as GDP variation but it focuses just on automotive field conditions.

The main peculiar components considered are the ones described in Section 3.1.3 and 3.1.4: number of competitors ( $n_c$ ) and brand market share ( $\%_{brand}$ ).

#### *Number of competitors*

It is an external factor since it depends on the market and not on the importance of the brand launching the model; the higher is the number different models in a segment the harder is to be the winner in customer choice.

Since this analysis focuses on a long-time horizon characterized by change of segments importance and mutation of market scenarios, the models considered have different year location and so different number of competitors ( $n_c$ ).



Multiplying the market share by  $n_c$  allows to compare the different vehicles as if they would be playing in the same market conditions.

### **Brand market share**

The brand identity is one of the main factors that influence the success of a new model. In certain countries, customers value more the national brands and for this reason their models are more successful. It is difficult to compare the behaviour of different vehicles because the sales of a specific model can be pulled by its brand strength and not by its asset.

The higher is the brand market share ( $\%_{brand}$ ) in a market the easier would be for a model to be successful.

Dividing the model market share by its brand one allows to compare the different vehicles as if they would be part of the same family and so without the trademark influence.

The “net coefficient” can be computed in this way as:

$$x_{net} = \frac{\%_{model} * n_c}{\%_{brand}}$$

where:

- $\%_{model}$  is the model market share;
- $\%_{brand}$  is the brand market share computed as in Section 3.1.4.

This value is influenced by the market and by the segment characteristics yet.

To overcome this limitation, the factor is normalized in the couple segment-market; it means computing the highest “net coefficient”  $x_{netREF}$  for the models considered in each pair as:

$$x_{netREF} = \frac{\max(\%_{model}) * \max(n_c)}{\min(\%_{brand})}$$

In order to get acceptable values, it is necessary to consider the variety of data and of course the outliers.

An outlier is any value that is numerically distant from most of the other data points in a set of data. They must be investigated deeply, and since they were sporadic cases of small brands they are just not considered in order to get a  $x_{netREF}$  value that can be used to compare the “net coefficient”.

Dividing each  $x_{net}$  by  $x_{netREF}$  it is possible to obtain a relative coefficient  $\%_{net}$  that allows to compare the different models in the succeeding months.

### 3.1.6 Number of registrations in first 18 months

It considers the volume in the firsts 18 months, excluding those months with a number of registrations that are not relevant and are due to the launch vehicles in the showrooms.

In this section three following step of data are considered and plotted:

- Actual data: it considers the volume in the months, considering all possible source of variations such are seasonality and random variables.
- Trend&Cycle (TC): it refines the previous set of data, removing the seasonality of the peculiar market in the specific segment as:

$$TC_{x_{deseason}} = \frac{R_{x_t}}{S_t}$$

where  $TC_{x_{deseason}}$  is the Trend&Cycle not-seasonal of model x,  $R_{x_t}$  is the number of registrations in month t of model x and  $S_t$  is the seasonality coefficient in month t.

- MMC(3): it consider the centred moving average of three elements of the previous set; for the first and last month it considers the moving average of 2 months. It allows to filter the cyclic component, focusing on the pure trend of the data.

The graph in Figure 54 describes the example of Jeep Renegade in the UK market. It is possible to notice that from the actual data to the TC the seasonal characteristic of UK market is filtered and in the following step to MMC(3) the cyclic property of this set of data is smoothed, underlying a growing trend that was difficult to see at first approach.

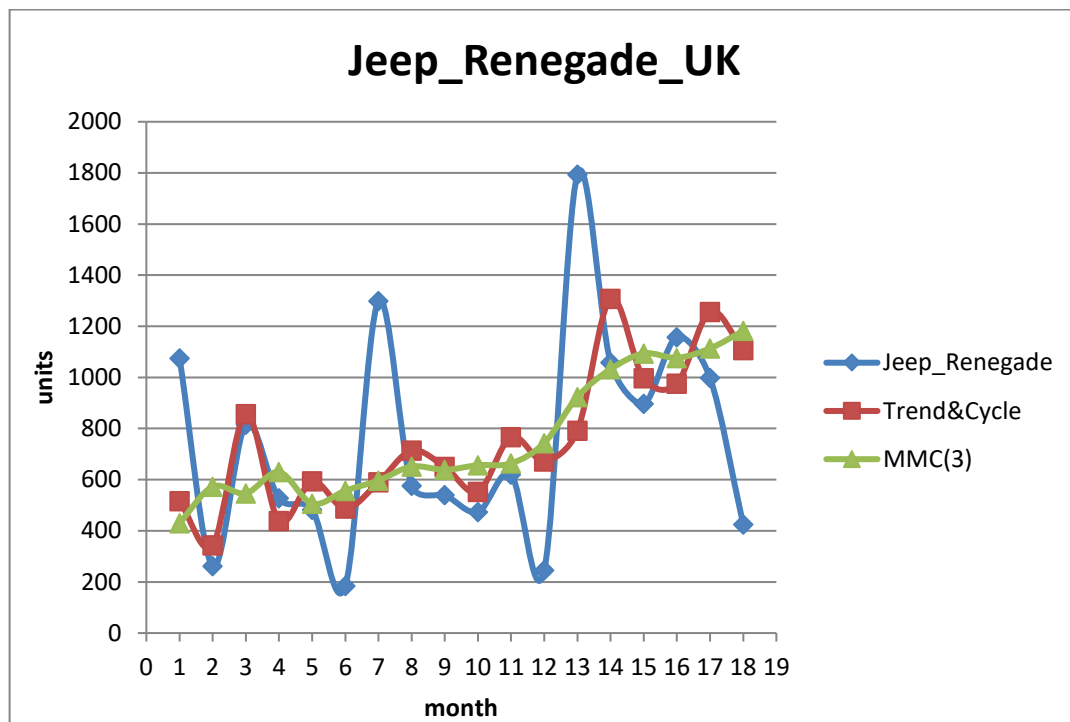


Figure 54 Example volume trend

### 3.1.7 Growth slope and the “Rim spokes”

Considering the whole volume in the first 18 months, the sundry models differ for how they reach that quantity.

In particular, the idea is to identify the slope of the growth of sales in the subsequent months by considering the share of the “launch volume” in each base period.

The different factors influencing the sales of a model can be considered as a conglomerate and the rates allow to identify a trend line in a scatterplot that can have a positive, null or negative slope.

Considering the direction of each set of data a rim shapes itself with the different spokes with their specific slopes describing the growth rate of sales in the launch phase.

In order to standardize the results obtained and compare the different models the monthly volumes of each vehicle were normalized respect to the whole period registrations and represented in the “rim spokes” graph.

The “Rim spokes” can be subdivided in this way in three macro areas:

- Positive trend: it is characterized by a slope higher than zero and it represents the ideal behaviour of a new model during its launch phase;



- Constant trend: it is characterized by lines with angular coefficient around zero and it describes those models in which the monthly sales do not stand out or because it is a non-significant substitution series of an already existing model, or a new vehicle not effective from customer point of view;
- Negative trend: it is characterized by a slope lower than zero and it shows a typical behaviour of the non-effective new model or new series, with sales decreasing month over month.



Figure 55 "Rim spokes" macro areas

This tool must be considered as a first approach analysis because each model is affected by the surrounding and by specific effects that must be punctually considered.

In Figure 56 it is possible to notice the example of I3 Segment in Italy:

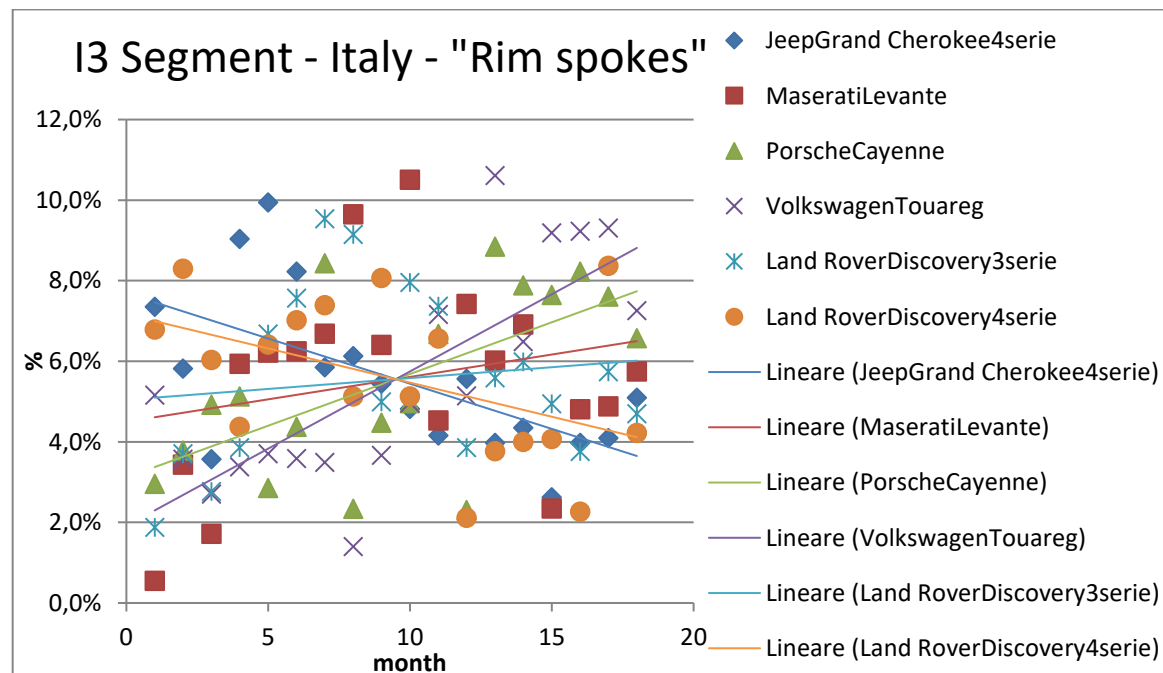


Figure 56 I3 Segment in Italy "Rim spokes" with the growth lines on models analysed

It allows to get the trend lines with different slopes describing different behaviour:

Table 5 I3 "spokes" equations in Italy

Brand	Model	"Spoke" equation
Jeep	Grand Cherokee (4serie)	$y = -0,0022x + 0,0769$
Maserati	Levante	$y = 0,0011x + 0,045$
Porsche	Cayenne	$y = 0,0026x + 0,0312$
Volkswagen	Touareg	$y = 0,0038x + 0,0191$
Land Rover	Discovery (3serie)	$y = 0,0005x + 0,0504$
Land Rover	Discovery (4serie)	$y = -0,0017x + 0,0717$

Considering the specific case of Land Rover Discovery, the two succeeding series are characterized by different slopes:

- The third series has a quite flat trend of sales mainly due to the fact it is substituting an already existing model and so it did not change consistently the registration profile;
- The forth series has a negative slope, and so it can be assumed the customers' expectations were not respected since the sales of the model fell with the launch of the new version.

Going deeper in this analysis, could help to really understand the trend of the different volume curves of the models; it consists in considering a second-degree trend line applied to the volume cleared by seasonality and cyclic component and study its geometrical characteristics.

### *Curve concavity and peak identification*

Considering the number of registrations, they are characterized by seasonality and specific cycle as described in Section 3.1.6; these two factors are independent from the model itself, but depend mainly on the market.

The launch phase is characterized by a specific trend for each vehicle and it can be described by a polynomial curve of second degree: a parabola.

The parabola is characterized by two parameters that can be useful to describe the automotive launch: concavity and vertex abscissa.

A generic parabola is described by the equation:

$$y = ax^2 + bx + c$$

To analyse the concavity, it is necessary to consider the  $a$  parameter:

- $a > 0$ , upward concavity;
- $a = 0$ , the parabola degenerates into a straight line;



- $a < 0$ , downward concavity.

The ideal launch phase should be characterized by a downward concavity, since sales need some time to grow since the model must be known and “accepted” by the market, then reach a peak to decrease and get a stable quota.

Sometimes it can happen the concavity is upward, that means the model requires some time to enter the market and so the first month’s sales are quite low and flat up to the vertex point in which they change their tendency and they start to increase.

In the case  $a$  is close to zero, and so the new vehicle’s sales have a straight trend, it is necessary to look to the  $b$  coefficient that describes the slope:

- $b > 0$ , growing trend;
- $b = 0$ , constant sales;
- $b < 0$ , decreasing trend.

At this point it is clear that what really characterize the sales profile in the launch phase is the vertex abscissa that in all the cases describes the months after which the trend changes its tendency and or reach the peak point or start the real growth.

This point is computed as:

$$x(V) = -\frac{b}{2a}$$

In this analysis the data used to get the trend are the « *MMC(3) deseason* » values, that are “cleared” by seasonality and cyclic component.

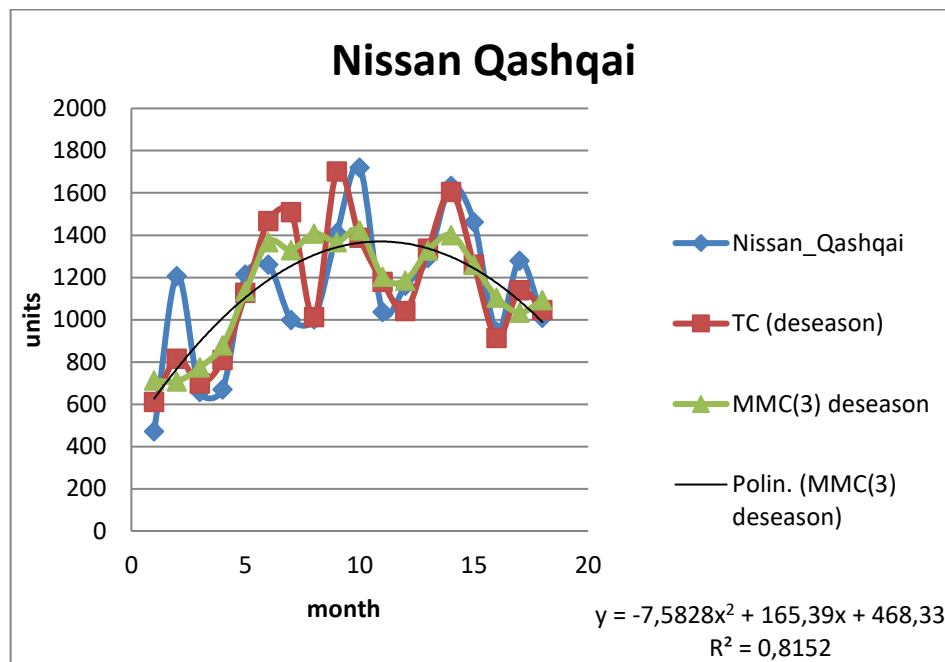


Figure 57 Example Nissan Qashqai in Germany - Concavity and peak

The trend curve in Figure 57 is  $y = -7,5828x^2 + 165,39x + 468,3$  with a  $R^2$  coefficient, that describes the accuracy of the regression, close to 0.82 (quite close to 1, and so quite good approximation of data).

Considering the parameters described in Section 3.1.7:

- $a = -7.5828$ , lower than zero and for this reason downward concavity;
- $x(V) = -\frac{165.39}{2(-7.5828)} = 10.91 \text{ months}$  that represent the peak after which sales decrease to stabilize to constant values.

This study is performed on all the models in each market in order to identify common trends and parameters and can be used as a verification of sales profile by the Supply Chain in the starting phase of the new model launch.

## 4. The “segment Garage” and the clusters analysis

The current chapter aims at identifying some common characteristics among vehicles of the same brand, market and segment.

It will follow a top down approach starting from the analysis of the segments going deeper into the markets up to the automotive groups.

The segments considered are the ones described in Section 2.2.2 and the markets considered are the EMEA 5MM, as already mentioned in Section 2.1.

From the study of concavity and peak month identification it is possible to correlate the two data and obtain six areas with specific characteristics; in Figure 58 the specificities of the graph obtained are reported.

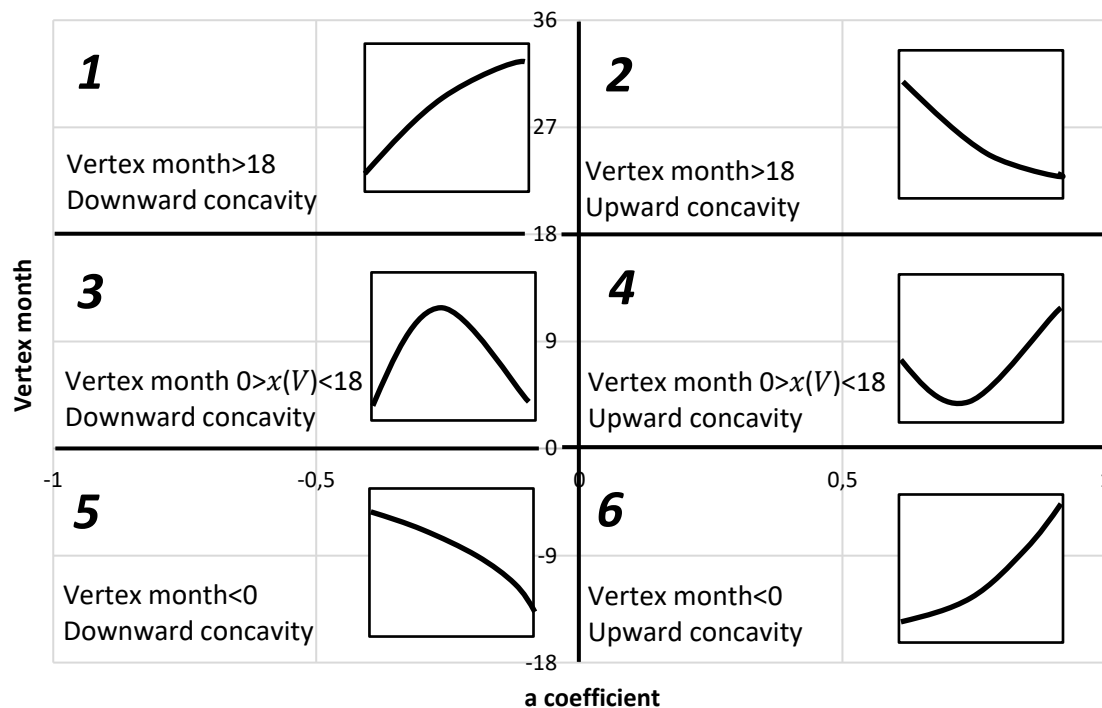


Figure 58 Concavity-peak month correlation: identification of the six areas

The results of these characteristics can be described as:

1. Vertex month  $> 18$  and downward concavity: in this case the launch phase has a continuously increasing trend, with no decline in the studying period;
2. Vertex month  $> 18$  and upward concavity: in this case the launch phase has a continuously decreasing trend, with no change of trend in the studying period;



3. Vertex month  $0 > x(V) < 18$  and downward concavity: it represents the “ideal” launch process with an increasing phase up to the volume peak, and at the end a decreasing phase;
4. Vertex month  $0 > x(V) < 18$  and upward concavity: the launch phase in the first months is unsuccessful and the registrations could have been pulled after the minimum point with a specific recovery action;
5. Vertex month  $< 0$  and downward concavity: in this area the launch phase has a continuously decreasing trend, with no change of trend in the studying period;
6. Vertex month  $< 0$  and upward concavity: in this area the launch phase has a continuously increasing trend, with no decline in the studying period.

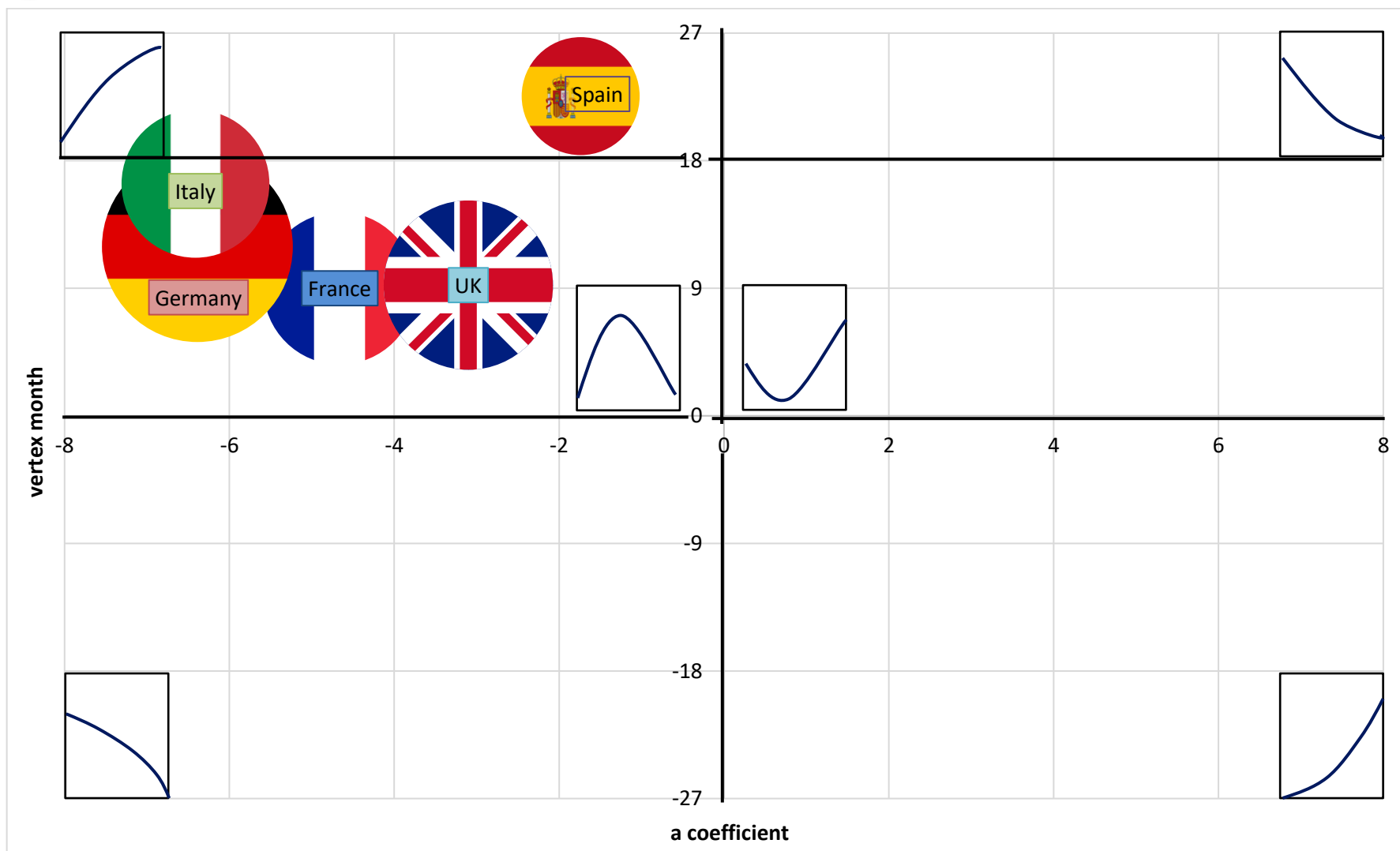


Figure 59 Graph of weighted country trend line concavity and peak month

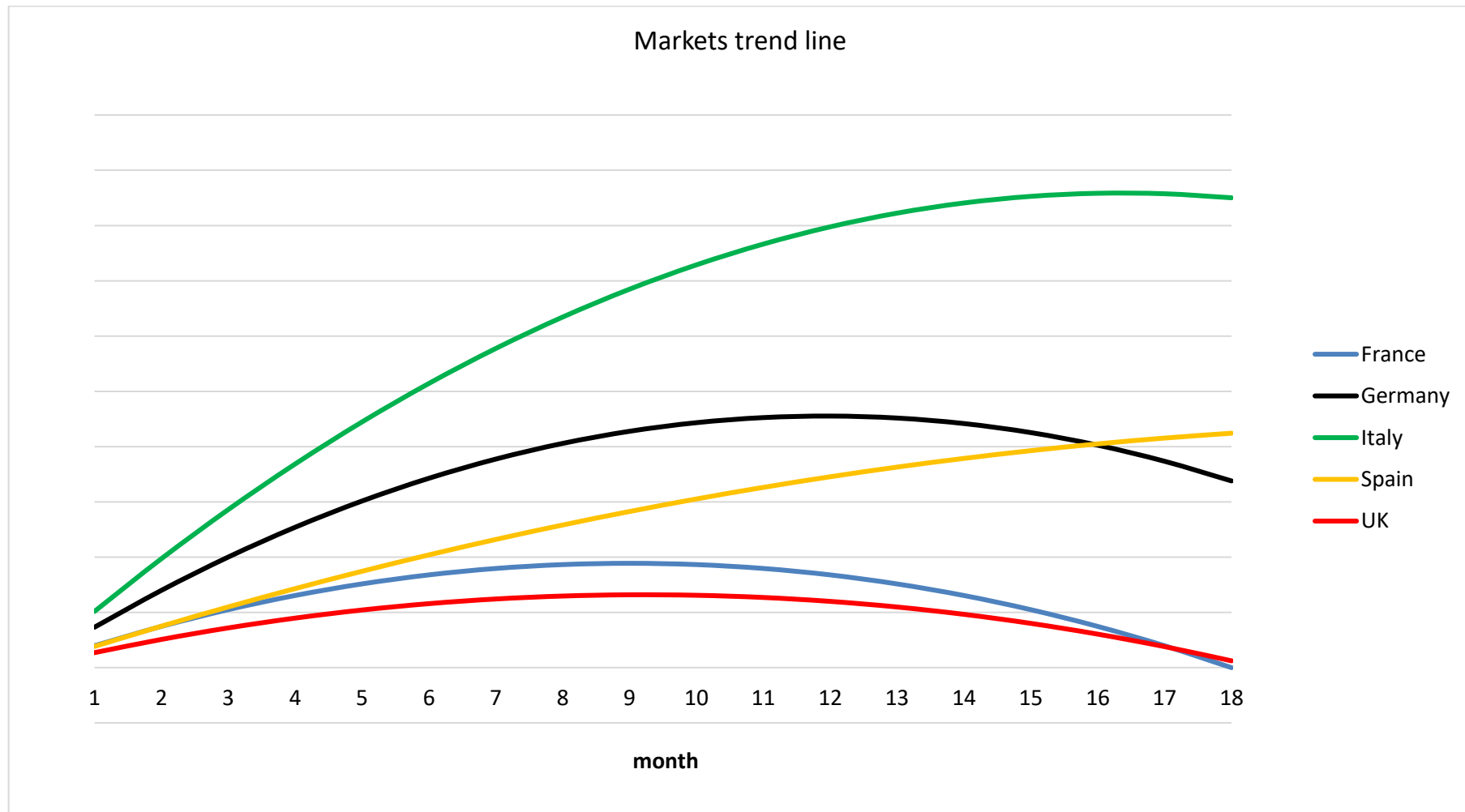


Figure 60 Markets volume launch trend line



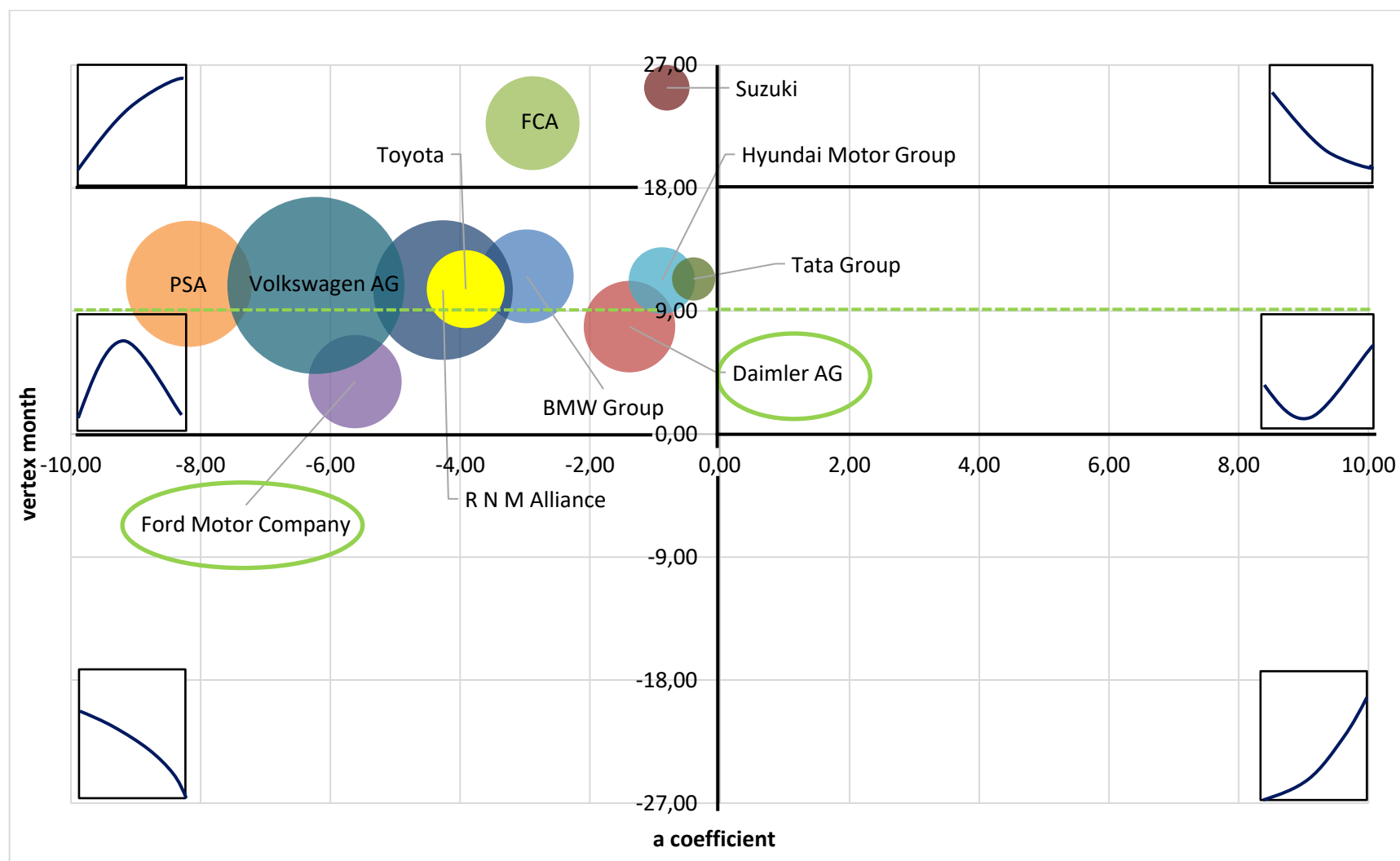


Figure 61 Graph of weighted brand trend line concavity and peak month in the 5MM

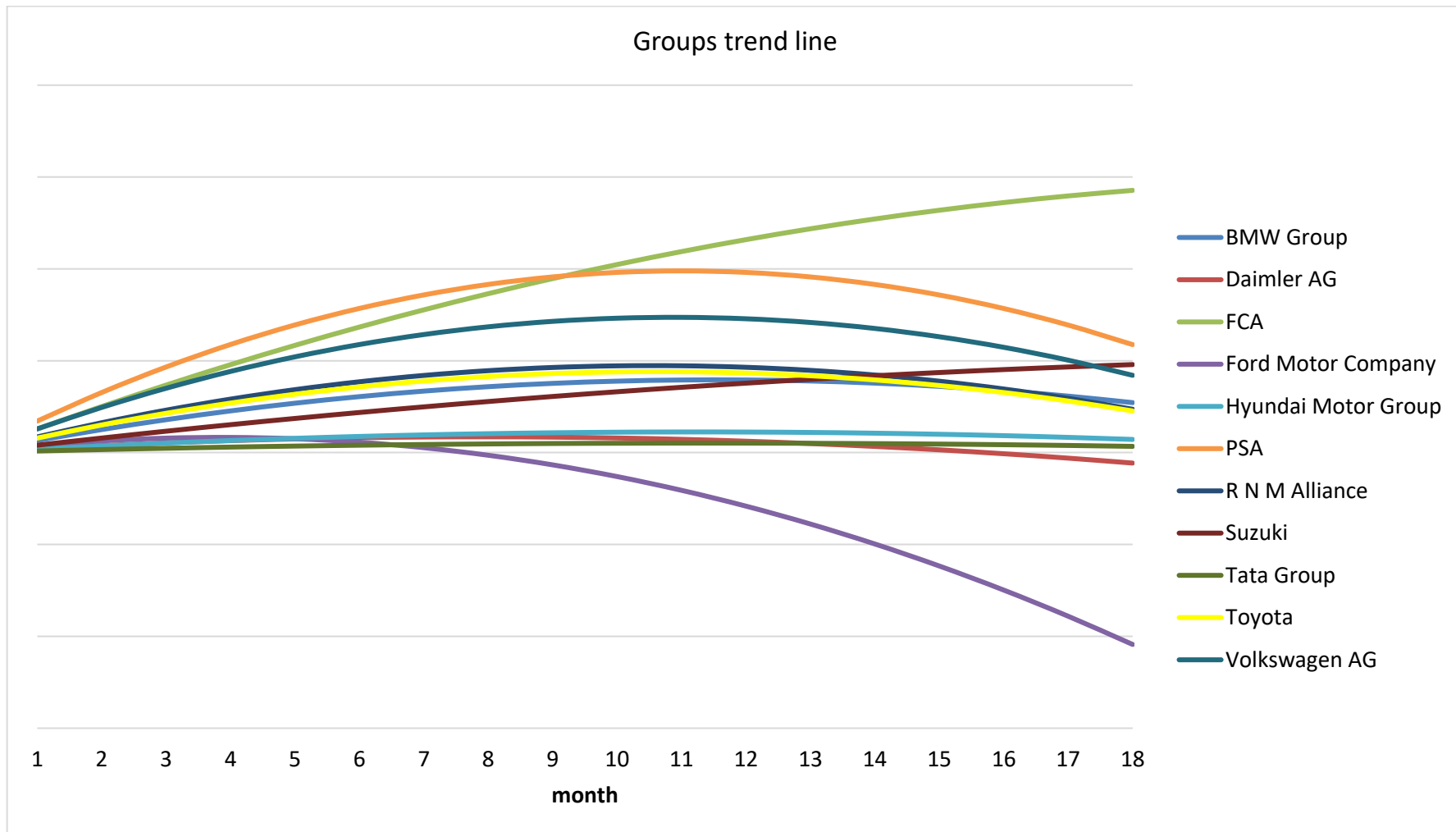


Figure 62 Groups volume launch trend line

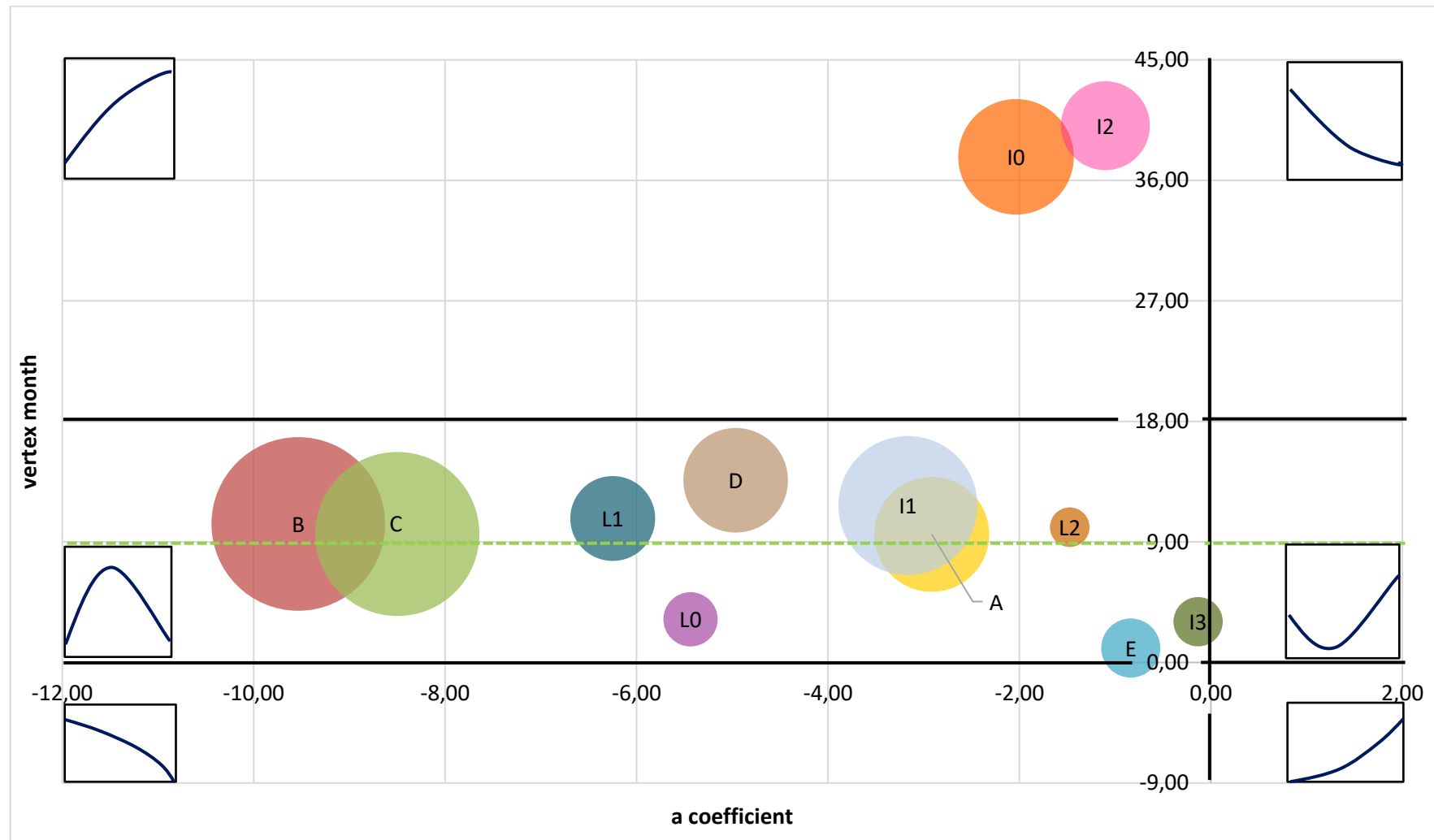


Figure 63 Graph of weighted segment trend line concavity and peak month in the 5MM

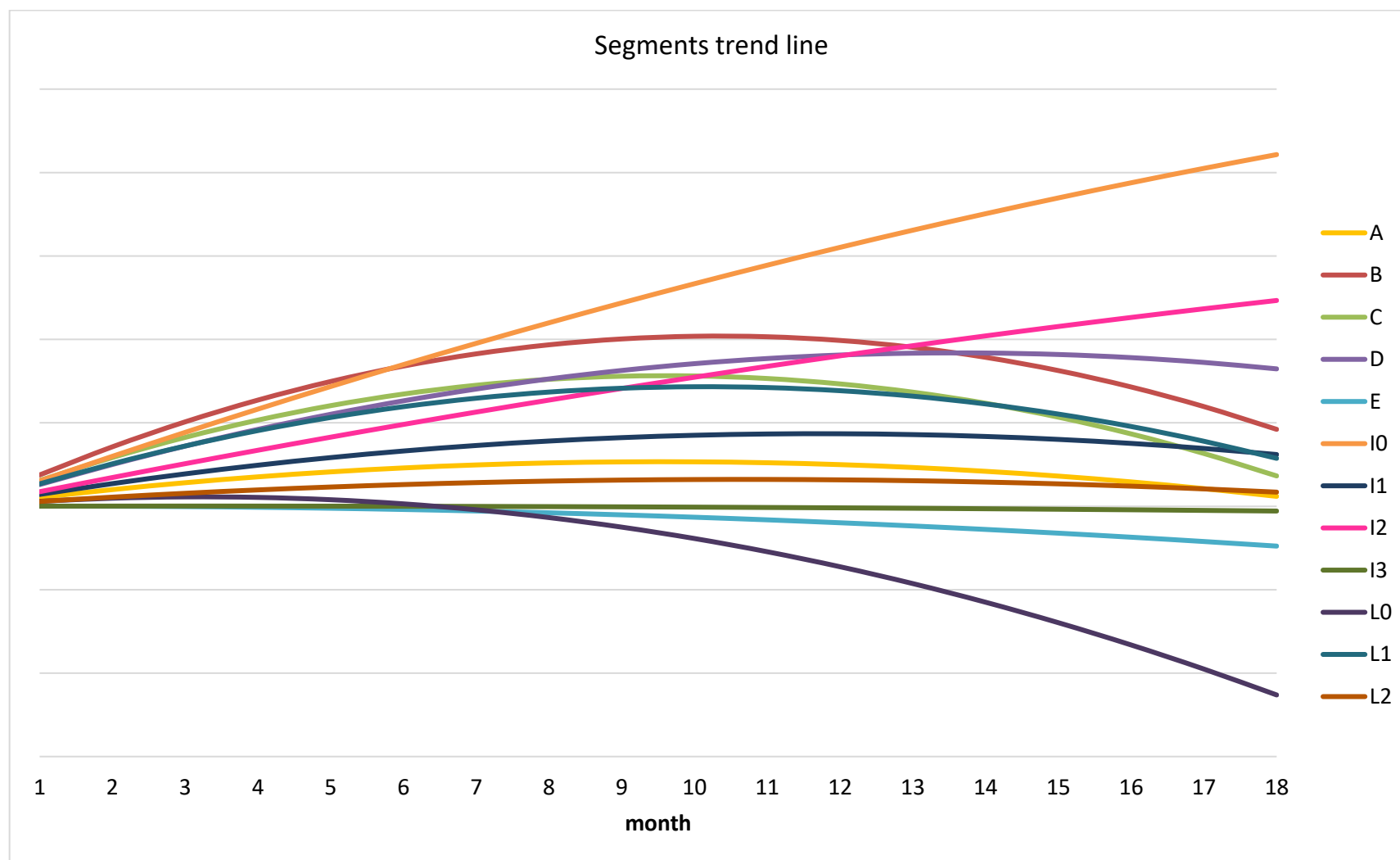


Figure 64 Segments volume launch trend line



The dimension of the bubbles in the graphs depend on the weight that each element has in terms of share.

In Figure 59, considering the average values of the models studied in the different segments, grouped per market, it is possible to see that in all the markets the trend line shows a downward concavity (a coefficient  $< 0$ ). Looking at the vertical axis, in all the countries the peak month is after the month 0; all the countries points fall in the first and third quadrant. In particular France, Germany and UK shows an “ideal” launch phase with the peak month inside the period considered, Italy average peak month is close to the eighteenth and Spain value is higher than 18 months, showing a continuously increasing trend in the considered period.

This is confirmed also in Figure 60 where the different trend lines are plotted as if the starting point at month 0 would be equal to zero for all the elements considered; it allows to compare the different behaviours independently from the volume of each market. It is possible to verify some common points among the different elements:

- The results obtained from the *a coefficient vs. peak month* graph are confirmed;
- UK and France have a similar trend, quite smooth respect to the other countries;
- Spain line has a quite flat shape, but with a continuously increasing trend that differentiate it from all the other elements;
- Italy shows the steepest increasing phase in the launch and it is maintained up to the seventeenth month so longer than France, Germany and UK.

The *a coefficient vs. peak month* graph is also used to identify the characteristics of the carmaker groups in the 5MM as the average values of the models considered in the analysis (Figure 61). The “R N M Alliance” refers to the Renault Nissan Mitsubishi Alliance considered as a unique group.

All the brands fall in the first and third quadrant area that means downward concavity with the peak month of the trend of “deseasonalized” volume higher than zero; all the brands fall in the area with peak month lower than 18 (third quadrant) except for FCA and Suzuki (first quadrant).

Looking to peak month data, it is possible to notice that two groups have an average value that falls in the first half of the considered launch period: they are Daimler AG and Ford Motor Company (below the green line set at 9months).



In Figure 62 it is possible to notice the launch trend lines of the different automotive groups; these data confirm the ones obtained in Figure 61:

- Ford MC shows a continuously decreasing trend for most of the launch period (of 18 months);
- As Ford MC, Daimler AG present the same behaviour except for the lower slope of the trend line;
- Tata Group and Hyundai MG both show a quite horizontal trend line: this could be ascribed to the mistrust of European market in emerging Asian corporates;
- PSA shows the steepest increasing trend in the launch phase among the different actors;
- FCA and Suzuki shows a quite linear trend always increasing in the eighteen months considered; the main difference is the steeper line that characterized the Italo American group: this could be attributed to the Westernness of the group respect to Suzuki.

The *a coefficient vs. peak month* graph was also applied to the different segment considered (Figure 63). It is possible to notice mainly the I0 and I2 segments that show a peak month above 18; this is mainly due to Jeep brand and will be analysed in detail in Section 0:

- I0 segment due to the big success of Jeep Renegade in Italy;
- I2 segment due to the Jeep New Cherokee low volume in Spain and a continuous improving trend.

All the other segments fall in the “ideal launch” area; in particular they have all the peak month after the ninth month except for the E, I3 and L0:

- L0 case (that will be discussed in Section 5.3) could be attributed to the fact that most of the models analysed were launched after 2005 and the whole segment was affected by a general crisis;
- E and I3 are both high level segments characterized by high price, mid age customers and are dominated by luxury optional.

At this point it is possible to underline the short increasing phase of the launch for luxury segments.

Figure 64 confirm the results already obtained, in particular:

- L0 segment shows a steep decreasing trend in the launch due to an appeal crisis that affected the segment till 2005;



- The segments E and I3 show a small decreasing trend (quite horizontal): this could derive from the “luxury” characteristics of the segments;
- I0 segment shows a continuously increasing and steep trend that could be attributed to the Jeep Renegade launch in Italy and to the recent success of the whole segment.



## 5. Specificities in the “segment Garage”

From the cluster analysis it can be interesting to enter inside some specific cases to enrich the study. In particular in this chapter will be analysed the most relevant cases that were chosen to underline some aspects that usually are not considered, but that could underline some criticalities or that could discover some relations not only in terms of potential customer but also in the launch phase.

In particular it will start from the concept of “ideal” launch focusing on the left side of a *coefficient vs. peak month* graph, looking at the brands trend curves in the 5MM with downward concavity with the goal of get some specific “outliers” cases trying to understand the main reasons and possible effects.

After this first approach, some specificities were considered starting from the concept of “similar”. *Similar* means having a resemblance in appearance, character, or quantity, without being identical; often in automotive what is not the same is not just the external shape, the brand, but a series of indicators that are similar but not identical and can trace a link among the different actors.

The main “similarities” considered are:

- the two leaders of A segment (Fiat 500 and Fiat Panda) are part of the same brand, but they differ in the characteristics and from the analysis it is expected to identify what is *similar* and what made the difference in their launches;
- the *similar* segments in terms of customer target such as the B and the L0 are quite different apparently but the analysis focus on discovering the *similarities* in their launches;
- the European leader of the C segment and of the market (Volkswagen Golf) in the launches of different series is the basis of the analysis to discover criticalities in a model that can be considered the undisputed king;
- the crisis that affected the D segment analysed starting from one of its most important actors (Audi A4) trying to catch the *similarities* between the model and the “family”;
- the most popular example (at least in Italy) of *similar* “cousins”: Fiat 500X and Jeep Renegade share the same architecture, same production plant (Melfi), different style





and different brand, but how much are they *similar*? This is the starting question of the last specificity analysis.

In all the cases considered the main elements analysed are the volume trend in the launch and the strength in terms of market share as described in Chapter 3.

Also in these cases a top-down approach will be held starting from the analysis of the segment in terms of volume, share and models in the markets, passing through the temporary locations of the launches considered, up to the comparison of the indicators considered among the different models.

It could be necessary to recap the main gauges used:

- peak month computed starting from the volume cleared by seasonality and cyclic component as:

$$x(V) = -\frac{b}{2a}$$

- the “theoretical” market share is the one computed as if the segment would be equally divided among the different models as:

$$mkt\%_{th} = 1/n_c$$

- the brand market share is computed considering just the segments where the brand competes;
- the “Net coefficient” is used to clear market share from the brand influence and to compare the models considering the same competition conditions; it is computed as:

$$x_{net} = \frac{\%_{model} * n_c}{\%_{brand}}$$

## 5.1 Downward concavity launch data

Analysing the main actors of the stage, the “ideal” launch process, as described, is characterized by an increasing phase, up to the volume peak, followed by a decreasing phase to reach a quite constant value; assuming to consider just the models that follow a downward concavity curve it can be interesting to analyse the brand and market position of the peak.

Table 6 Brand peak volume month in the 5MM

Brand	France	Germany	Italy	Spain	UK	Total
Alfa Romeo	10,98	1,69	11,66	13,04	13,32	9,38
Audi	3,24	12,30	-34,65	12,56	8,73	-1,28
BMW	16,14	21,19	13,46	8,87	9,09	14,07
Citroen	13,83	13,94	10,22	24,97	13,71	15,39
Dacia	24,14	14,70	14,82	11,03		16,17
Fiat	-0,89	19,36	13,91	9,15	9,45	9,91
Ford	9,95	10,05	9,44	11,78	10,27	10,27
Hyundai	19,04	12,95		7,12		13,04
Jaguar	6,81	67,59	7,55	7,42		22,34
Jeep	16,82	7,90	206,11	559,08	1,76	131,59
Kia	9,55	8,12	7,71	10,23		8,90
Lancia	12,23	5,90	7,70	11,38	11,48	9,44
Land Rover	11,17	8,58	10,13	7,68	-8,11	4,28
Maserati	87,78	7,39	10,34	8,87	13,40	22,53
Mercedes	12,70	23,15	13,51	13,07	16,29	16,12
Mini	17,27	11,91	13,84		11,93	13,74
Nissan	12,37	8,62	13,75	12,54	13,02	12,07
Opel	14,53	13,32	14,20	13,41	14,54	13,92
Peugeot	12,53	14,47	12,27	16,64	13,78	13,91
Porsche	18,12	13,59				15,86
Renault	8,83	11,91	11,84	10,72	10,30	10,78
Suzuki	13,76	17,01	13,99	60,84	21,07	25,33
Toyota	7,37	9,82	11,45	13,99	11,20	10,69
Volkswagen	15,66	13,85	12,58	10,25	9,06	12,44
Total	10,88	12,94	20,24	31,03	10,45	16,89

The negative values in the table describe a negative slope trend line in the first eighteen months of registrations, since it considers just the curves with concavity towards the bottom. For the same reason the lower is the month in which the peak occurred, the shorter is the positive increasing phase of registrations.

From a first rough analysis, it appears a misalignment between France, Germany, UK and Italy, Spain; in fact, the average peak position in the first three is between 10 and 13, and so around one year, while for Italy and Spain it reaches values higher than the studying period (Italian peak $\approx$ 20 months, Spanish peak $\approx$ 30 months).

The cause of this discrepancy can be described by the behaviour of Jeep brand in these two markets.



Table 7 Jeep models volume peak month in 5MM

	France	Germany	Italy	Spain	UK	Total
Cherokee		8,51	10,42		9,57	<b>9,50</b>
Compass	5,77	9,41	-22,54	2,06	-14,38	<b>-3,93</b>
Grand Cherokee		21,98	-101,62			<b>-39,82</b>
New Cherokee		4,85	17,15	1678,05	3,24	<b>425,82</b>
Patriot		2,03			8,61	<b>5,32</b>
Renegade	38,97	9,65	1338,49			<b>462,37</b>
Wrangler	5,72	-1,13	-5,26	-2,88		<b>-0,89</b>
<b>Jeep Totale</b>	<b>16,82</b>	<b>7,90</b>	<b>206,11</b>	<b>559,08</b>	<b>1,76</b>	<b>131,59</b>

The two outliers do not refer to the same model, but in Italy is due to Jeep Renegade (launched in the fourth quarter of 2014), while in Spain it is due to Jeep New Cherokee (launched in the first quarter of 2014).

### *Renegade launch in Italy*

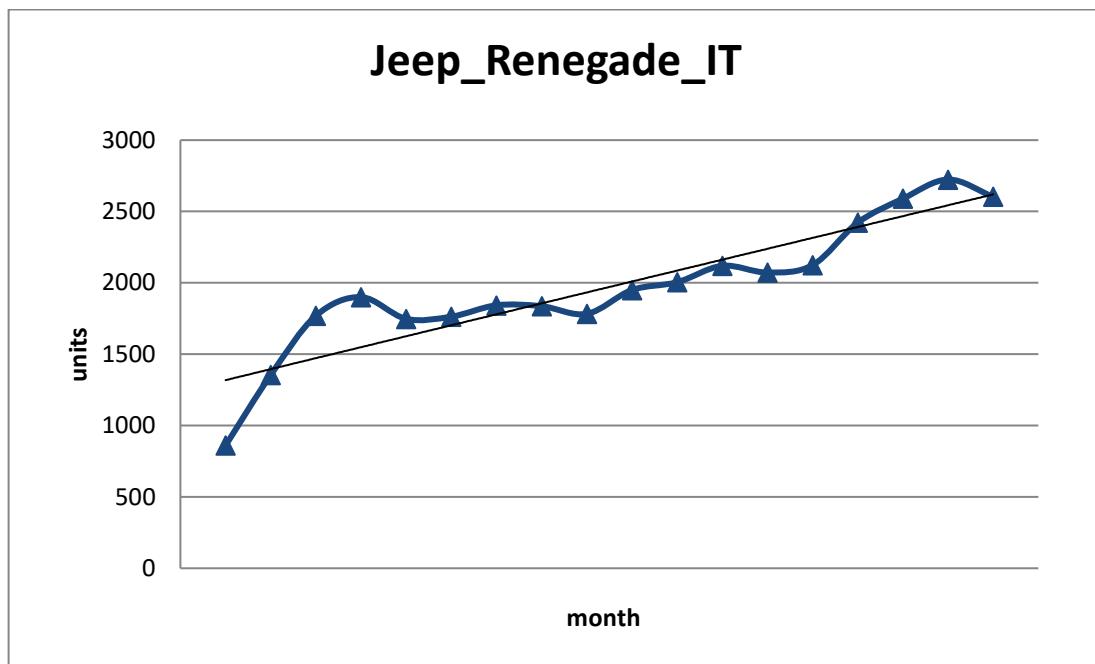
This paragraph aims at analysing the I0 Segment in Italy with a specific focus on Jeep Renegade in order to try to understand the reason of the peak value of the trend line about the first eighteen months equal to 1338,5 months.

In Table 8 the main launch data of this vehicle are reported, considering the time period, the monthly volume and the cumulative volume while in Figure 65 is reported the graph of the volume cleared from the seasonality and the cyclic component as described in Section 3.

Table 8 Jeep Renegade in Italy launch volume data

Month	2014-10	2014-11	2014-12	2015-01	2015-02	2015-03	2015-04	2015-05	2015-06	2015-07	2015-08	2015-09	2015-10	2015-11	2015-12	2016-01	2016-02	2016-03
Volume	629	1026	1810	1950	1789	2305	2239	2042	2183	1769	927	1900	1984	2153	1865	3220	3014	3308
Cumulative Vol	629	1655	3465	5415	7204	9509	11748	13790	15973	17742	18669	20569	22553	24706	26571	29791	32805	36111

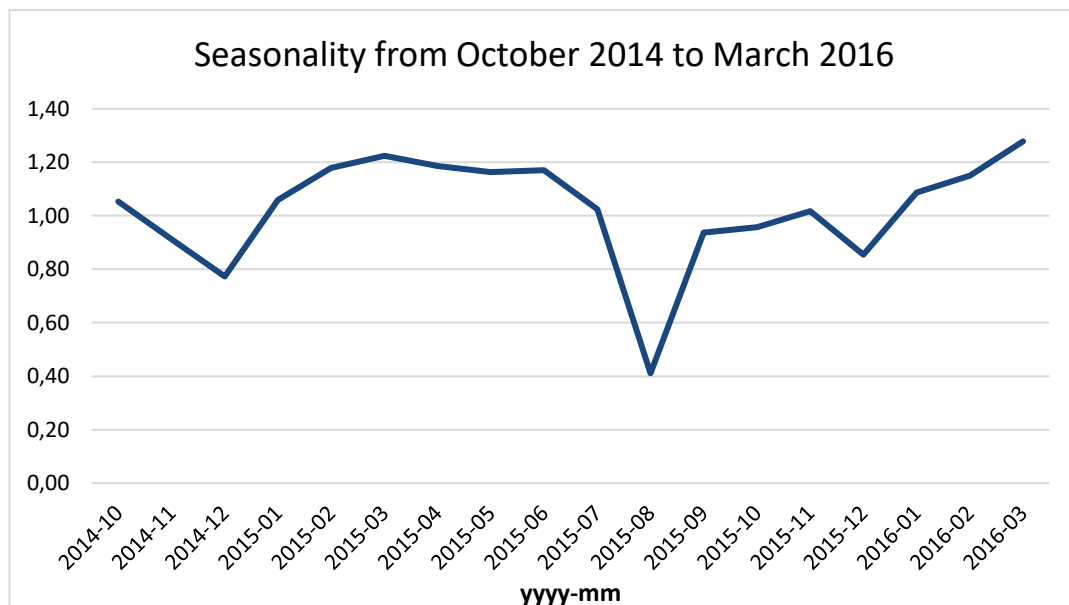
This model was launched in October 2014 registering more than 36 thousand vehicles in the first eighteen months.



**Figure 65 Jeep Renegade deseasonalized monthly volume**

The monthly volume without considering the seasonality and the cyclic component, maintained a quite constant positive trend, without reaching the decline point within the launch period”.

Looking at seasonality values during this period it could be possible to understand the possible strategic decision that affected this success.



**Figure 66 Jeep Renegade launch period seasonality in Italy**

Locating the launch in October allowed to use the seasonality to improve the registration volume after about 14 months.

In order to understand deeper this phenomenon, it is necessary to study the surrounding conditions of the segment, of the market and of the brand.

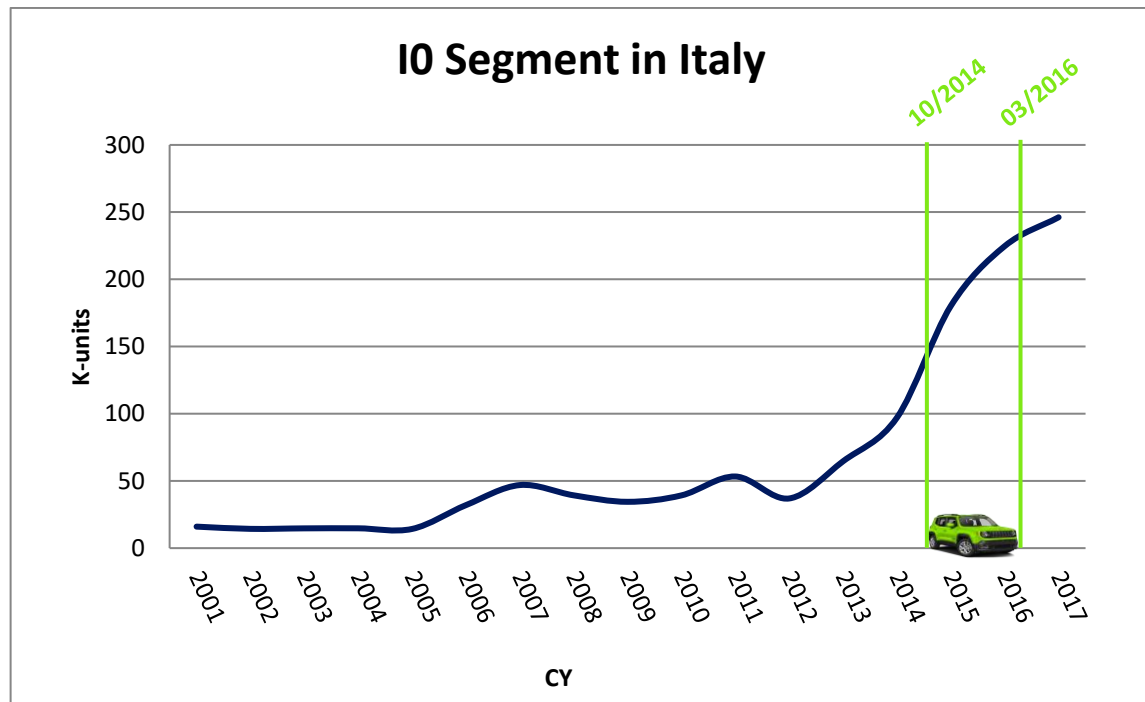


Figure 67 I0 Segment in Italy trend with temporary location of Jeep Renegade

As it is possible to notice in Figure 67 this model in Italy was launched in a prolific period for this segment, with yearly growth rate of about 25%.

The SUVs segment was starting to dominate the global marketplace, and in particular the I0 one represented a trade-off between a small car (B segment) characterized by manoeuvrability and low fuel consumption, and a comfortable and a roomy vehicle such as the I1 segment.

All these surrounding conditions are confirming the success of the vehicle as it could be easy to expect from the only analysis of the concavity and of the peak month.

Going deeper in the study, referring to Section 2.3.1 and to Appendix 1, the Jeep brand was part of the agreement between Fiat and Chrysler in 2009; the new FCA group considered, since the first day, this brand as the luxury one, focusing also on off-road performances.

Being a luxury brand, most of the customers were mid aged people; to have a wider customer portfolio in 2014 the Renegade was launched as an entry level for the trademark, allowing younger clients to enter in the Jeep family.



This model represented the first new one for the brand after the FCA group foundation and furthermore it represented the first model produced out of USA; in fact, it is produced in Melfi (Italy) on the production line shared with Fiat 500X.

In Italy this model was appreciated due to the strength and off-road idea behind the brand, and a sort of homemade concept related to the production site located in the south of the “boot”.

Looking at market share figures it is possible to understand how this model played in the industry, comparing its relative results with its brand ones and with the minimum quota, considered as if the market would be equally divided among the different vehicles.

In Table 9 the main data relative to market share in the launch phase are reported; in particular the main elements considered are:

- the market share, computed as the portion of the segment in the specific country the Jeep Renegade was able to get monthly during its launch phase;
- number of models commercialized in the relative segment in the specific time period;
- the ratio between its market share and the “theoretical” computed as if the market would have been divided equally among the different players (Section 3.1.3);
- the brand market share considering the average values Jeep got in the segments where it is present;
- the ratio between the model market share and the brand one that allow to understand if the model pulled the carmaker image since the first phases, or it uses the “family image” to enter the industry and to conquer appreciation;
- the normalized “Net coefficient”<sup>5</sup> that is used to clear the vehicle market share from the influence of the brand and of crowding of the segment (Section 3.1.5).

---

<sup>5</sup> “Net coefficient” computed as  $x_{net} = \frac{\%model * n_c}{\%brand}$  and normalized respect to market and segment.



Table 9 Italy - Jeep Renegade market share data

Jeep Renegade - Italy	2014-10	2014-11	2014-12	2015-01	2015-02	2015-03	2015-04	2015-05	2015-06	2015-07	2015-08	2015-09	2015-10	2015-11	2015-12	2016-01	2016-02	2016-03
Market share	5,9%	10,4%	20,3%	15,0%	12,0%	14,4%	13,9%	12,4%	12,6%	11,3%	14,3%	12,4%	12,3%	12,2%	12,3%	16,6%	14,5%	14,1%
Number of models in I0 Seg.	17	17	17	18	18	18	19	19	19	19	19	19	19	19	19	18	18	18
Ratio real vs. "teoretical"	1,00	1,77	3,45	2,71	2,16	2,59	2,63	2,35	2,40	2,15	2,71	2,36	2,33	2,32	2,34	2,98	2,61	2,54
Brand market share	8,0%	8,8%	12,9%	9,2%	9,7%	9,1%	7,8%	8,0%	12,3%	8,8%	13,9%	8,3%	10,6%	11,7%	13,3%	11,9%	12,0%	11,3%
Ratio real vs. Brand	0,74	1,18	1,58	1,64	1,24	1,58	1,78	1,54	1,03	1,28	1,03	1,50	1,16	1,04	0,93	1,39	1,21	1,25
Normalized "Net coefficient"	7,0%	11,1%	14,9%	16,4%	12,4%	15,8%	18,8%	16,3%	10,9%	13,5%	10,9%	15,8%	12,3%	11,0%	9,8%	13,9%	12,1%	12,5%

### Jeep Renegade relative performances

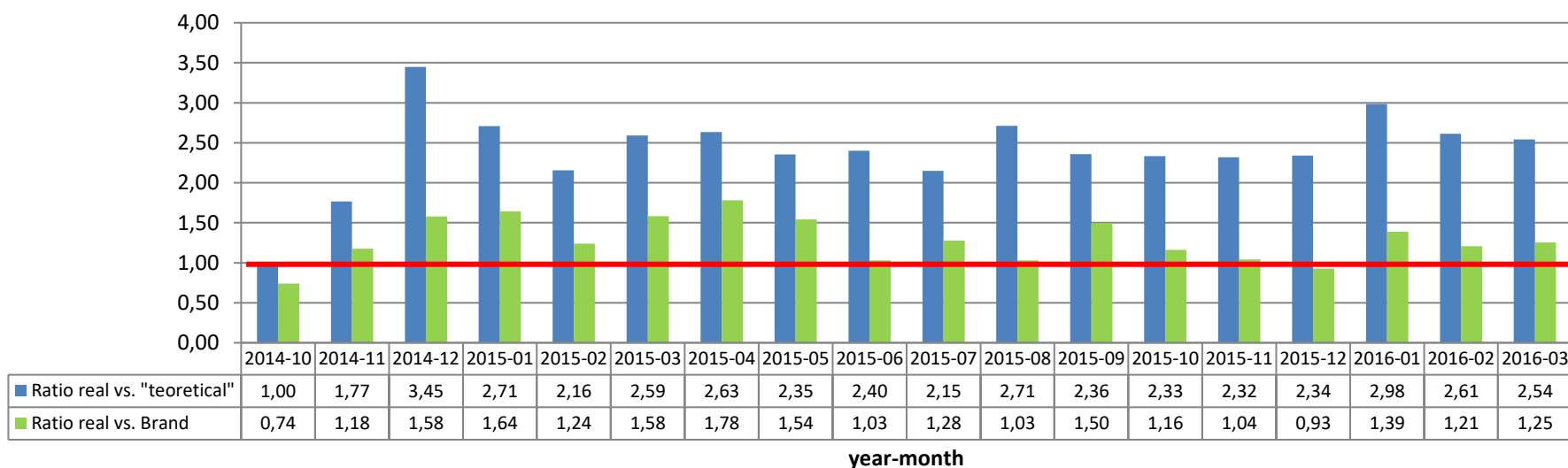


Figure 68 Italy - Jeep Renegade comparison parameters graph



Since the early phase of the launch this model got a relevant portion of the segment stabilizing its market share between 12% and 14% after just four months.

Analysing the ratios that help to understand the surrounding conditions, it performed better than its “theoretical” quota since the second month setting a stable value around 2,5, that means it got a portion of the market two times and half higher than what it could do, symbol of a high appreciation by the customers.

Looking at the comparison with the brand, Renegade in the early phase of its launch, pulled the Jeep quota, reaching market share 1,8 times higher than the brand one, aligning after about nine months.

These performances can be graphically appreciated in Figure 68, where the blue columns refer to the comparison with the “theoretical” values, while the green ones to the comparison with the brand ones. The red line is set to 1, in order to define the two areas of better or worst market shares in both the cases.

The last element to be analysed is the “Net coefficient”; it includes both the previous cases, considering how much the brand is relevant in the model result, and how many models are commercialized in the segment, and so how high the competition is.

These values are normalized considering the highest coefficient possible considering the different conditions of the models analysed; in particular in Italy in the I0 segment the normalizing state is:

- maximum models market share: 51,75%
- minimum brand market share: 5,46%
- maximum number of models: 19

In this situation the Jeep Renegade performances can be studied in Figure 69, where the normalized coefficient is monthly plotted; it is possible to notice that it reached the peak of about 19% in the seventh month, to stabilize between 10% and 14% in the following months.



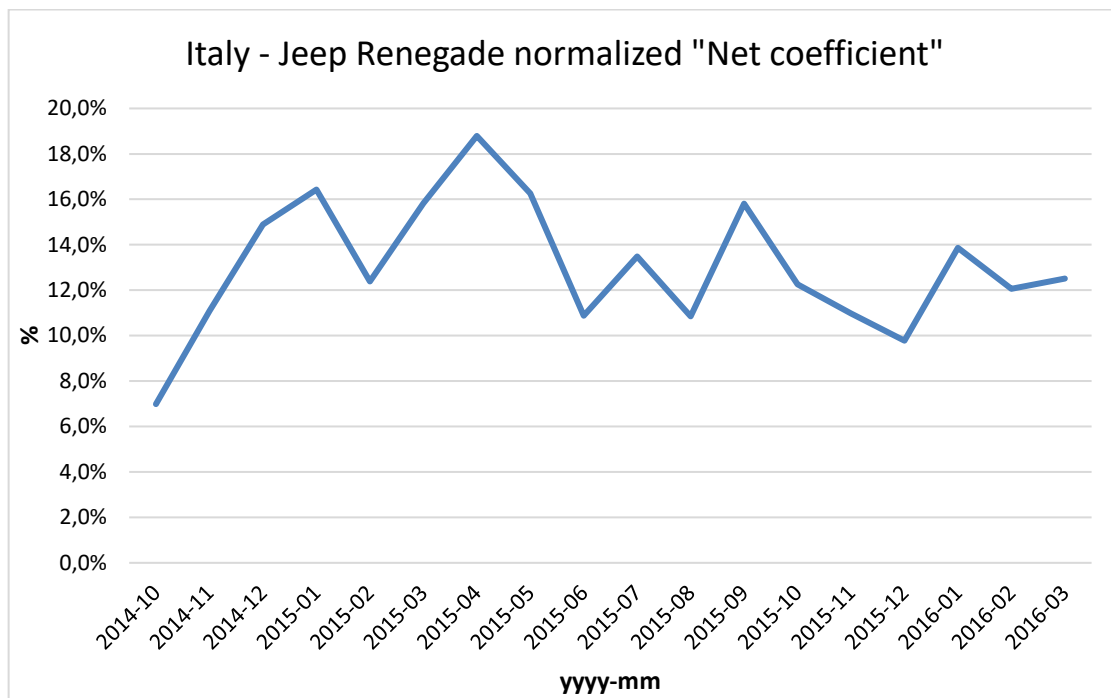


Figure 69 Italy - Jeep Renegade normalized "Net coefficient"

Summarizing all the elements considered in this section:

- the model had a continuous increase of volume during the first 18 months of the launch;
- it performed better than both the brand and its “theoretical” market portion since the early months;
- it reached soon both the peak of pure market share and the net one cleared by the brand and market influences;
- it played in a developing period for the segment.

Stated these considerations, it is possible to conclude that in Italy it got big success since the early phases, pulling its brand performances.

However, the volume and market share analysis move in two different directions: on one hand the volume continued to grow in the succeeding months, on the other hand the market share reached soon a stable condition. It means that the registrations after a starting successful period, were pulled by a segment spread that was running without obstacles.

### ***New Cherokee launch in Spain***

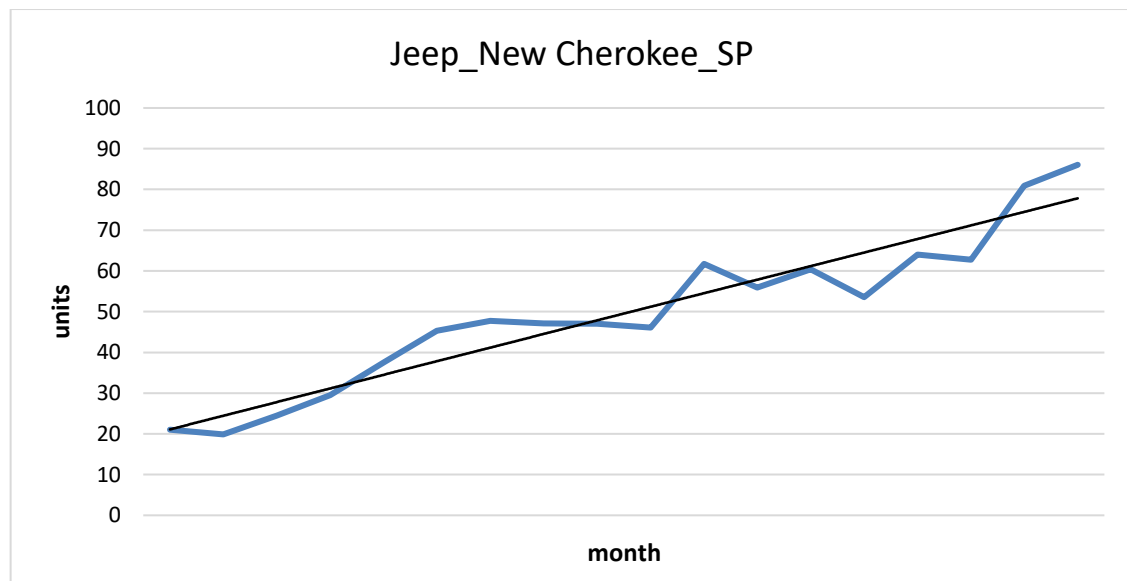
In Spain, from the identification of the volume peak temporal location, emerged a high value for Jeep New Cherokee equal to 1678,1 months.

In Table 10 the main launch data of this vehicle are reported, considering the time period, the monthly volume and the cumulative volume, while in Figure 70 is reported the graph of volume cleared from seasonality and the cyclic component as described in Section 3.1.1.

**Table 10 Jeep New Cherokee in Spain launch volume data**

Month	2014-01	2014-02	2014-03	2014-04	2014-05	2014-06	2014-07	2014-08	2014-09	2014-10	2014-11	2014-12	2015-01	2015-02	2015-03	2015-04	2015-05	2015-06
Volume	17	21	18	36	44	41	56	26	35	59	47	90	38	51	87	70	52	126
Cumulative Vol	17	38	56	92	136	177	233	259	294	353	400	490	528	579	666	736	788	914

This model was launched in Spain in January 2014, without reaching considerable registrations within the first eighteen months (less than 1000 units).



**Figure 70 Jeep New Cherokee deseasonalized monthly volume**

The monthly volume without considering the seasonality and the cyclic component, maintained a quite constant positive trend, without reaching the decline point within the “launch period”.

Looking at seasonality values during this period it could be possible to understand the possible strategic decision that affected this success.

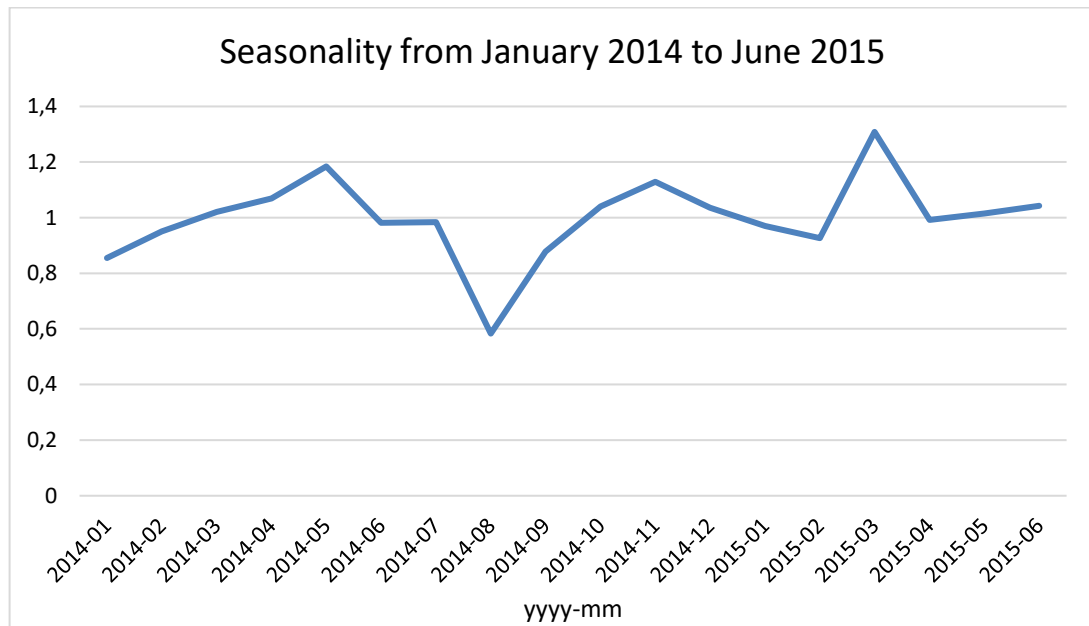


Figure 71 Jeep New Cherokee launch period in Spain seasonality

In Spain, differently from the case of Renegade launch in Italy, the seasonality is not so strong, and the only month with small appeal is August, while all the other months have more or less the same strengths; what could have influenced the behaviour of this model is the peak in seasonality in March 2003, that corresponds to the fifteenth month of the launch phase and could have relaunched the registration in a period that usually tends to be stable. In order to understand deeper this phenomenon, it is necessary to study the surrounding conditions of the segment, of the market and of the brand.

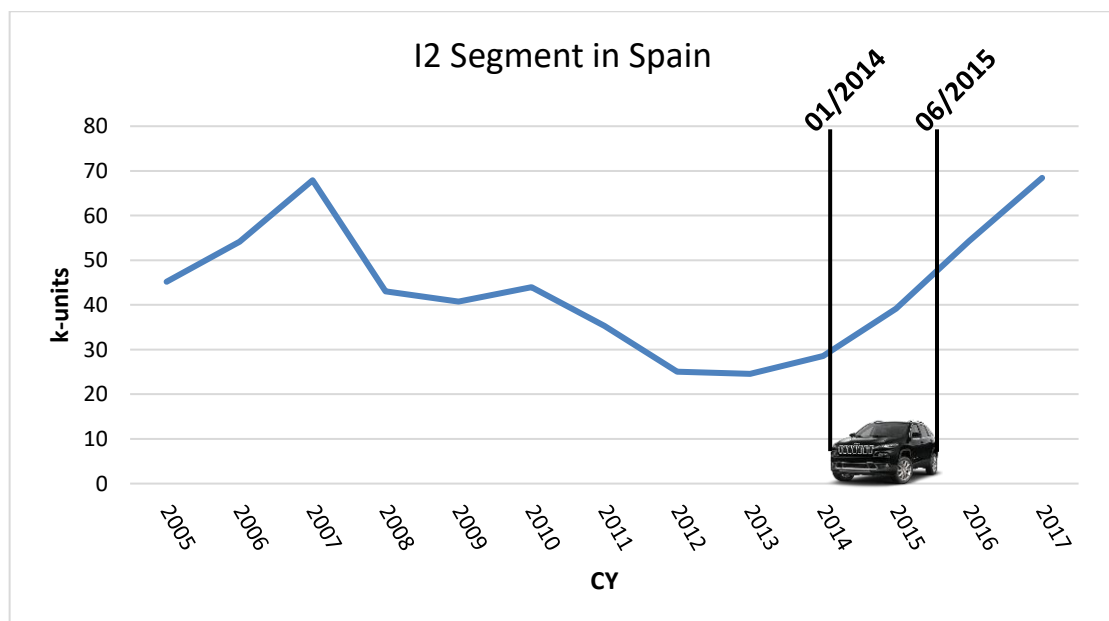


Figure 72 I2 Segment in Spain trend with temporary location of Jeep New Cherokee



As it is possible to notice in Figure 72 this model in Spain was launched in a prolific period for this segment, with yearly growth rate of about 30%.

The I2 segment was starting to be relaunched after the 2008 crisis and the continuously growing monthly volume could have been pulled by the whole segment trend.

Furthermore, this model represented the substitution of the old Jeep Cherokee, but it was characterized by a completely new design respect to the previous version; this revolutionary design for the model could have created a strong and lasting interest by the customers.

Looking at market share figures it is possible to understand how this model played in the industry, comparing its relative results with its brand ones and with the minimum quota, considered as if the market would be equally divided among the different vehicles.

In Table 11 the main data relative to the market share in the launch phase are reported; in particular the main elements considered are:

- the market share;
- the number of models commercialized in the relative segment;
- the ratio between the model market share and the “theoretical” one (Section 3.1.3);
- the brand market share;
- the ratio between the model market share and the brand one;
- the normalized “Net coefficient” (Section 3.1.5).



Table 11 Spain - Jeep New Cherokee market share data

Jeep New Cherokee - Spain	2014-01	2014-02	2014-03	2014-04	2014-05	2014-06	2014-07	2014-08	2014-09	2014-10	2014-11	2014-12	2015-01	2015-02	2015-03	2015-04	2015-05	2015-06
Market share	0,9%	1,0%	0,8%	1,5%	1,6%	1,8%	2,3%	1,8%	1,5%	2,1%	1,5%	3,1%	1,3%	1,8%	2,1%	2,2%	1,6%	3,7%
Number of competitors	22	22	22	24	24	24	24	24	24	25	25	25	25	25	25	25	25	25
Ratio real vs. "theoretical"	0,20	0,22	0,18	0,36	0,39	0,43	0,56	0,43	0,37	0,52	0,38	0,77	0,33	0,45	0,53	0,56	0,40	0,93
Brand market share	2,6%	3,2%	2,5%	2,5%	2,4%	4,1%	2,9%	4,3%	2,6%	2,5%	3,1%	4,3%	2,9%	6,3%	3,6%	4,2%	2,7%	4,6%
Ratio real vs. Brand	0,36	0,32	0,32	0,61	0,68	0,44	0,82	0,42	0,58	0,84	0,48	0,71	0,46	0,29	0,59	0,53	0,59	0,81
Normalized "Net coefficient"	0,9%	0,8%	0,8%	1,7%	2,0%	1,2%	2,3%	1,2%	1,7%	2,5%	1,4%	2,1%	1,4%	0,9%	1,8%	1,6%	1,8%	2,4%

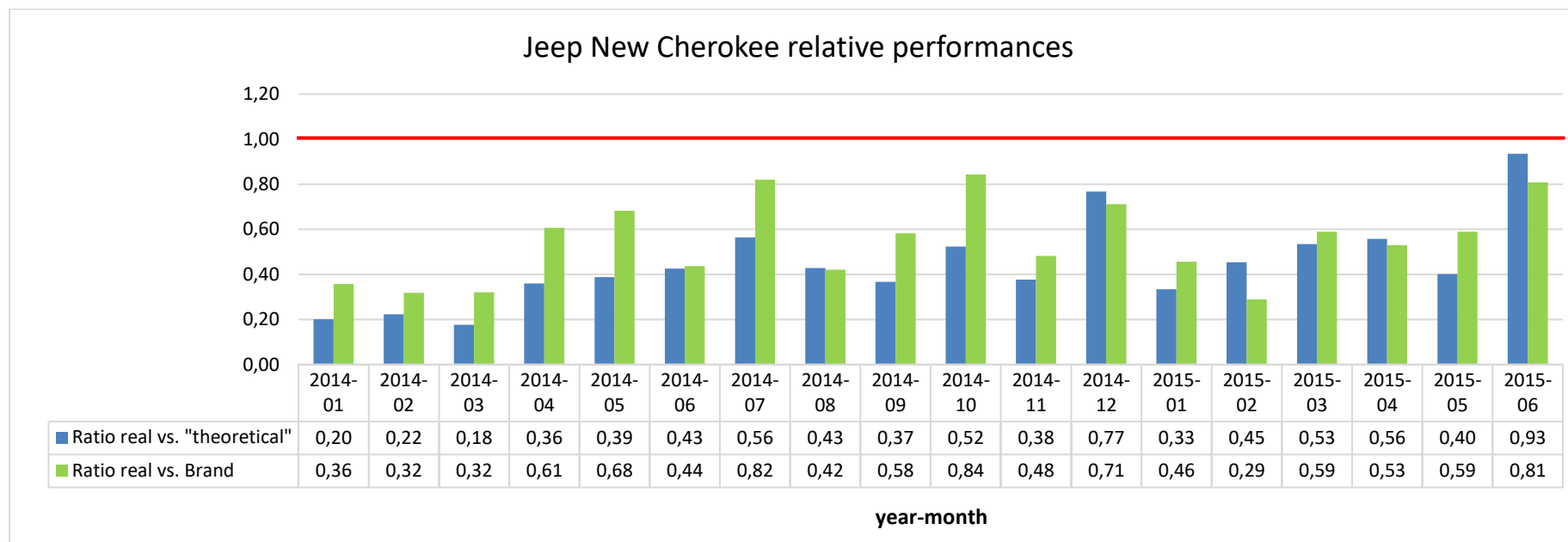


Figure 73 Spain - Jeep New Cherokee comparison parameters graph



This model got a small portion of the industry, with a market share that reached maximum 3,7% in the launch period.

Analysing the ratios that consider the surrounding conditions, during the period considered is always underperformed both respect to the “theoretical” value and to the brand one. It can be seen in Figure 73, where the blue columns represent the latter and the green ones the former. The red line is set to 1, in order to define the two areas of better or worst market shares in both the cases.

The ratio versus the “theoretical” has a quite stable trend with the exception of the eighteenth month, while the ratio versus the brand has an oscillatory behaviour, and the causes should be investigated in a specific study.

The last element to be analysed is the “Net coefficient”; it includes both the previous cases, considering how much the brand is relevant in the model result, and how many models are commercialized in the industry, and so how high the competition is.

These values are normalized considering the highest coefficient possible among the different conditions of the models analysed; in particular in Spain in the I2 segment the normalizing state is:

- maximum models market share: 20,65%
- minimum brand market share: 0,74%
- maximum number of models: 30

In this situation the Jeep New Cherokee performances can be studied in Figure 74, where the normalized coefficient is monthly plotted.

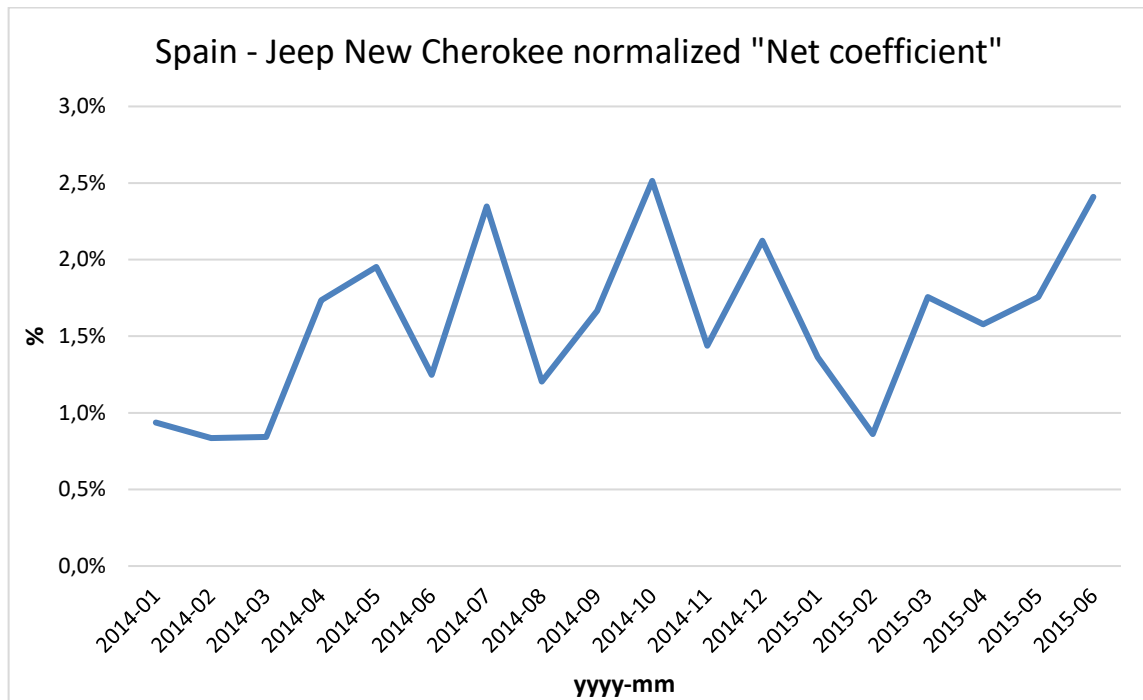


Figure 74 Spain - Jeep New Cherokee normalized "Net coefficient"

Considering the market share cleared by external influences, it is possible to notice an oscillatory trend that moves between 1% and 2% that is a big relative gap but it represents just 1%, so a small absolute quantity.

As the Jeep Renegade case in Italy, the high volume peak month is mainly due to a constant increase of registration pulled by the segment spread after the economic crisis; in this case also the low volume must be considered since it reaches just 120 registrations in the eighteenth month.

## 5.2 A Segment

The A Segment is the one characterized by high maneuverability, low cost and parking easiness.

This portion of the industry has a heterogeneous behavior in terms of share according to the specific market.

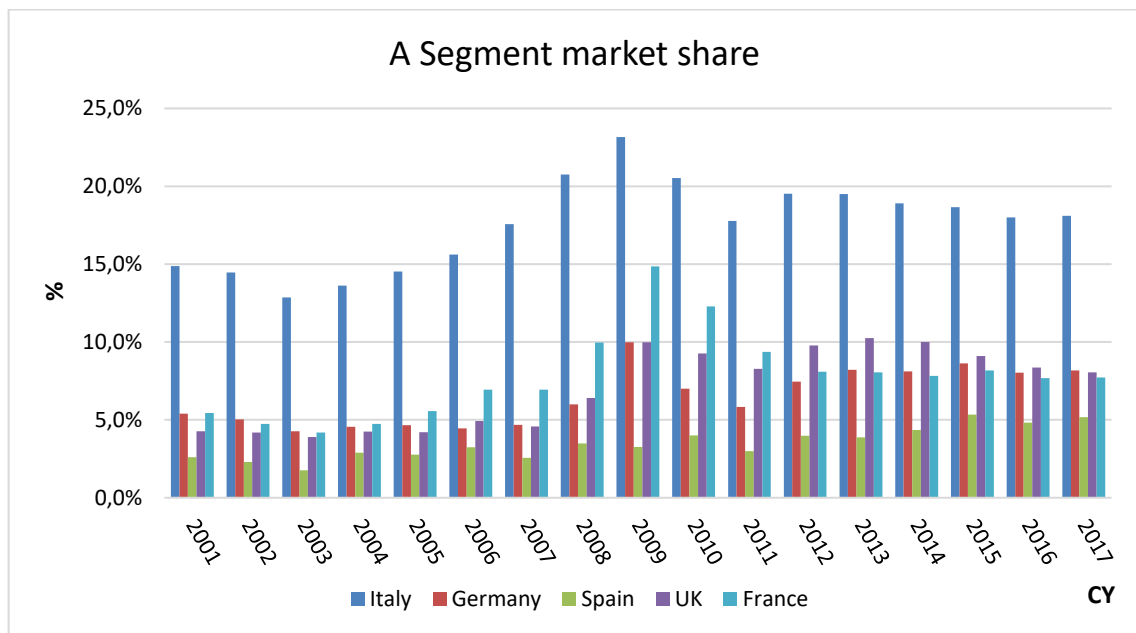


Figure 75 A Segment market share in the 5MM

As it is possible to notice from Figure 75 this segment is relevant mainly in Italy where it represented around 18% in 2017.

In general, it is characterized by a peak in 2009 mainly due to incentives to buy new cars that influenced mainly the lowest segments; starting from 2012 there is a general stabilization of the market share in all the five countries considered (Italy  $\approx 18\%$ ; Germany, UK and France  $\approx 8\%$ , Spain  $\approx 5\%$ ).

The 2009 peak influenced all the carmakers that started to bet more on this industry as it is possible to notice analysing the number of models commercialized of Figure 76.

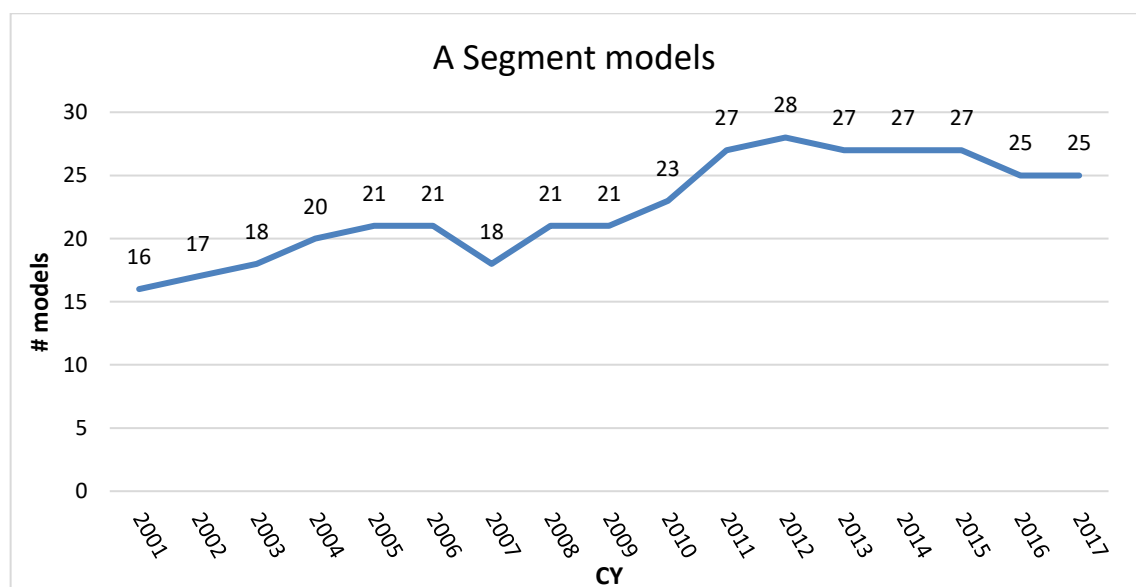


Figure 76 A Segment - number of model commercialized from 2001 to 2017





Starting from 2009 the number of different vehicles passed from 21 up to 28 in 2012, with an increase of 33%; this is also due to the necessity to develop smaller and smaller car to react to the motorization process in the emerging markets where the concentration of population is high and the parking space is limited.

For the volume analysis of the models considered the seasonality coefficients used are the ones relative to the specific year-month couple and not the average value for the month; this is mainly due to the variability of this coefficient year over year as can be noticed in Figure 77 and Figure 78.

The average seasonality values can describe well just August month that is characterized by low volumes and so it has a seasonality coefficient quite constant and between 0,4 and 0,7. On the opposite, in certain months the coefficient varies year over year with values from lower than 1 to higher than 1.

This is also confirmed in Figure 78, where the actual volumes are compared with the volumes obtained using the average seasonality coefficients: points are distributed along the trend line, but there are some exceptions that can be attributed to the high variability of economy and consequently automotive incentives in the considered period of time.

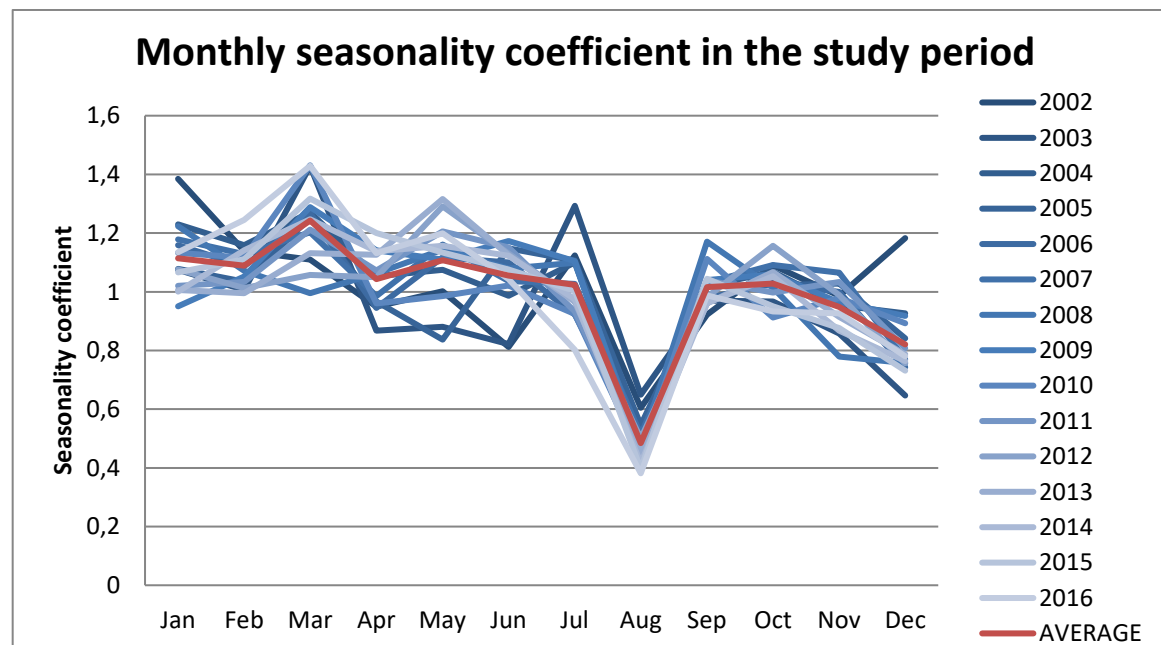


Figure 77 Graph of comparison among average seasonality coefficient and years values

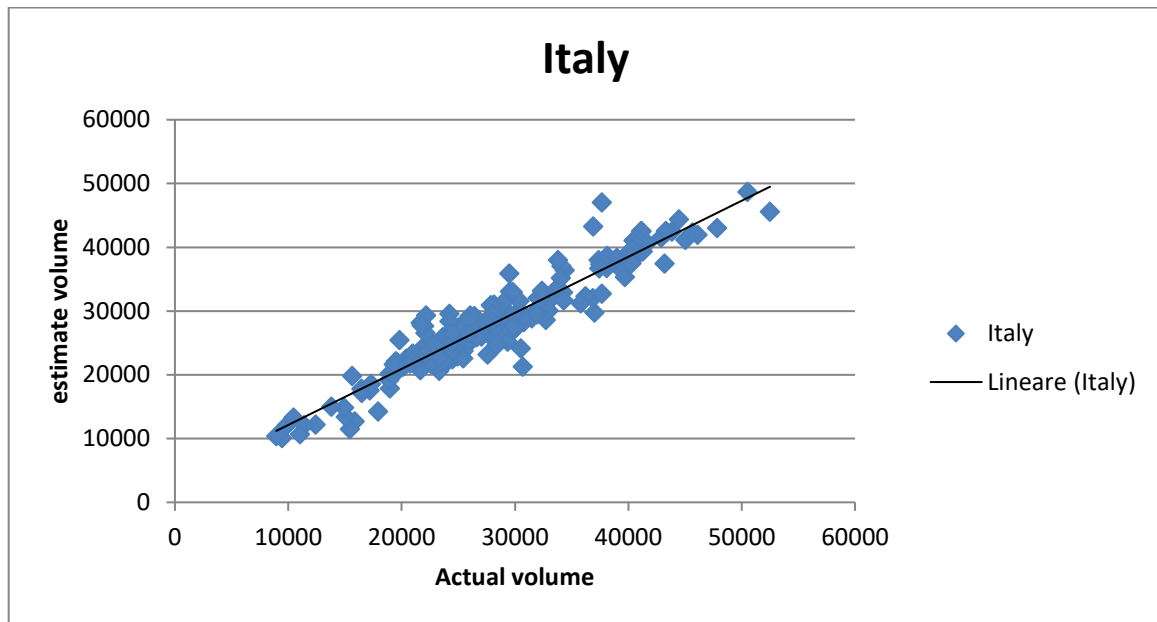


Figure 78 Actual volume versus estimated volume using average monthly seasonality

Since this segment spread is relevant mainly in Italy (with a share double respect to the other countries), the analysis will focus on this market comparing two models of the same brand with different customer targets: Fiat 500 and Fiat Panda (3<sup>rd</sup> series).

They have a different price level and different customization possibilities, but they share the same strong brand image. Furthermore, they are the segment leaders in Italy.

The first month considered for the launch in Italy is for Fiat 500 (red car in Figure 79) July 2007, while for the third series of the Panda (blue car in Figure 79), January 2012.

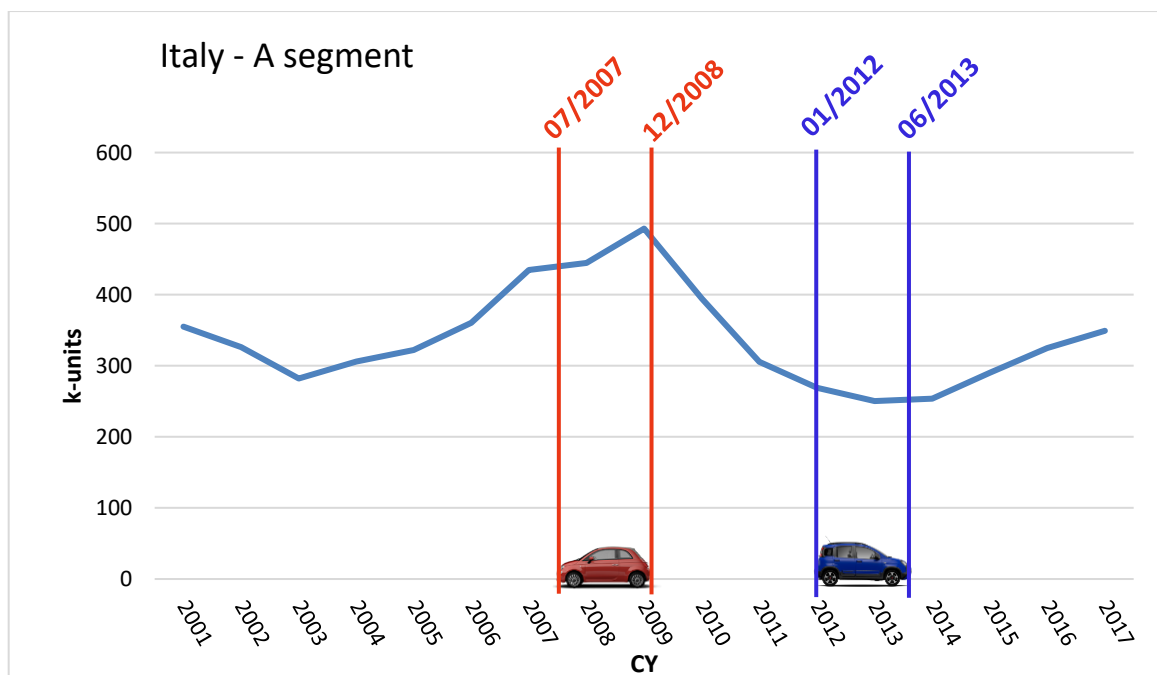


Figure 79 A segment in Italy trend with temporary location of Fiat 500 and Fiat Panda (3<sup>rd</sup> series)

The two models differ mainly for the temporal and economical location:

- Fiat 500 was launched in the mid of 2007 (before the automotive crisis of 2008), when the segment in Italy had a positive trend and reached the peak yearly volume of about 500 thousand vehicles registered;
- the third series of Fiat Panda was launched at the beginning of 2012; this period, as can be appreciated in Figure 79, is characterized by a negative trend and the segment reached the minimum yearly volume of the last sixteen years in 2013.

Despite these differences both in the surrounding conditions and in the type of vehicle and in particular of customers, the two models passed the threshold of 100 thousand registrations in the first eighteen months: Fiat 500 reached the value of 123.965 cars and Fiat Panda (3<sup>rd</sup> series) 104.584 cars. These are huge numbers thinking to the 402 thousand cars of Fiat brand registered in the whole 2017 in Europe.

Looking at the volume trends, both the models had a downwards concavity; instead they had a different peak month:

- Fiat 500 volume peak at 10,95 months;
- Fiat Panda (3<sup>rd</sup> series) volume peak at 60,59 months, and so out of the studying period.

The volumes cleared by the seasonality and the cyclic component can be observed in Figure 80 and Figure 81, where the trend lines are also reported.

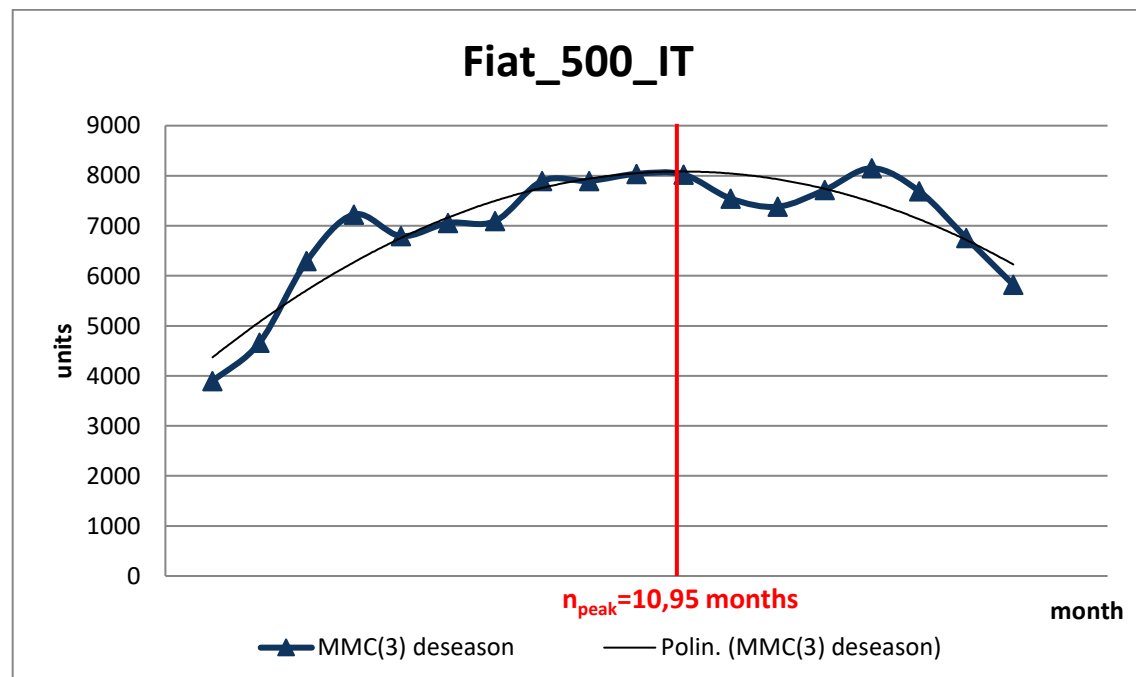


Figure 80 Fiat 500 deseasonalized monthly volume

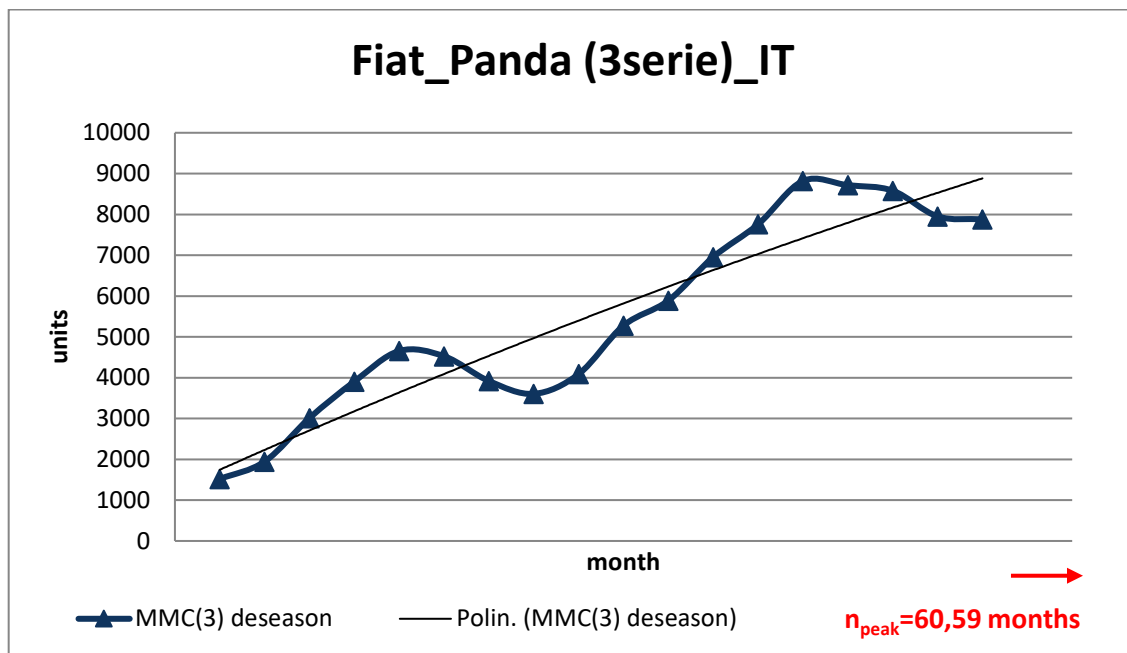


Figure 81 Fiat Panda (3<sup>rd</sup> series) deseasonalized monthly volume

As it is possible to notice, Fiat Panda in the first eighteen months can be approximated by a flat increasing trend line, while the volumes of Fiat 500 are well described by a parabolic trend line.

Looking at market share data of the two models in Table 12 and Table 13, it is possible to understand the surrounding conditions that characterized the launch phases, and in particular:

- Number of models in the segment and consequently competitors for Fiat 500 were ranging from 18 to 21, while for the third generation of Fiat Panda were ranging from 26 up to 28;
- the brand market share was quite similar for the two models even if they were launched into different economical and company period.

Looking at these considerations, it is clear that the “internal” surrounding conditions are similar, while the marketplace where they played was different; in particular the Panda during its launch had to fight against a number of models 30% higher in comparison to Fiat 500.

The ratio between the actual market share and the “theoretical” one and between the actual and the brand market share are plotted for the two models in Figure 82 and Figure 83.



Table 12 Italy - Fiat 500 market share data

Fiat 500 - Italy	2007-07	2007-08	2007-09	2007-10	2007-11	2007-12	2008-01	2008-02	2008-03	2008-04	2008-05	2008-06	2008-07	2008-08	2008-09	2008-10	2008-11	2008-12
Market share	8,5%	12,7%	16,9%	21,6%	20,1%	13,1%	23,2%	20,1%	19,3%	23,1%	21,4%	19,6%	20,0%	20,7%	22,5%	22,9%	16,3%	14,3%
Number of competitors	18	18	18	18	18	18	19	19	19	21	21	21	20	20	20	19	19	19
Ratio real vs. teoretical	1,52	2,29	3,03	3,88	3,62	2,36	4,42	3,83	3,67	4,84	4,50	4,13	3,99	4,15	4,49	4,36	3,09	2,72
Brand market share	23,8%	23,0%	23,4%	23,5%	23,9%	26,7%	22,3%	26,3%	24,3%	25,0%	20,8%	23,4%	21,9%	23,1%	22,9%	23,9%	24,0%	25,8%
Ratio real vs. brand	0,36	0,55	0,72	0,92	0,84	0,49	1,04	0,76	0,80	0,92	1,03	0,84	0,91	0,90	0,98	0,96	0,68	0,55
Normalized "Net coefficient"	1,8%	2,8%	3,6%	4,6%	4,2%	2,5%	5,5%	4,1%	4,2%	5,4%	6,0%	4,9%	5,1%	5,0%	5,5%	5,1%	3,6%	2,9%

Table 13 Italy - Fiat Panda (3<sup>rd</sup> series) market share data

Fiat Panda (3 series) - Italy	2012-01	2012-02	2012-03	2012-04	2012-05	2012-06	2012-07	2012-08	2012-09	2012-10	2012-11	2012-12	2013-01	2013-02	2013-03	2013-04	2013-05	2013-06
Market share	4,1%	9,1%	12,2%	18,2%	21,0%	22,4%	16,8%	13,4%	18,7%	23,7%	29,7%	27,3%	38,9%	41,5%	42,8%	38,2%	40,6%	34,7%
Number of competitors	28	28	28	26	26	26	27	27	27	27	27	27	27	27	27	26	26	26
Ratio real vs. teoretical	1,14	2,54	3,42	4,73	5,45	5,83	4,55	3,60	5,05	6,40	8,02	7,38	10,51	11,21	11,55	9,93	10,56	9,03
Brand market share	20,8%	24,2%	19,8%	22,0%	27,0%	26,8%	24,2%	28,8%	26,4%	18,7%	24,4%	26,1%	28,4%	22,1%	31,5%	25,6%	23,6%	26,4%
Ratio real vs. brand	0,20	0,37	0,62	0,83	0,78	0,84	0,69	0,46	0,71	1,27	1,22	1,05	1,37	1,88	1,36	1,49	1,72	1,32
Normalized "Net coefficient"	1,5%	2,9%	4,8%	6,0%	5,6%	6,1%	5,2%	3,5%	5,3%	9,6%	9,2%	7,9%	10,3%	14,2%	10,2%	10,8%	12,5%	9,6%

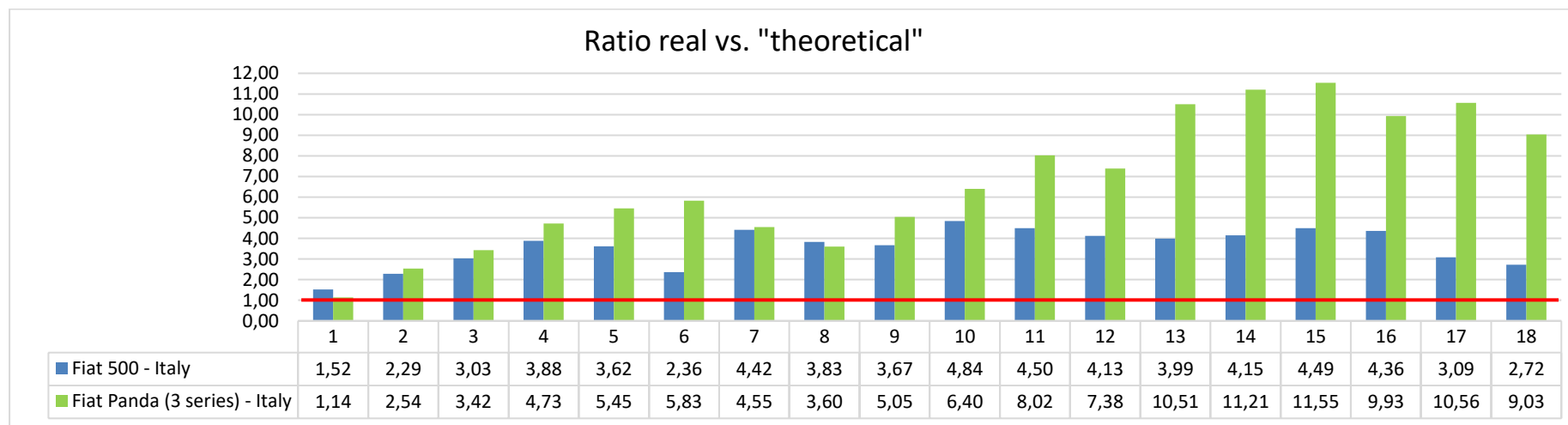


Figure 82 Graph of ratio between actual and "theoretical" market share

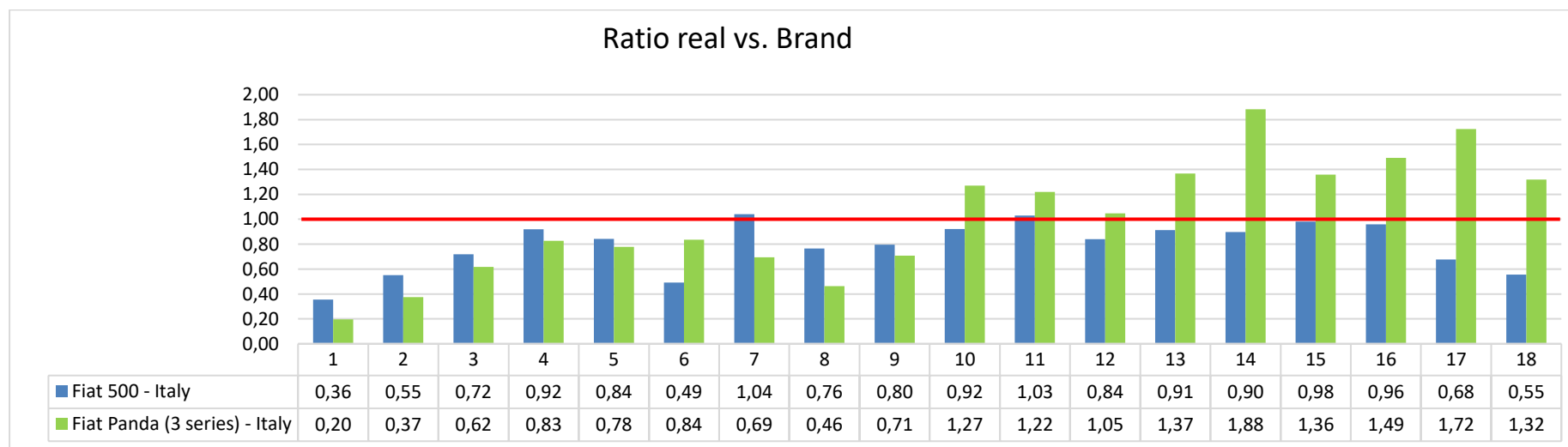


Figure 83 Graph of ratio between actual and brand market share

Since it is a really crowded segment and the two models analyzed are leaders in this segment, the ratio between the actual market share and the “theoretical” one is higher than 1 since the early phases for both the models. The difference is that if for Fiat 500 it reached a stable value equal to 4 in about five months, for Panda it grew in the following months to reach values greater than 10; it can be considered mainly due to the increase of number of models in the segment in 2012 respect to 2007 as already stated.

Looking at performances compared to the brand ones, Fiat 500 market share, after an increasing phase, is aligned to the carmaker one with an oscillatory behavior.

Fiat Panda coefficient analysis is aligned to the volume performances; it has a continuously increasing trend passing from 0,20 in the first month to 1,88 in the fourteenth month; the crossing point from values lower than 1 to values higher than 1 is in the tenth month, pulling the brand performances for quite half of its launch process.

The last indicator to be considered to better compare the two models is the normalized “Net coefficient” plotted in Figure 84.

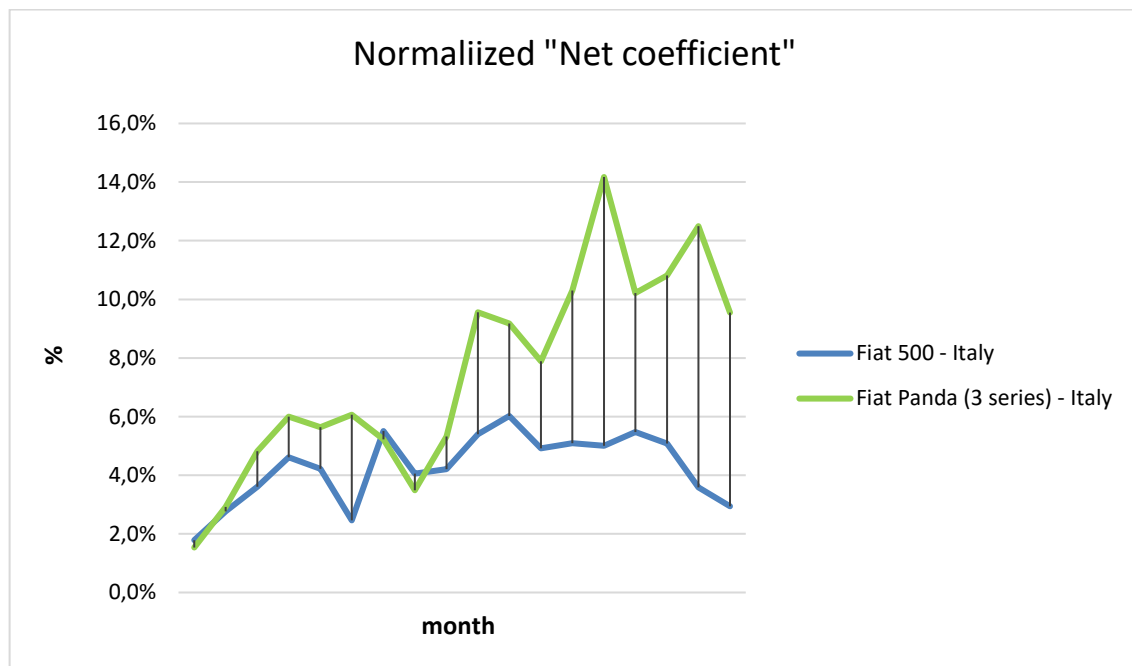


Figure 84 Graph of normalized “Net coefficient” for Fiat 500 and Fiat Panda (3<sup>rd</sup> series)

The two models have been plotted in the same graph in order to compare them and understand how they differ. Considering the surrounding conditions, Panda was able to fight against a crowded market getting improving results month over month both in terms of volume and market share. Instead Fiat 500 normalized “Net coefficient” passed from 2%



up to a peak at 6% to decrease around 3% in the eighteenth months, aligned to volume figures.

From this analysis, considering also the whole segment trend in Italy it is possible to underline some aspects:

- both the models were successful in terms of volume registered in the launch period; what differed were the surrounding conditions where they played: on one side Fiat 500 entered the market in a prolific period, while Panda had an increasing trend in a marketplace that was reducing the registrations year over year;
- the two vehicles were offered to the customers in a different way:
  - 500 was a re-proposal of the old icon of sixties, but as a completely new model, without substituting any previous series;
  - Panda was the third series of a successful model, considered as a symbol of reliability and robustness;
- both the models performed better than the “theoretical” market share, computed as if the market would be divided in equal parts among all the actors;
- Fiat 500 market share during the whole launch phase was aligned to the brand one, while Panda after ten months started to pull the brand performances.

### 5.3 B Segment vs. L0 Segment

B segment and L0 segment are characterized by high internal roominess, accessible price and comfort in the drive. They can be considered as a sort of competitors since they partially share their customer target.

The B one was highly influenced by the automotive industry of 2009. One consequence of this event and revolution is the reduction of appreciation of the carmakers on this segment as described in Figure 85, where the trend of number of models is plotted.

In 2001 the actors of the stage were 35, increasing up to its peak value of 47 in 2008 and it fell in the last year considered in the analysis to 30; so, the reduction in the last sixteen years is of about 14%, while respect to 2008 it is about 36%, that means more than one third. These numbers can be considered as a good indicator of the general decline of the segment.





In Figure 86 instead, the number of models populating L0 Segment over years is plotted; in 2001 they were just 5, reaching 16 in 2011 and decreasing to 11 in 2016; from 2001 currently, they are more than doubled, but respect to 2011 they reduced of about 30%.

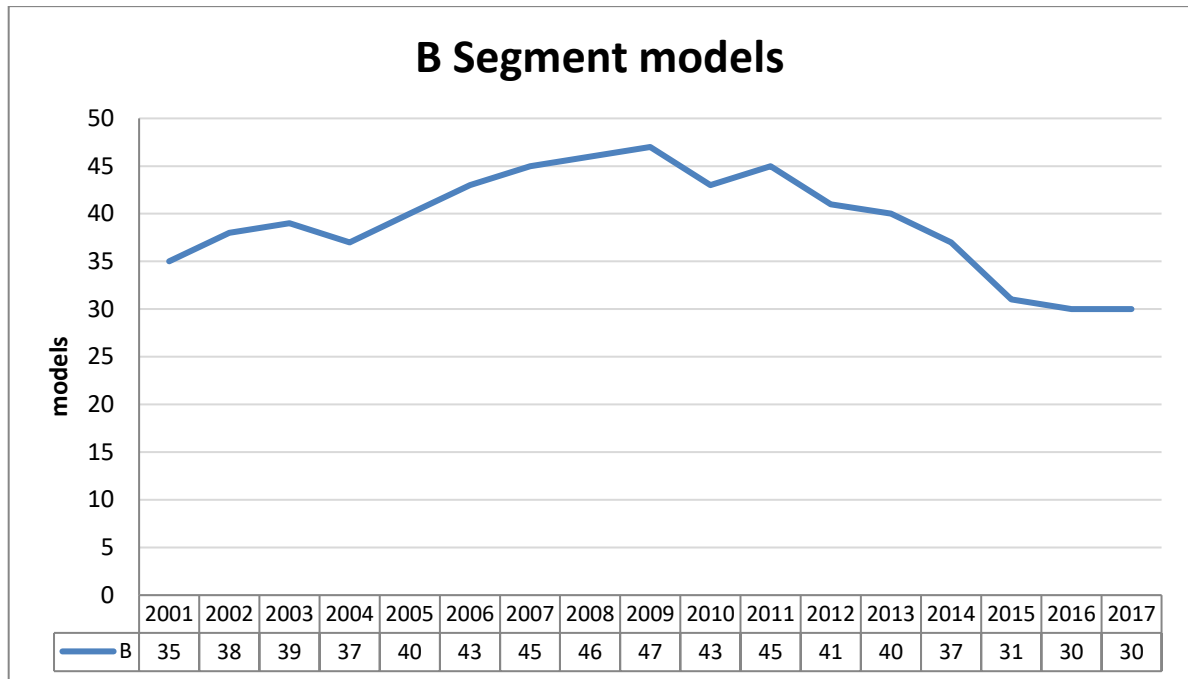


Figure 85 Graph of number of models in B Segment

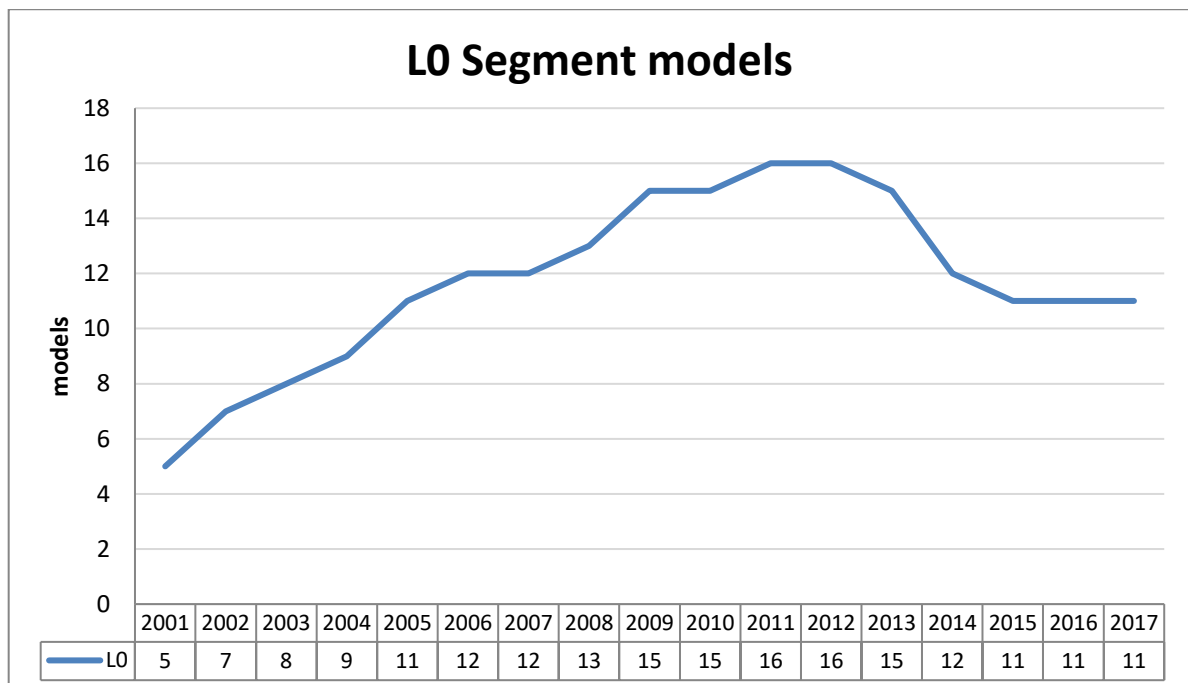


Figure 86 Graph of number of models in L0 Segment

To better understand how the different markets changed their interests in these segments it is necessary to look at Figure 87, where the volume trends in the five Major Markets are plotted.

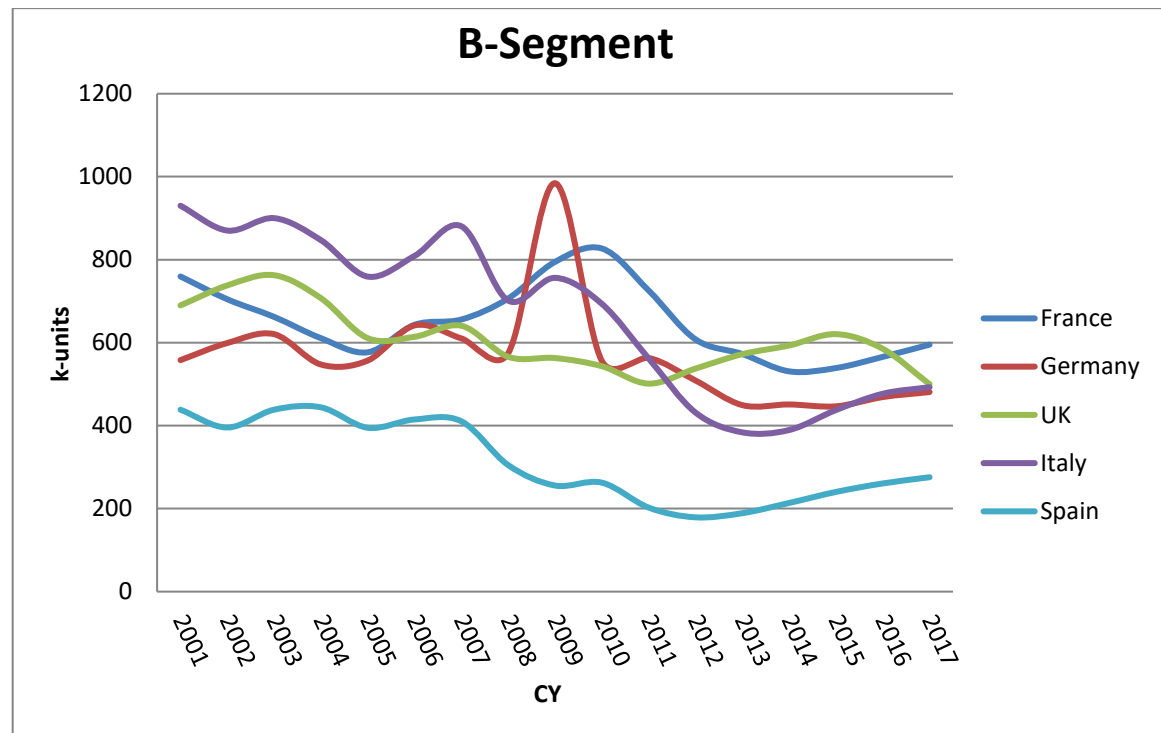


Figure 87 B Segment 2001-2017 trend 5MM

From a first graphical analysis stand out the German peak of volume in 2009; as already mentioned in Section 2.2.2, it is the result of a strong incentives campaign of the government in order to promptly react to the economic crisis.

Except for UK, in all the other countries considered it is possible to notice a smooth volume recovery in the last three years (from 2015 to 2017).

At the beginning of the millennium the country that was appreciating more this segment was Italy (more than 900 thousand registrations in 2001), while in 2017 the volumes in the different countries except for Spain are similar and equal to 500 thousand each. Instead Spain during the whole period, registered the lowest number of vehicles in the segment passing from about 400 thousand to 300 thousand.

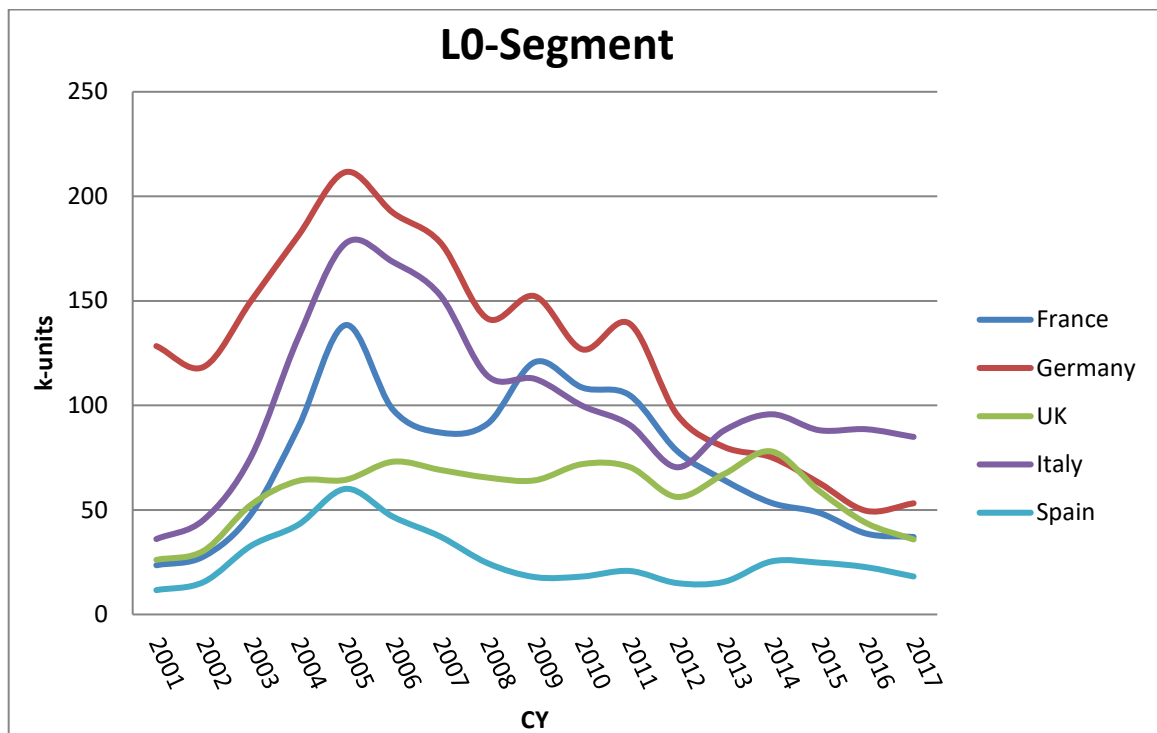


Figure 88 L0 Segment 2001-2017 trend 5MM

Looking at L0 trends (Figure 88) instead, in all the markets considered except for UK, the peak volume of registrations occurred in 2005 and after that it started a declining phase.

As for B Segment, also for L0 one Spain along the whole period registered the lowest number of vehicles passing from about 11 thousand in 2001 to the peak of 60 thousand in 2005 up to the 18 thousand in 2017.

In both the B and L0 segments UK maintained a quite stable trend respect to the other countries; this must be investigated deeper, but can be associated to historical reasons of a stable economy characterized mainly by high monthly seasonality. In particular in the L0, despite the other countries, it reached the peak volume in 2014 (about 78 thousand vehicles registered).

Considering the two segments as a unique cluster of cars characterized by the same specifics and customer target, it is possible to conclude that it lost appeal starting from 2005 in all the countries except to UK.

Considering the volume cleared by seasonality and the cyclic component, it can be interesting to analyze the differences in the different curves. In particular, considering the ones with downward concavity, it is possible to consider the volume peak month in the two segments in the different markets considered in this project work (Table 14 and Figure 89).

Table 14 B and L0 segments volume peak months in 5MM

Segment	France	Germany	Italy	Spain	UK	Total
B	10,95	10,95	11,14	14,80	11,80	11,78
L0	8,31	7,52	8,46	10,48	6,29	8,28
Total	10,24	10,10	10,42	13,50	10,49	10,85

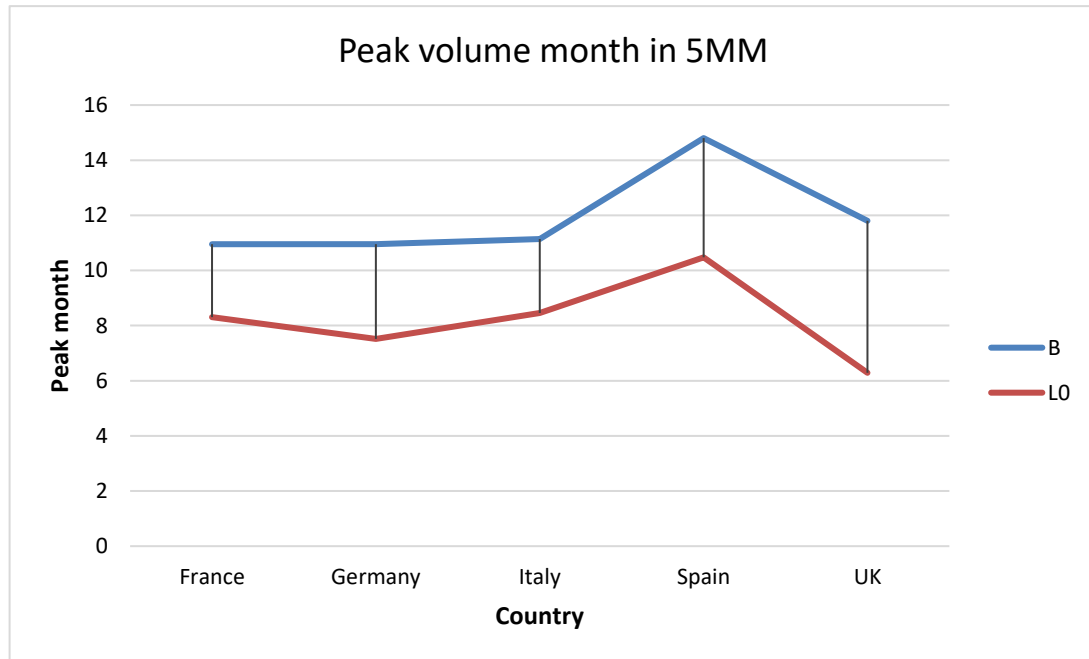


Figure 89 Graph of B and L0 segments volume peak months in 5MM

In all the countries considered, grouping data relative to the peak month per segment and plotting the values, it is possible to notice that L0 segment has a shorter increasing phase (average value equal to 8,28 months) respect to B segment (average value equal to 11,78 months). In each country the gap between the two clusters varies from 2,65 to 5,5 and they can be considered comparable. In Spain the peak month for both the cases is higher than in the other countries of about 25%; for all the considered elements it is possible to conclude that:

1. L0 segment launch is characterized by a shorter increasing phase respect to B one;
2. Spain launches for both the segments have an increasing phase of about 25% longer than in the other countries considered.

## 5.4 C Segment and its undisputed leader

C Segment is the common level of car bought by European families; it includes several kinds of sub clusters, from the sporty to the comfort, from the cheapest to the luxury vehicle.

Since its birth, Volkswagen Golf represents the undisputed leader of the segment; in the period considered in this project work it was the leader in the 5MM for most of the months, giving up the scepter just to Ford Focus in small periods until 2007.

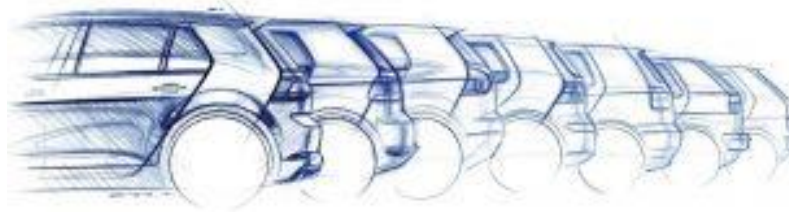


Figure 90 Golf external shape evolution in the 7 series

Starting from 2001 the German car manufacturer launched the last three versions (5<sup>th</sup>, 6<sup>th</sup> and 7<sup>th</sup> series). In this section the analysis will focus on this model that is pulling the whole industry and its launch data in these last versions.

This segment represents since several years a focal point for all the carmakers; this is underlined by the trend of number of models that populate the industry (Figure 91). The different exemplary passed from around 40 to 53 with a constant increase of 29%, that is a relevant percentage.

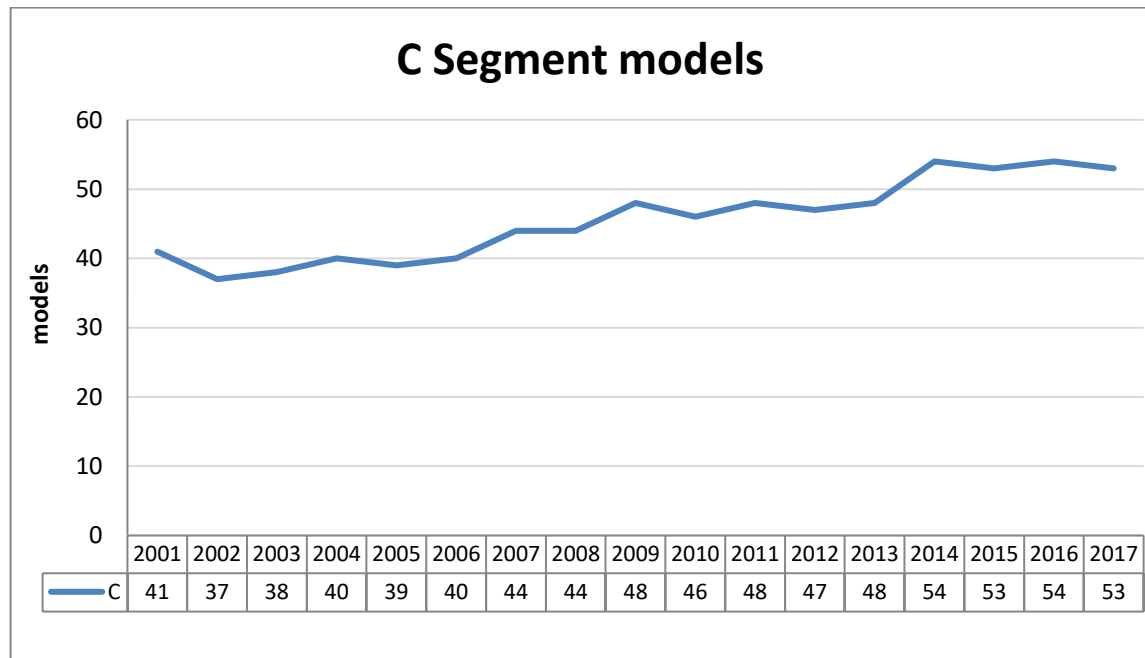


Figure 91 Graph of number of models in C Segment

This segment has different impacts on each market; during the whole 2017 in the 5MM were registered about 2 million cars subdivided as:

- France ≈ 315 thousand (representing a quota of 15%);

- Germany  $\approx$  710 thousand (representing a quota of 34%);
- Italy  $\approx$  273 thousand (representing a quota of 13%);
- Spain  $\approx$  280 thousand (representing a quota of 13%);
- UK  $\approx$  514 thousand (representing a quota of 25%);

Most of these vehicles were registered in Germany and UK in the last year; in Figure 92 it is possible to appreciate how the total volume changed in the last sixteen years and also how much the different markets contributed.

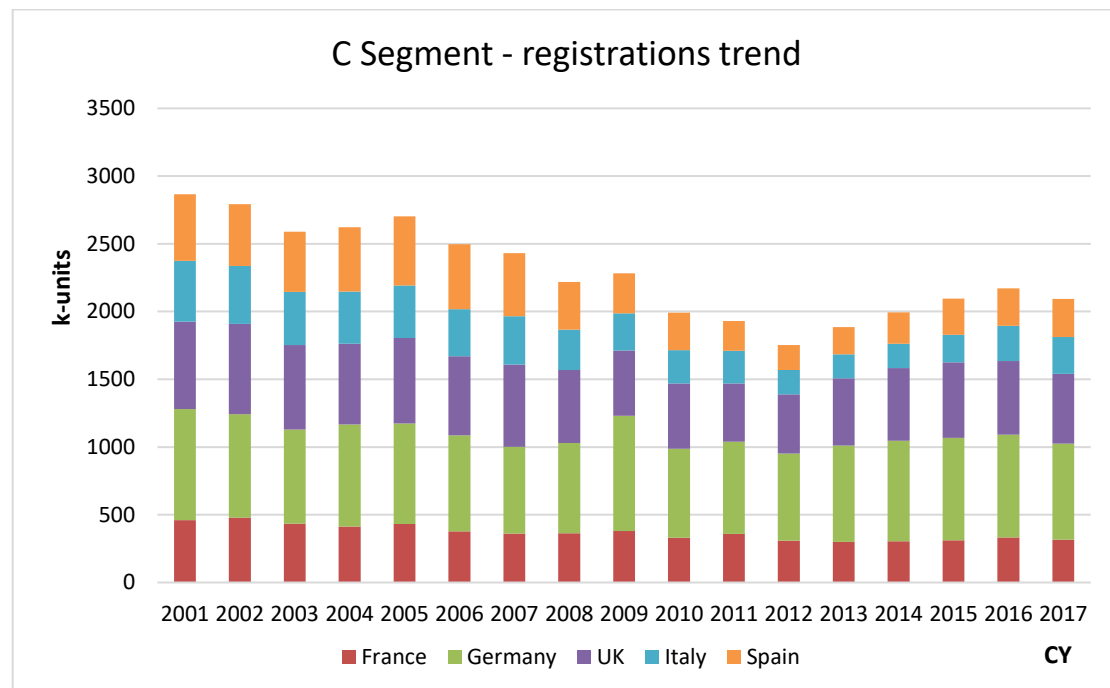


Figure 92 Graph of C segment registrations in the 5MM from 2001 to 2017

Considering the whole volume in the 5MM it is possible to notice a negative trend, passing from 2,9 million in 2001 to 2,1 million in 2017. This datum seems to be in contrast with the trend of models offered to the markets; but focusing on years from 2012 going on, both the data show a positive trend after a reduction of registrations and a stable period in terms of new products launched.

Considering the origin of Volkswagen and the importance in this segment of Germany, the analysis will focus on Golf launches in Germany of the 5<sup>th</sup>, 6<sup>th</sup> and 7<sup>th</sup> series.

In Figure 93 the volume trend of this segment in Germany is reported; furthermore, the launches of the three series of Volkswagen Golf considered are located in the time period considered (2001-2017).

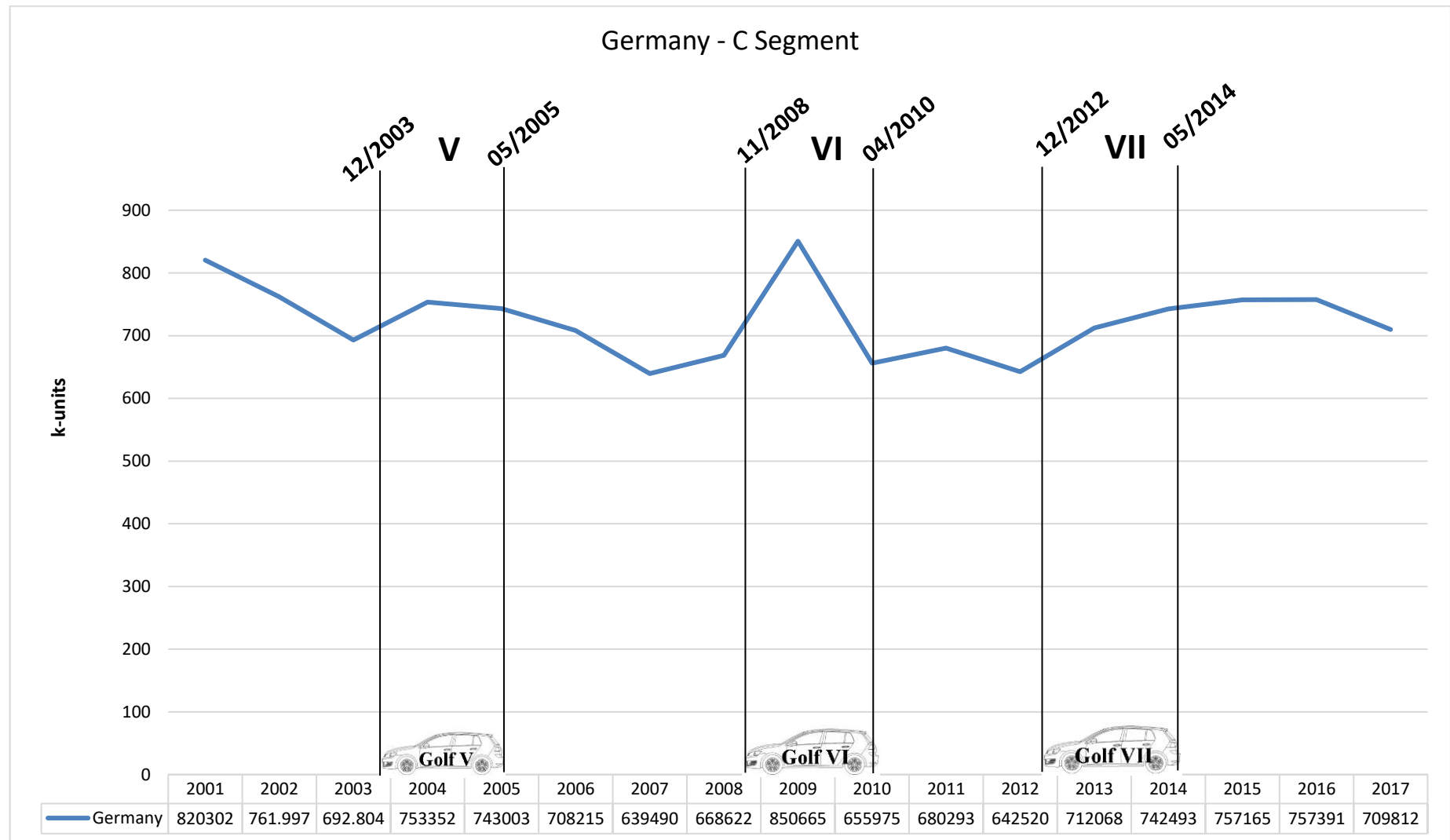


Figure 93 Germany - C Segment registrations trend with temporary location of Volkswagen Golf V, VI and VII



As it is possible to notice, the yearly volume of registrations oscillated from 640 thousand to 850 thousand in the period considered; the minimum point occurred in 2007 as result of the economic crisis of 2006, while the maximum point was set in 2009 as a result of government incentives to react to the collapse of registrations of the previous years.

The three-following series considered were launched in different market conditions:

- Golf V (December 2003): the 2004 for the industry was a positive year since registrations increased of 9% respect to the previous year, passing from 693 thousand to 753 thousand;
- Golf VI (November 2008): launched at the end of a fruitless period but it took advantage of 2009 that represented the relaunch year for automotive industry in general, and in particular the C segment was affected by an increment of about 27% of the registrations;
- Golf VII (December 2012): as can be notice in the graph of Figure 93 it was launched in a period of smooth increase of registrations year over year with an increment of 11% from 2012 to 2013.

Once defined the surrounding conditions of the market and the segment in the three different periods it is necessary to look at the volume data in Table 15 and Figure 94.

The three models differ by the cumulative volume reached at the end of the study period, in particular:

- Golf V launch volume  $\approx$  310 thousand vehicles;
- Golf VI launch volume  $\approx$  372 thousand vehicles;
- Golf VII launch volume  $\approx$  290 thousand vehicles.

All these quantities represent big numbers considering they were reached in just eighteen months. These data confirm what already mentioned in the analysis of the segment in Germany: Golf VI was pulled in terms of volume during the launch phase by government incentives, in fact it reached a cumulative quantity 20% higher respect to the previous series and even 28% higher than the following one.





Table 15 Volkswagen Golf V, VI and VII launch volume data

Volkswagen Golf V	2003-12	2004-01	2004-02	2004-03	2004-04	2004-05	2004-06	2004-07	2004-08	2004-09	2004-10	2004-11	2004-12	2005-01	2005-02	2005-03	2005-04	2005-05
Volume	11868	14514	14255	20170	19.721	17673	19428	18495	12627	20226	21538	25438	18370	12532	12679	16810	17504	16037
Cumulative Volume	11868	26382	40637	60807	80.528	98201	117629	136124	148751	168977	190515	215953	234323	246855	259534	276344	293848	309885

Volkswagen Golf VI	2008-11	2008-12	2009-01	2009-02	2009-03	2009-04	2009-05	2009-06	2009-07	2009-08	2009-09	2009-10	2009-11	2009-12	2010-01	2010-02	2010-03	2010-04
Volume	11231	14780	12012	18542	19.499	25943	30990	35831	23649	21416	25442	24068	20487	13148	14000	16805	23656	20801
Cumulative Volume	11231	26011	38023	56565	76.064	102007	132997	168828	192477	213893	239335	263403	283890	297038	311038	327843	351499	372300

Volkswagen Golf VII	2012-12	2013-01	2013-02	2013-03	2013-04	2013-05	2013-06	2013-07	2013-08	2013-09	2013-10	2013-11	2013-12	2014-01	2014-02	2014-03	2014-04	2014-05
Volume	7588	11480	11565	17434	18.126	16447	18136	14885	12386	16634	20461	20324	15233	15077	13829	19907	21478	18531
Cumulative Volume	7588	19068	30633	48067	66.193	82640	100776	115661	128047	144681	165142	185466	200699	215776	229605	249512	270990	289521

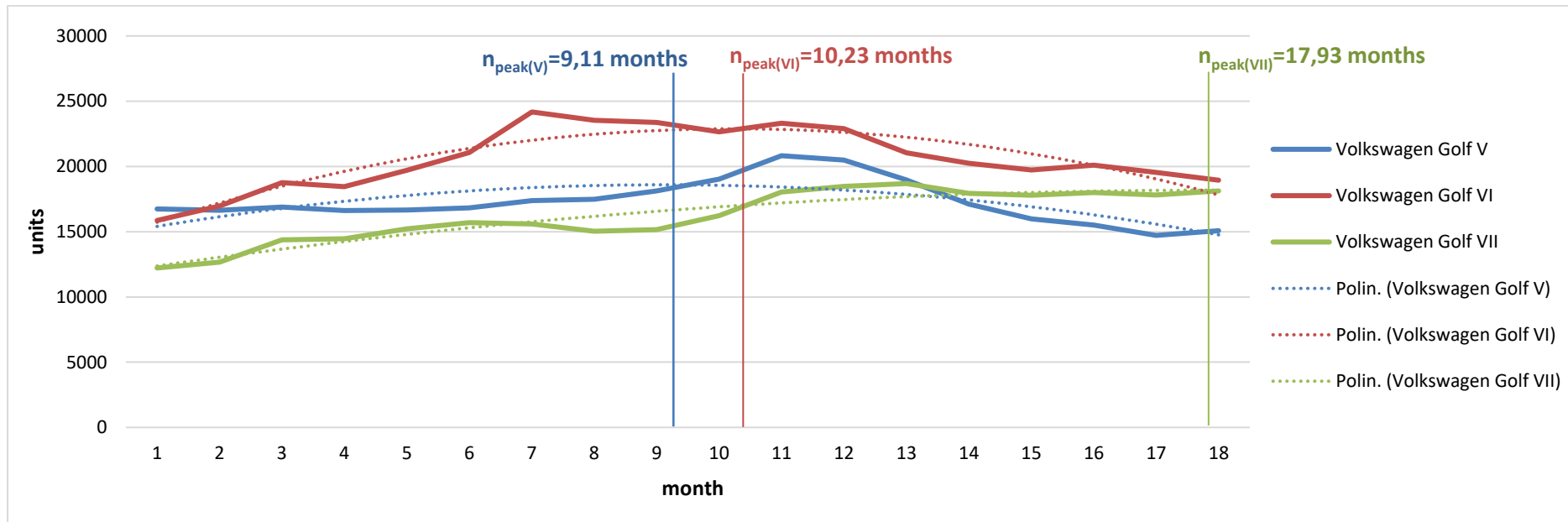


Figure 94 Graph of deseasonalized volume with peak month location of Golf V, VI and VII

Looking at peak month about the trend of the volume cleared by the seasonality and the cyclic component it is possible to notice some differences:

- Golf V: peak at 9,11 months that corresponds to the lowest value among the series considered of the model; in particular it is placed in September 2004 that, as already mentioned in the analysis of the market, corresponds to an incremental year in terms of segment volume, and it represents a month characterized by a seasonality value higher than one for the market (Figure 95);



Figure 95 Seasonality coefficients in Germany in the launch period of Golf V

- Golf VI: peak at 10,23 months that, as the previous series, corresponds to September month characterized by a value of seasonality higher than one (Figure 96); furthermore, this version is the one with highest volume registered in the launch phase and the 2009 is the year of government incentives;

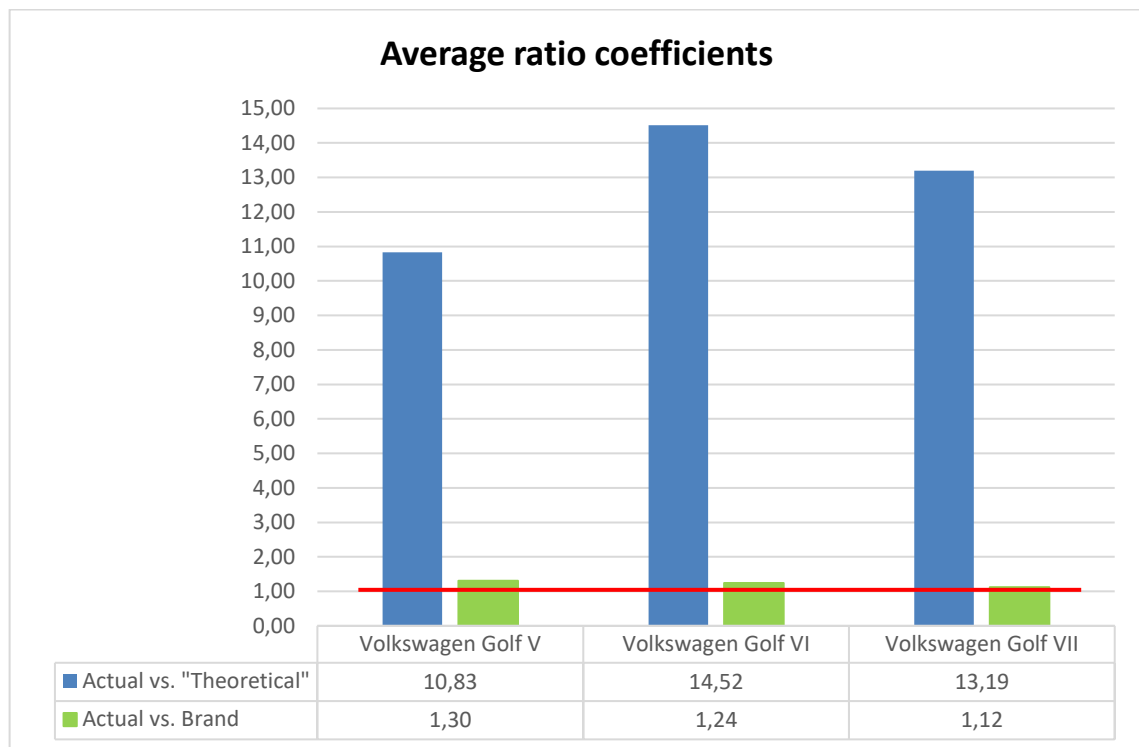


Figure 96 Seasonality coefficients in Germany in the launch period of Golf VI

- Golf VII: peak month at the end of the launch phase (17,93 months); this model was the less successful in terms of launch volume and, as underlined by the peak month, it was the series that required more time to be appreciated by the customers; comparing this datum with the market yearly volumes (Figure 93) it is possible to notice that the peak month occurred in the year of maximum volume of this series launch (2014).

From this analysis it is possible to conclude that the peak volumes for these following series of Volkswagen Golf are highly influenced by the segment trend; furthermore, the correspondence between the peak months of fifth and sixth series should be investigated deeper with the use of conjoint analysis in order to verify if it is related to the market, to the segment or to the brand characteristics.

Looking at the market share figures, and in particular at the average values of ratios of actual market share versus the “theoretical” one and versus the brand one (Figure 97), it is confirmed the leadership of all the series considered in the C segment; the comparison with a “theoretical” portion of the market shows values ranging from 10,83 to 14,52. Considering the comparison with brand performances in Germany, this model is quite aligned with ratio values ranging from 1,12 to 1,30.



**Figure 97 Graph of Volkswagen Golf V, VI and VII average ratios coefficients**

The best version compared with its surrounding competitors is the Golf VI, while the best one compared to the brand performances is the Golf V; this version is the one that pulled more the brand in its launching phase.

In Table 16 it is possible to see at the detailed monthly values of both the ratio of actual versus “theoretical” values and actual versus brand market share.

In Table 16 all the market share figures are reported.

Looking at the number of models in the segment for the three different versions, it is possible to notice that they played in different marketplaces: Golf V had to fight against 38-40 competitors, while Golf VI and Golf VII were launched in a more crowded marketplace (Golf VI:43-48 competitors; Golf VII: 46-54 competitors).

Considering market share data, Golf V reached the maximum of 34,7% in November 2004 after 12 months from the first significant month; Golf VI reached the maximum of 36% in June 2009, after 8 months from the first considered period; Golf VII reached the maximum of 32,3% in November 2013 after 12 months from the first significant month. The three models differ for the maximum market share reached and also for the month in which they reach it; as already confirmed by volume analysis the most successful version was Golf VI with the month of peak volume of the trend line quite aligned with the one of peak of market share.



Table 16 Volkswagen Golf V, VI and VII market share data

Volkswagen Golf V	2003-12	2004-01	2004-02	2004-03	2004-04	2004-05	2004-06	2004-07	2004-08	2004-09	2004-10	2004-11	2004-12	2005-01	2005-02	2005-03	2005-04	2005-05
Market share	26,3%	31,7%	28,4%	27,4%	29,9%	27,5%	26,6%	30,6%	26,7%	29,2%	34,6%	34,7%	27,0%	26,8%	25,6%	21,6%	24,6%	22,4%
Number of models	38	38	38	38	40	40	40	39	39	39	39	39	39	39	39	39	38	38
Ratio real vs. teoretical	10,00	12,06	10,81	10,43	11,95	11,02	10,65	11,91	10,42	11,38	13,49	13,52	10,51	10,47	9,99	8,43	9,37	8,51
Brand market share	18,4%	19,5%	18,6%	17,7%	19,8%	20,7%	22,2%	22,0%	20,3%	21,7%	24,1%	24,1%	21,6%	22,8%	24,3%	23,8%	23,2%	24,8%
Ratio real vs. brand	1,43	1,63	1,53	1,55	1,51	1,33	1,20	1,39	1,32	1,35	1,43	1,44	1,25	1,18	1,05	0,91	1,06	0,90
Normalized "Net coefficient"	7,2%	8,2%	7,7%	7,8%	8,0%	7,1%	6,4%	7,2%	6,8%	7,0%	7,4%	7,5%	6,4%	6,1%	5,4%	4,7%	5,4%	4,6%

Volkswagen Golf VI	2008-11	2008-12	2009-01	2009-02	2009-03	2009-04	2009-05	2009-06	2009-07	2009-08	2009-09	2009-10	2009-11	2009-12	2010-01	2010-02	2010-03	2010-04
Market share	24,3%	27,6%	29,7%	30,0%	24,0%	33,0%	33,8%	36,0%	29,6%	33,4%	33,9%	33,7%	33,8%	28,5%	34,1%	35,5%	33,6%	34,0%
Number of models	44	44	48	48	48	48	48	48	47	47	47	43	43	43	45	45	45	46
Ratio real vs. teoretical	10,70	12,16	14,28	14,39	11,51	15,85	16,21	17,27	13,94	15,69	15,93	14,49	14,53	12,27	15,32	15,99	15,12	15,66
Brand market share	24,8%	25,5%	21,8%	26,1%	25,2%	27,9%	27,5%	27,9%	25,4%	28,0%	27,6%	27,9%	26,8%	24,5%	23,3%	23,9%	23,6%	22,5%
Ratio real vs. brand	0,98	1,08	1,37	1,15	0,95	1,18	1,23	1,29	1,17	1,19	1,23	1,21	1,26	1,17	1,46	1,48	1,42	1,51
Normalized "Net coefficient"	5,7%	6,3%	8,7%	7,3%	6,1%	7,5%	7,8%	8,2%	7,3%	7,4%	7,6%	6,9%	7,2%	6,7%	8,7%	8,9%	8,5%	9,2%

Volkswagen Golf VII	2012-12	2013-01	2013-02	2013-03	2013-04	2013-05	2013-06	2013-07	2013-08	2013-09	2013-10	2013-11	2013-12	2014-01	2014-02	2014-03	2014-04	2014-05
Market share	17,0%	26,9%	23,9%	25,4%	26,5%	27,1%	27,0%	25,2%	23,6%	27,1%	30,2%	32,3%	28,8%	30,7%	28,0%	27,6%	31,3%	26,9%
Number of models	47	48	48	48	46	46	46	48	48	48	48	48	48	51	51	51	54	54
Ratio real vs. teoretical	8,00	12,90	11,48	12,20	12,21	12,46	12,41	12,11	11,35	13,02	14,51	15,50	13,84	15,67	14,29	14,09	16,88	14,54
Brand market share	24,2%	24,8%	24,7%	23,6%	26,1%	25,6%	24,2%	25,2%	21,8%	22,5%	24,8%	25,1%	25,9%	23,6%	21,7%	23,1%	24,1%	24,1%
Ratio real vs. brand	0,70	1,08	0,97	1,08	1,02	1,06	1,12	1,00	1,09	1,20	1,22	1,29	1,11	1,30	1,29	1,20	1,29	1,12
Normalized "Net coefficient"	4,4%	6,9%	6,2%	6,9%	6,2%	6,5%	6,8%	6,4%	6,9%	7,7%	7,7%	8,2%	7,1%	8,8%	8,7%	8,1%	9,3%	8,0%

Considering the market share values cleared by the brand influence and the surrounding conditions of the marketplace it is possible to see the graphs of the normalized “Net coefficient” in Figure 98, Figure 99 and Figure 100.

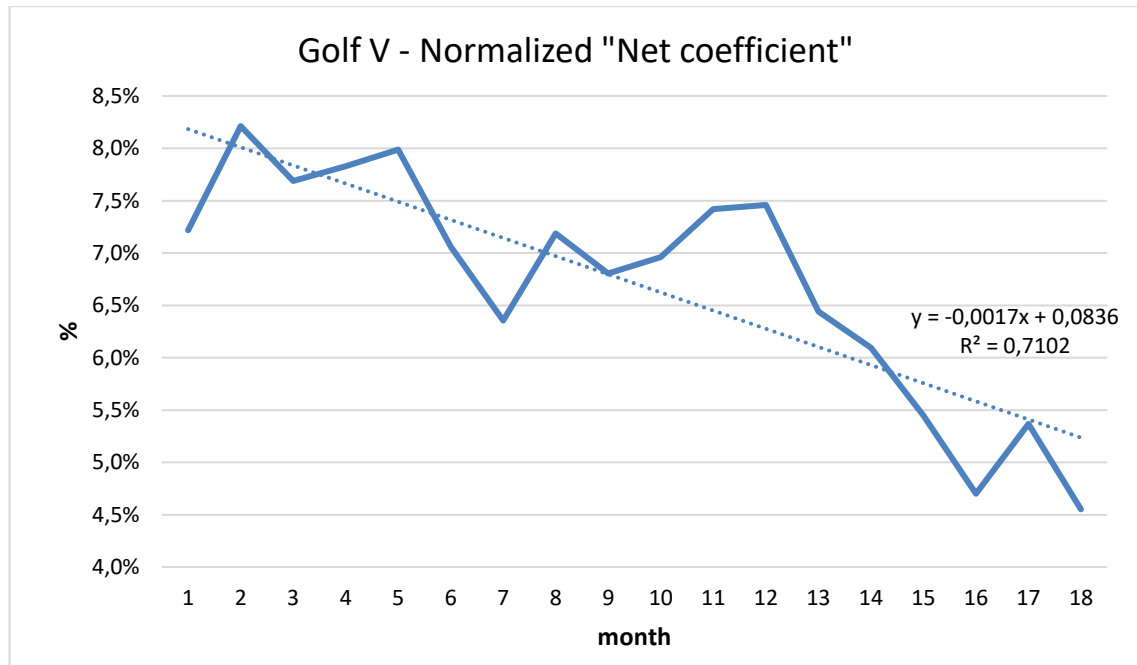


Figure 98 Normalized "Net coefficient" in the launch phase for Golf V

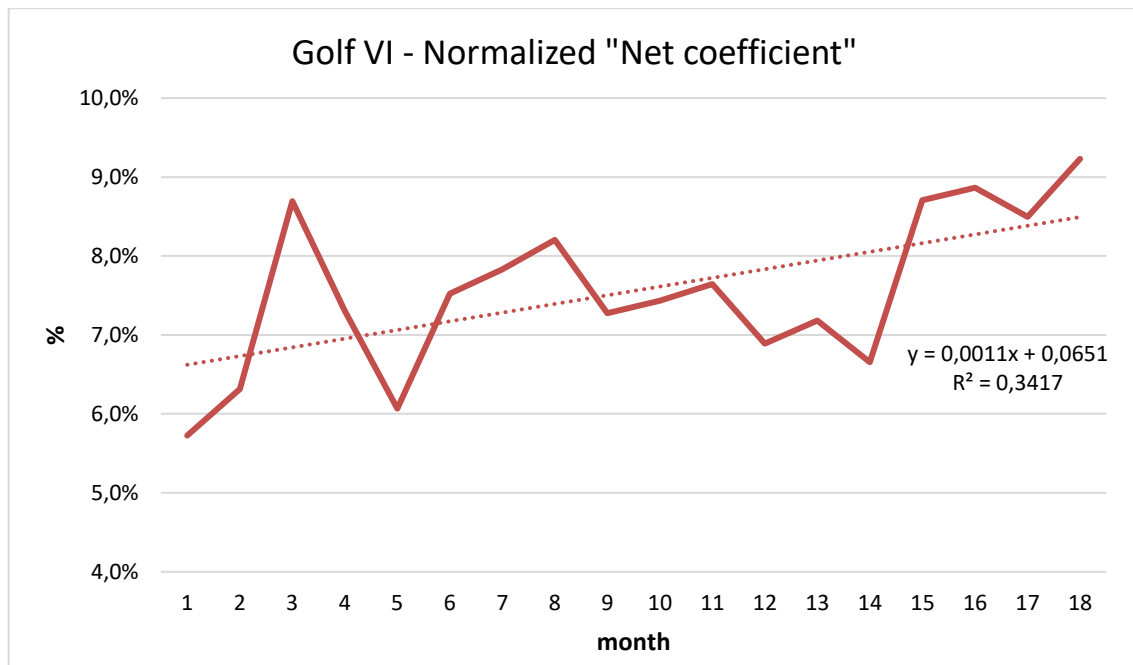


Figure 99 Normalized "Net coefficient" in the launch phase for Golf VI

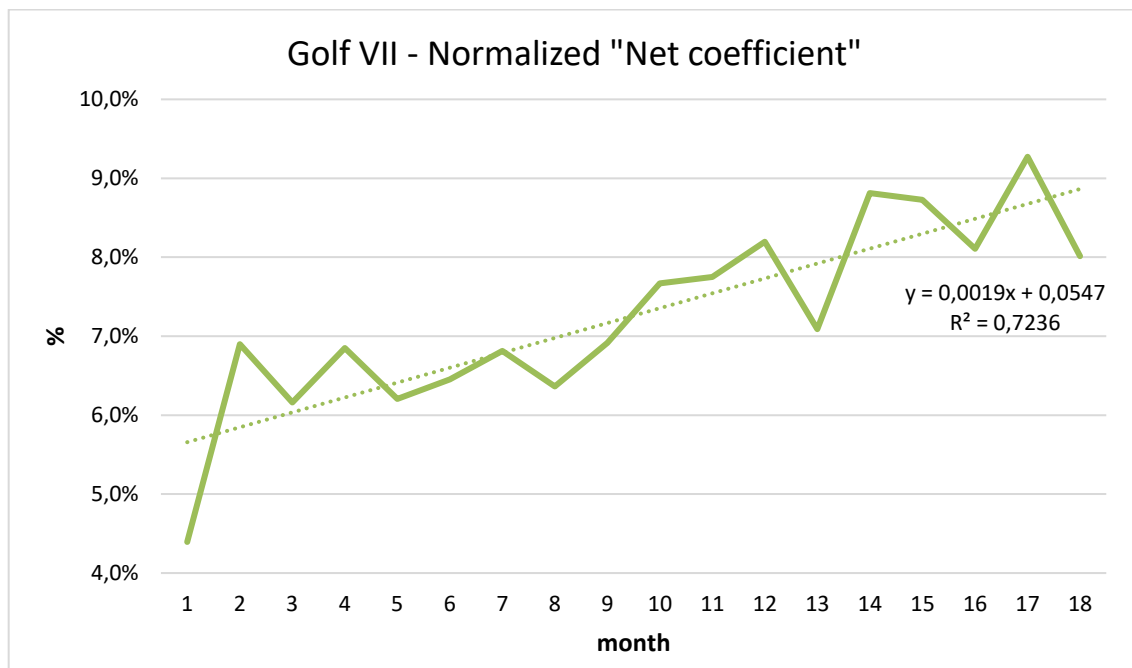


Figure 100 Normalized "Net coefficient" in the launch phase for Golf VII

Comparing the linear trend of the three models it is possible to notice that:

- Golf VI and Golf VII have a positive slope in the normalized "Net coefficient", so they increased their market share considering the changes of the brand strength and the marketplace conditions;
- Golf V is the only version considered with negative slope, mainly due to the fact that the model maintained a stable market share during the months (with the exception of some specific cases), while the brand increased significantly its market share passing from 18% to about 25%; the causes of this change should be investigated in the brand portfolio of models or in some specific incentives actions on other already existing models.

Considering all the data analyzed the three-succeeding series have different trends both in terms of volume and market share:

- Golf V reached soon the peak volume, but in terms of market share cleared by brand and segment influences (normalized "Net coefficient") had a negative slope;
- Golf VI peak volume month is similar to the previous series, but it was the most successful in terms of overall launch volume and it had a positive slope in the normalized "Net coefficient";

- Golf VII normalized “Net coefficient” trend is similar to the Golf VI, but it required quite eighteen months to reach the peak volume in its launching phase, that could be attributed to the necessity to be deeply discovered by customers.

### 5.5 D Segment collapse: Spanish case of Audi A4

D segment, as already described in Chapter 2.2.2, is the one that during the studying period lost the highest number of registrations; in the 5MM it passed from about 2,3 million of 2001 to about 851 thousand of 2017, with a reduction of 63% (Figure 101).

In this section the analysis will focus on the Spanish market, because it is the one that had a steeper decrease and it is quite stable since 2012.

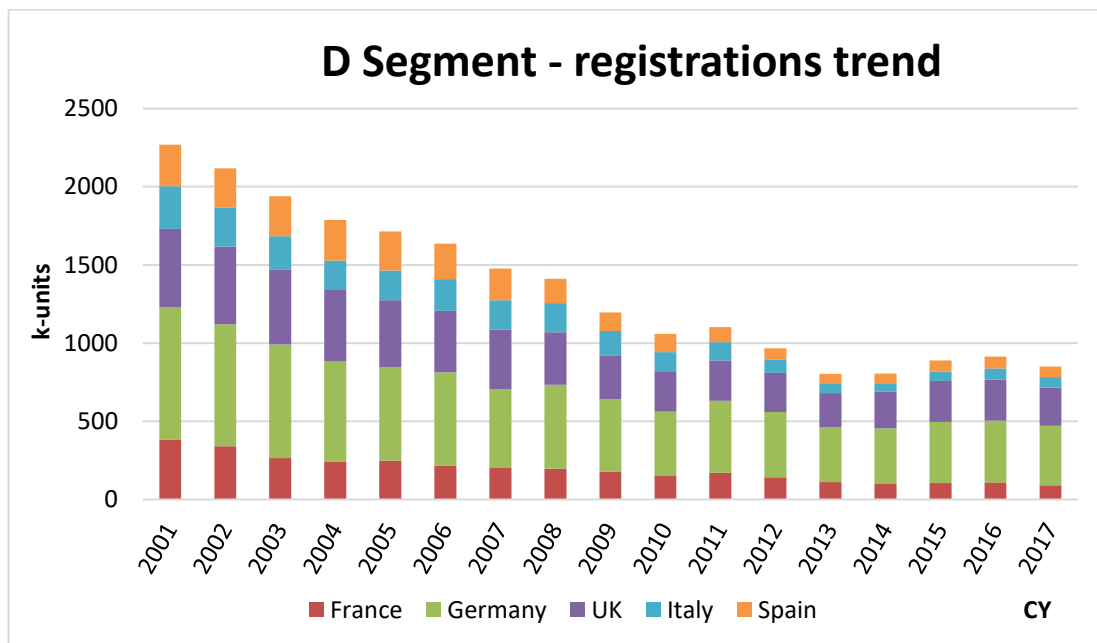
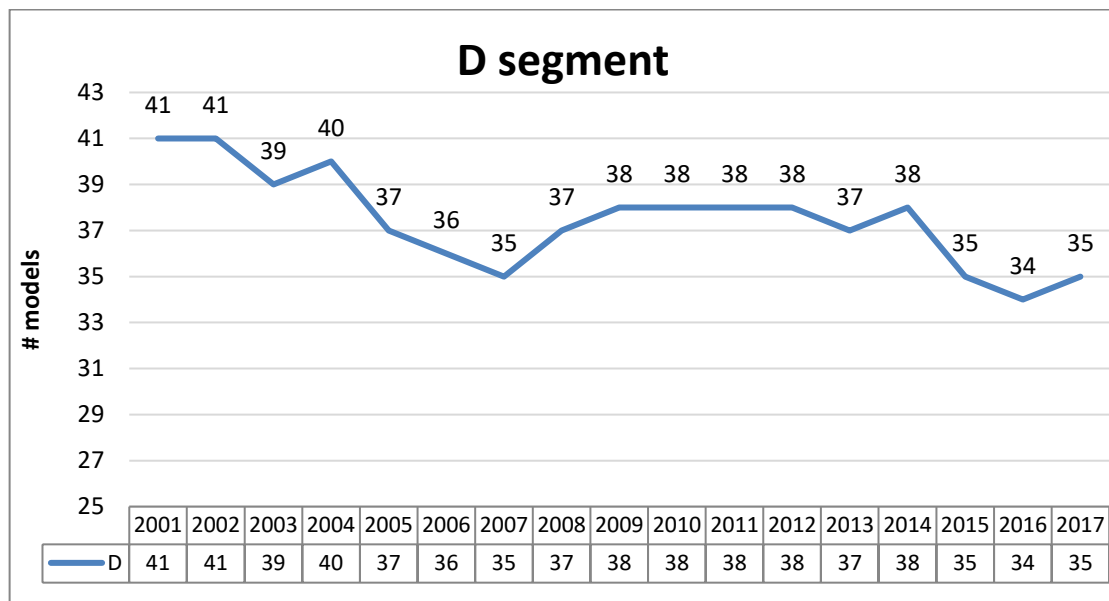


Figure 101 D Segment registrations yearly volume in the 5MM

Despite the collapse of this segment volume, carmakers continued to invest as witnessed by Alfa Romeo Giulia launch and the number of models available. The Figure 102 shows the trend line of the number of models offered in the 5MM; in the last sixteen years it passed from 41 to 35, with a smooth trend.





**Figure 102 D Segment number of models**

In this segment the models considered are:

- Alfa Romeo 159;
- Alfa Romeo Giulia;
- Fiat Croma;
- Opel Insignia;
- Ford Mondeo (3<sup>rd</sup> and 4<sup>th</sup> series);
- Volkswagen Passat (6<sup>th</sup>, 7<sup>th</sup> and 8<sup>th</sup> series);
- BMW series 3 (5<sup>th</sup> and 6<sup>th</sup> series);
- Audi A4 (3<sup>rd</sup>, 4<sup>th</sup> and 5<sup>th</sup> series).

To underline the change of appreciation of this segment, the model with the longest period between the considered launches is chosen; since the first considered month of 3<sup>rd</sup> series of Audi A4 is January 2005, while of the 5<sup>th</sup> series is January 2016 the analysis will focus on this model.

In Table 17 the main volume and market share figures of the considered series of Audi A4 are reported.



Table 17 Spain - Audi A4 (3rd, 4th and 5th series) market share and volume data

Audi A4 (3 series)	2005-01	2005-02	2005-03	2005-04	2005-05	2005-06	2005-07	2005-08	2005-09	2005-10	2005-11	2005-12	2006-01	2006-02	2006-03	2006-04	2006-05	2006-06
Market share	8,4%	9,7%	9,8%	11,1%	10,4%	7,6%	7,5%	8,8%	8,4%	9,7%	6,1%	5,6%	11,7%	7,7%	8,0%	9,2%	8,2%	8,4%
Volume	1454	1911	2289	2516	2.176	2053	2103	1525	1479	1684	1193	1147	1991	1429	1921	1676	1741	2018
Cumulative volume	1454	3365	5654	8170	10.346	12399	14502	16027	17506	19190	20383	21530	23521	24950	26871	28547	30288	32306
Seasonality coeff	0,80	0,92	1,09	1,07	0,99	1,29	1,35	0,83	0,84	0,84	0,96	1,00	0,84	0,94	1,24	0,94	1,10	1,25
TC (deseason)	1808	2080	2102	2353	2197	1596	1559	1833	1753	2013	1249	1150	2357	1515	1552	1784	1586	1611
MMC(3) deseason	1944	1997	2178	2217	2048	1784	1663	1715	1866	1672	1471	1586	1674	1808	1617	1641	1660	1598

Audi A4 (4 series)	2008-02	2008-03	2008-04	2008-05	2008-06	2008-07	2008-08	2008-09	2008-10	2008-11	2008-12	2009-01	2009-02	2009-03	2009-04	2009-05	2009-06	2009-07
Market share	8,0%	11,2%	13,3%	16,0%	13,1%	17,0%	14,1%	12,4%	11,3%	11,3%	9,9%	9,7%	12,2%	11,7%	13,7%	10,7%	12,0%	11,0%
Volume	1160	1637	2095	2408	1.991	2806	1220	1227	1325	1052	1029	777	938	1030	1182	926	1411	1503
Cumulative volume	1160	2797	4892	7300	9.291	12097	13317	14544	15869	16921	17950	18727	19665	20695	21877	22803	24214	25717
Seasonality coeff	0,98	1,00	1,11	1,10	1,16	1,30	0,71	0,85	1,05	0,88	1,03	0,81	0,79	0,93	0,91	0,90	1,20	1,37
TC (deseason)	1185	1630	1894	2187	1724	2161	1715	1450	1258	1190	1003	954	1181	1113	1303	1032	1180	1096
MMC(3) deseason	1407	1570	1904	1935	2024	1866	1775	1474	1299	1150	1049	1046	1083	1199	1149	1172	1103	1138

Audi A4 (5 series)	2016-01	2016-02	2016-03	2016-04	2016-05	2016-06	2016-07	2016-08	2016-09	2016-10	2016-11	2016-12	2017-01	2017-02	2017-03	2017-04	2017-05	2017-06
Market share	10,2%	11,3%	11,2%	11,6%	14,5%	13,8%	11,4%	11,0%	11,6%	7,6%	8,3%	8,9%	11,0%	11,2%	13,2%	12,8%	15,3%	7,7%
Volume	614	775	825	748	1.051	1008	761	455	665	431	522	524	592	594	927	697	1034	555
Cumulative volume	614	1389	2214	2962	4.013	5021	5782	6237	6902	7333	7855	8379	8971	9565	10492	11189	12223	12778
Seasonality coeff	0,96	1,09	1,17	1,02	1,14	1,15	1,06	0,67	0,94	0,94	1,05	0,99	0,91	0,90	1,19	0,93	1,16	1,26
TC (deseason)	638	712	708	730	918	873	716	677	705	461	499	531	654	662	778	753	893	442
MMC(3) deseason	675	686	717	785	840	836	755	699	614	555	497	561	615	698	731	808	696	668



Considering the market share values of the three series of the model it is possible to notice similar values ranging from 7% to 12%. In particular it is possible to look at the graphs of these data in Figure 103, Figure 104 and Figure 105.

The third series is characterized by a minimum market share in the month 12 of 5,6% and a maximum of 11,7% in month 13.

The forth series is characterized by a minimum market share in the first month of 8% and a maximum of 17% in month 6.

The fifth series is characterized by a minimum market share in the month 10 of 7,6% and a maximum of 15,3% in month 17.

Considering these numbers, it is possible to assume that the less appreciated series was the third, since it reached both the lowest maximum value and the lowest minimum value.

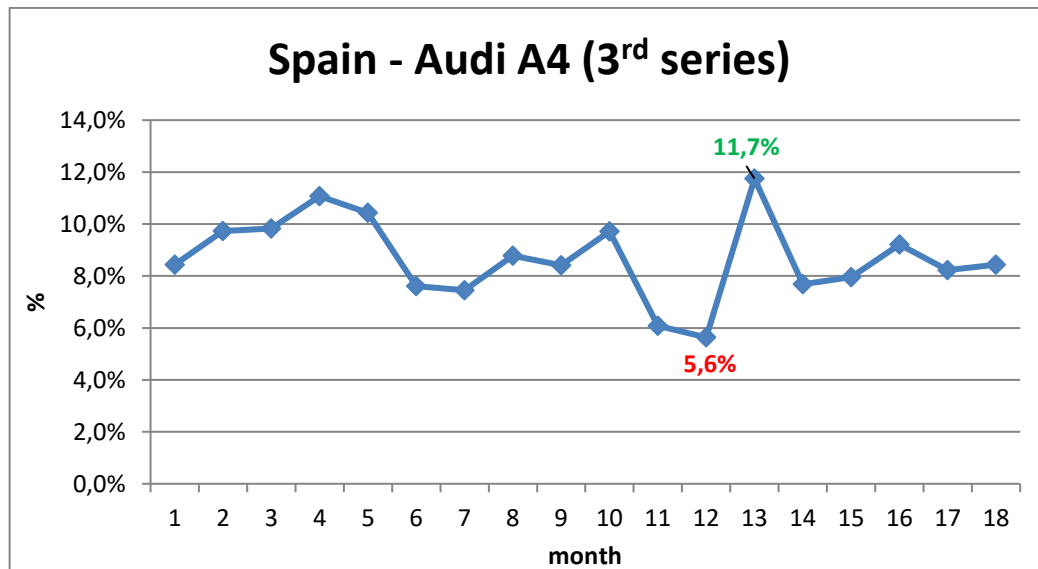


Figure 103 Graph of market share in the launch phase of Audi A4 (3<sup>rd</sup> series) in Spain

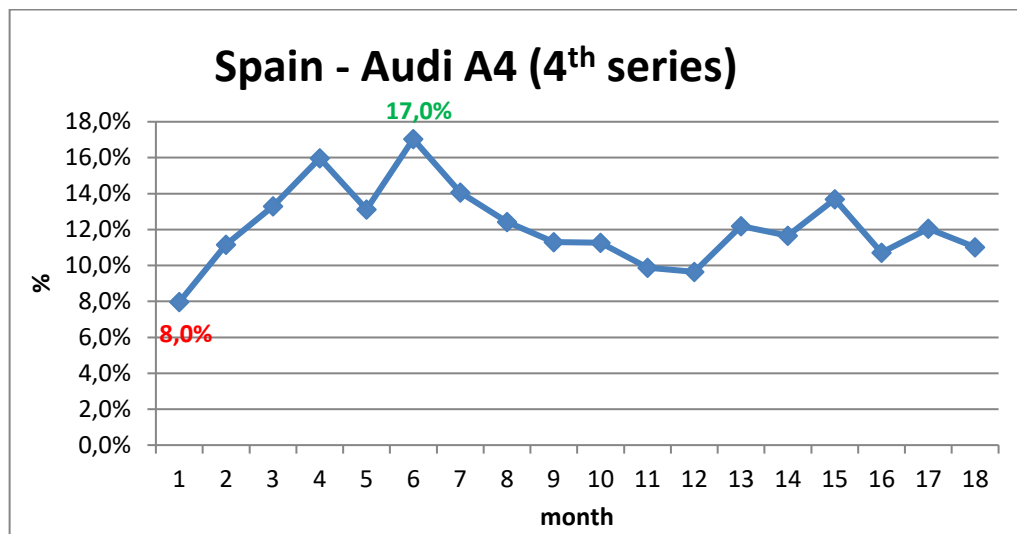


Figure 104 Graph of market share in the launch phase of Audi A4 (4<sup>th</sup> series) in Spain

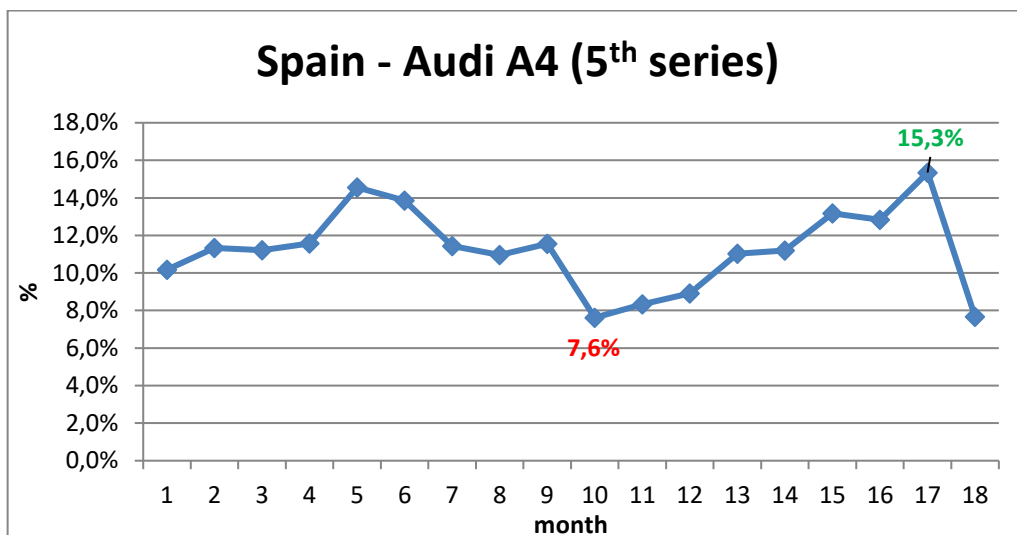


Figure 105 Graph of market share in the launch phase of Audi A4 (5<sup>th</sup> series) in Spain

With some differences, it is possible to consider the three cars comparable in terms of market share in their launch phase.

These figures are not confirmed by the overall volume of registrations in the launch phase, in particular:

- Audi A4 (3<sup>rd</sup> series) launch volume equal to 32.306 vehicles;
- Audi A4 (4<sup>th</sup> series) launch volume equal to 25.717 vehicles;
- Audi A4 (5<sup>th</sup> series) launch volume equal to 12.778 vehicles.

This means that, considering always the launch period of eighteen months, in Spain the forth series registered about 20% vehicles less than the previous one, while the fifth series about 50% less than the forth and 60% less than the third series.

Considering when the models were launched, these percentages are comparable with the segment trend in the same market (Spain); this is confirmed by the fact that the market shares were almost the same, with an increase from third to fourth series of about 5% in the peak month.

The result of this analysis confirm that the whole segment lost appeal in the 5MM, and in particular in Spain as just demonstrated.

It can be interesting to look at the volume data cleared by seasonality values and by the cyclic component in order to consider the concavity of the trend line (Figure 106).

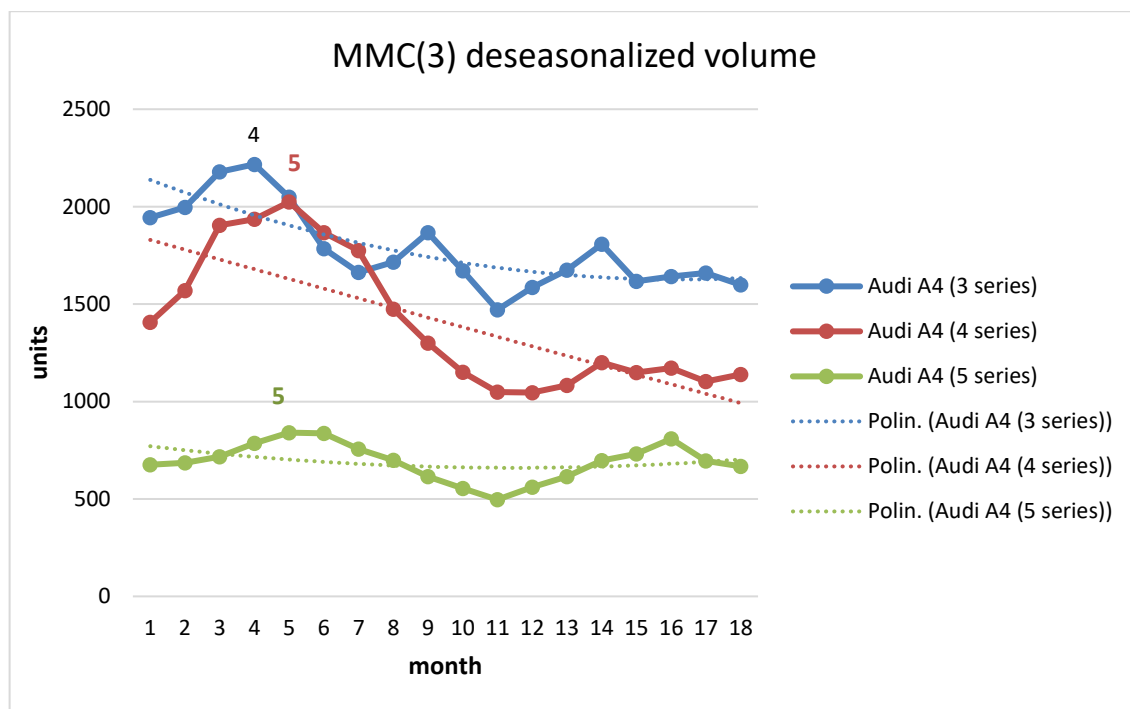


Figure 106 Graph - Audi A4 (3rd, 4th and 5th series) volume per month cleared by seasonality and cyclic component with second degree trend line

The three trend lines have upward concavity, as confirmed in Table 18; this means they do not follow the “ideal” launch phase.

Table 18 Spain - Audi A4 (3rd, 4th and 5th series) trend line equation and concavity

Brand	Model	Series	yyyy-mm launch	Trend line equation	Concavity
Audi	A3	3	2005-01	$y = 2,1986x^2 - 71,446x + 2206,7$	upward
Audi	A3	4	2008-02	$y = 0,0613x^2 - 50,41x + 1879,6$	upward
Audi	A3	5	2016-01	$y = 1,0105x^2 - 23,179x + 792,75$	upward

Looking deeper at the volume cleared by seasonality and cyclic component it is possible to notice that these models follow a launch phase that is quite short, since they reach the peak



volume in maximum the 5<sup>th</sup> month; considering the launch period equal to 18 months in this case is too long, and requires a specific analysis of data.

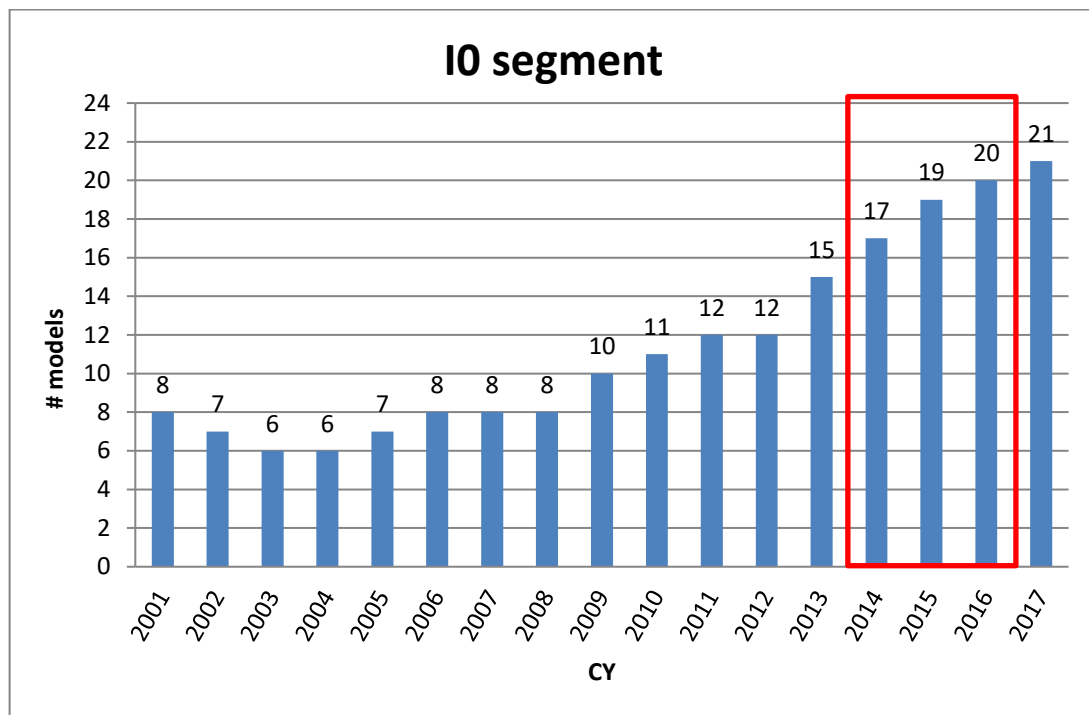
This can be due to the kind of vehicles involved in this segment and the specific market more interested in lower segment vehicles; in order to verify these hypothesis, it could be necessary to start a specific work, using also the aid that can come from the conjoint analysis.

## 5.6 Melfi plant

As already mentioned in Chapter 5.1 with the analysis of Jeep Renegade launch in Italy, Melfi plant is the production site of two models of the same group (FCA) but of two different brands: Fiat 500X and Jeep Renegade.

These vehicles share the same platform and some of the components. They differ mainly for the internal and external style.

They are part of I0 segment, and were launched at short distance between the end of 2014 and the beginning of 2015. It was a development period for the segment in all the EMEA markets and carmakers were investing a lot offering new models to the customers as it is possible to notice in Figure 107, where the number of models in I0 segment are plotted; in the launch phase of the two FCA models, the number of players in the segment were increasing of about two per year, that are a consistent number considering the current “population” of 21 vehicles.



**Figure 107 Graph of the trend of number of models in I0 Segment in 2001-2017 period**

FCA decided to launch the “same” structural vehicle under two different brands, with two different styles to ride the incredible development was affecting the segment, as it is possible to graphically appreciate in Figure 108, where the volume of registered cars per month (cleared by the yearly cyclic component) in the 5MM are plotted.

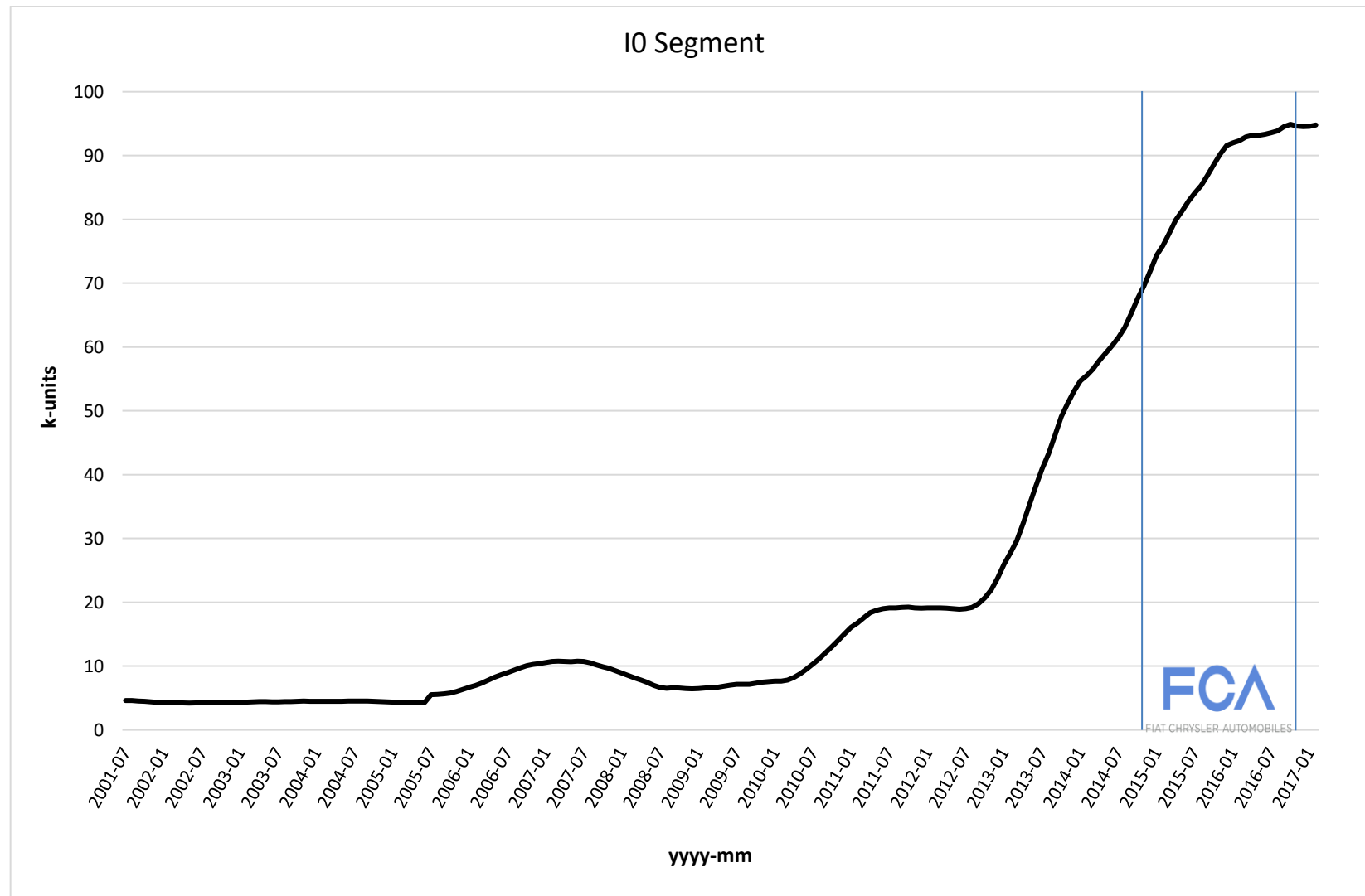


Figure 108 Graph - Volume of I0 segment in the 5MM cleared by cyclic component





The two FCA SUVs were launched in a phase of improvement for the whole segment; the period of launch considered of eighteen months finishes in 2016, that corresponds to the year of reduction of registrations improvement.

**Table 19 Cumulative volume comparison between Fiat 500X and Jeep Renegade**

		Italy	Germany	Spain	UK	France
Jeep	Renegade	36111	7781	5438	13431	11177
Fiat	500X	60567	11553	9815	18959	20143
Delta	Volume	24456	3772	4377	5528	8966
Delta	%	67,7%	48,5%	80,5%	41,2%	80,2%

In all the countries the two models differ for the cumulative volume of registrations in the first eighteen months; Fiat 500X got higher volumes and the difference varies from 41,2% in UK to 80,5% in Spain that is in any case consistent and not negligible.

Considering the whole launch period of eighteen months, it is possible to evaluate the average figures of the two models respect to the brand values and the “theoretical” values of market share (Table 20 and Table 21).

**Table 20 Ratio of model market share and “theoretical” one for Fiat 500X and Jeep Renegade**

Ratio actual vs. “theoretical”							
		Italy	Germany	Spain	UK	France	5MM
Fiat	500X	3,55	0,90	1,13	0,99	0,99	1,51
Jeep	Renegade	2,41	0,65	0,73	0,75	0,58	1,02

**Table 21 Ratio of model market share and brand one for Fiat 500X and Jeep Renegade**

Ratio actual vs. Brand							
		Italy	Germany	Spain	UK	France	5MM
Fiat	500X	0,72	1,28	0,43	0,79	0,82	0,81
Jeep	Renegade	1,28	1,06	1,07	1,57	0,93	1,18

Since the two cars were launched in the same period, the ratios of actual versus the “theoretical” market share are aligned to the volume data.

The Fiat 500X values are in all the markets considered higher than the ones of Jeep Renegade; in particular the only three cases with average performances higher than 1 are the red circles ones: in Italy both the models and in Spain the Fiat 500X.

The ratios versus the brand market share show different figures; in particular it is possible to notice that in 4 markets over 5 the Jeep Renegade performed better than the brand (in all the 5MM except for France), while Fiat 500X performed better than the brand just in Germany.

Considering both the information of Table 20 and Table 21 it appears clear that in most of the markets the 500X was pulled by the brand performances in its launch phase, while for Jeep the Renegade launch was able to pull the whole brand performances, except for France case.

Considering French market, bad performances of the Renegade respect to its brand, it is also confirmed by the ratio of its actual market share and the “theoretical” one (0,58 that represent the lowest value for the model); the cumulative volume data instead show that this country is the second one for the Renegade (about 20 thousand vehicles), just after Italy. It is possible to conclude that in France the Jeep brand had already a big appeal before the small SUV launch.

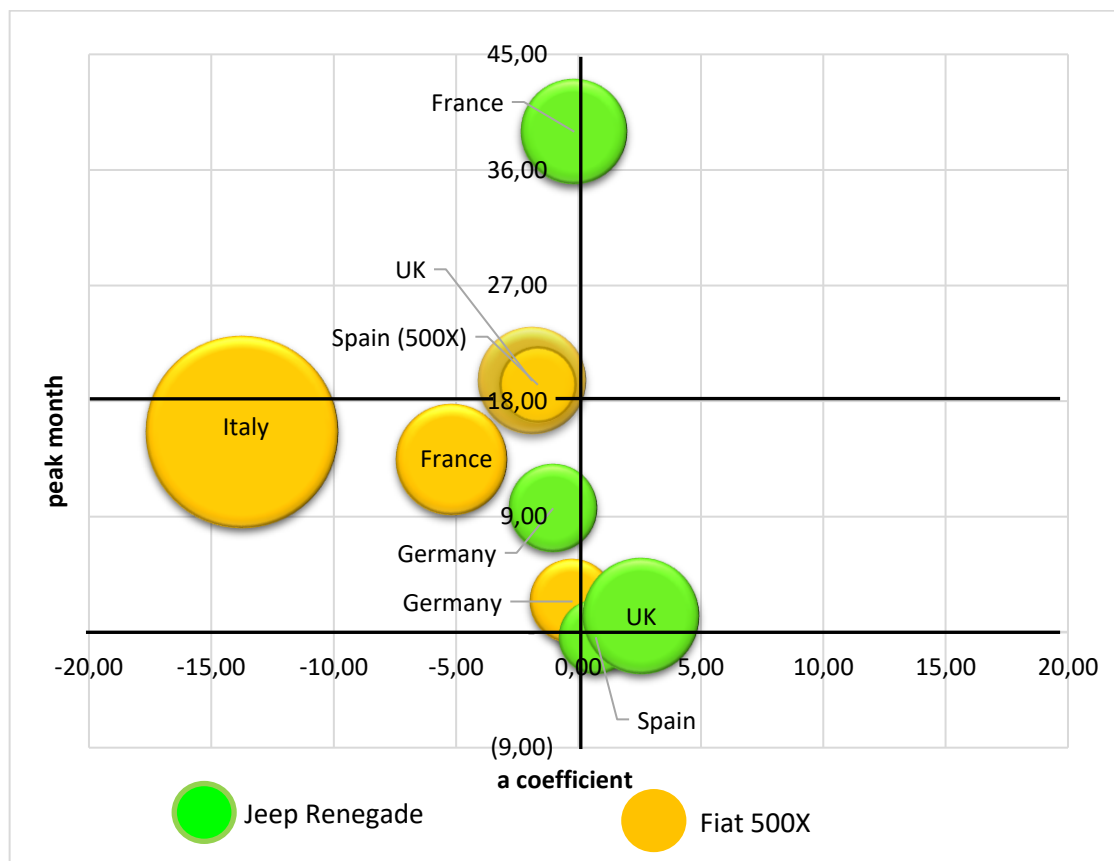


Figure 109 Fiat 500X and Jeep Renegade volume trend lines concavity-peak month correlation

In Figure 109 the two models in the different markets are plotted in the graph described in Section 4 where the concavity is correlated to the peak month. The Jeep Renegade performances in Italy are not plotted, since the volume peak is reached at 1338,5 months and it has been as an outlier as analysed in Chapter 5.1.

Looking at abscissa values (and so at the concavity), all Jeep Renegade points fall in the downward concavity area, while the Fiat 500X all close to zero *a coefficient*; in particular



UK and Spain have a trend line with upward concavity and Germany, France and Spain have downward concavity.

Focusing on Fiat 500X, in all the markets considered the model got an “ideal” or always increasing launch phase; the only country where the volume peak occurred in the first half of the launch phase is Germany ( $x(V)=2,38$  months) and so it has a decreasing trend for 87% of its launch phase.

Considering Jeep Renegade, excluding the Spain as already mentioned, the different markets show a heterogeneous behaviour:

- France: in the first eighteen months it shows an always increasing trend;
- Germany: it shows an “ideal” trend, with downward concavity and volume peak after 9,65 months, so roughly in the middle of the launch phase;
- Spain: in the first eighteen months it shows an always increasing trend;
- UK: it shows an upward concavity, with peak volume after 1,26 months that could be due to an ineffective reveal to the country and customers that required few months to care about the product.

In Table 22, Figure 110, Figure 111, Figure 112, Figure 113 and Figure 114 are reported and plotted the normalized “Net coefficient” data in the 5MM.



Table 22 Normalized "Net coefficient" of Jeep Renegade and Fiat 500X in the 5MM

Country	Brand	Model	2014-10	2014-11	2014-12	2015-01	2015-02	2015-03	2015-04	2015-05	2015-06	2015-07	2015-08	2015-09	2015-10	2015-11	2015-12	2016-01	2016-02	2016-03	2016-04	2016-05	2016-06	2016-07	2016-08	2016-09
France	Fiat	500X				1,1%	1,7%	2,6%	3,3%	3,6%	3,4%	3,3%	3,8%	3,6%	2,2%	2,8%	3,5%	2,8%	3,2%	3,3%	4,5%	3,2%	2,6%			
France	Jeep	Renegade		2,1%	3,2%	4,7%	2,4%	2,2%	3,6%	4,4%	2,9%	3,8%	2,4%	2,7%	3,3%	3,8%	3,7%	3,6%	3,4%	3,4%	5,4%					
Germany	Fiat	500X						8,4%	12,3%	9,5%	7,2%	4,8%	10,0%	6,6%	8,3%	6,1%	7,7%	4,0%	6,1%	5,7%	7,4%	7,3%	6,1%	6,9%	6,4%	
Germany	Jeep	Renegade	4,8%	5,4%	8,3%	4,1%	5,9%	5,1%	6,2%	5,7%	7,5%	5,5%	5,3%	7,2%	7,5%	6,2%	5,2%	5,4%	5,4%	5,5%						
Italy	Fiat	500X				4,9%	4,1%	5,3%	8,4%	6,8%	6,4%	8,6%	6,1%	6,9%	8,3%	9,2%	8,6%	9,1%	8,4%	9,7%	7,6%	8,0%	6,5%			
Italy	Jeep	Renegade	7,0%	11,1%	14,9%	16,4%	12,4%	15,8%	18,8%	16,3%	10,9%	13,5%	10,9%	15,8%	12,3%	11,0%	9,8%	13,9%	12,1%	12,5%						
Spain	Fiat	500X						1,1%	0,9%	1,1%	1,9%	1,4%	2,0%	1,5%	1,2%	3,3%	1,9%	1,4%	1,6%	3,2%	1,7%	3,2%	2,1%	2,3%	2,0%	
Spain	Jeep	Renegade		3,6%	2,9%	3,9%	6,0%	2,7%	3,4%	3,9%	3,2%	3,8%	4,2%	5,0%	5,4%	6,6%	4,2%	7,5%	6,1%	4,0%	5,7%					
UK	Fiat	500X							3,5%	1,1%	1,9%	1,8%	1,6%	2,8%	2,3%	1,4%	1,7%	2,6%	2,4%	2,8%	2,5%	3,2%	3,7%	4,2%	3,5%	3,4%
UK	Jeep	Renegade							3,5%	3,2%	5,2%	3,4%	4,8%	4,0%	4,0%	5,0%	5,2%	4,0%	5,8%	4,9%	4,9%	6,3%	6,8%	5,5%	8,0%	7,6%

The highlighted values correspond to the first relevant month considered in the analysis; the green ones refer to Jeep Renegade, while the orange ones refer to Fiat 500X.

Here the main concepts related to "Net coefficient" are reported:

- The main peculiar components considered are number of competitors ( $n_c$ ) and brand market share ( $\%_{brand}$ );
- The "net coefficient" can be computed in this way as:

$$x_{net} = \frac{\%_{model} * n_c}{\%_{brand}}$$

where:

- $\%_{model}$  is the model market share;
- $\%_{brand}$  is the brand market share;
- the factor is normalized in the couple segment and market.

In the following pages the graphs of these values are reported.

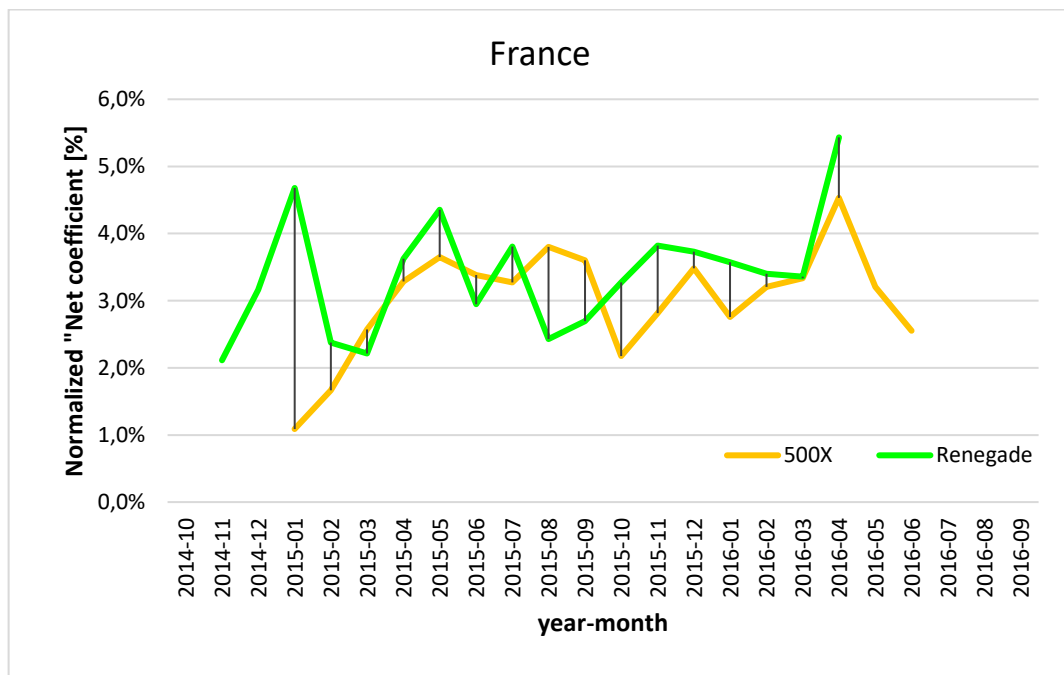


Figure 110 Graph of normalized "Net coefficient" of Jeep Renegade and Fiat 500X in France

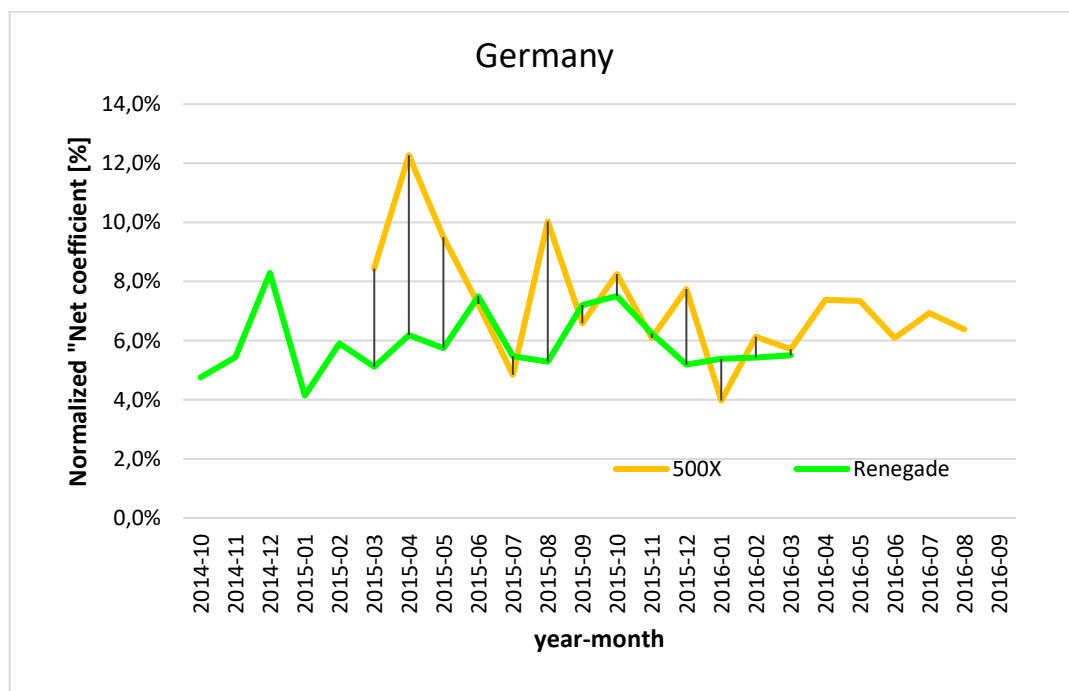


Figure 111 Graph of normalized "Net coefficient" of Jeep Renegade and Fiat 500X in Germany

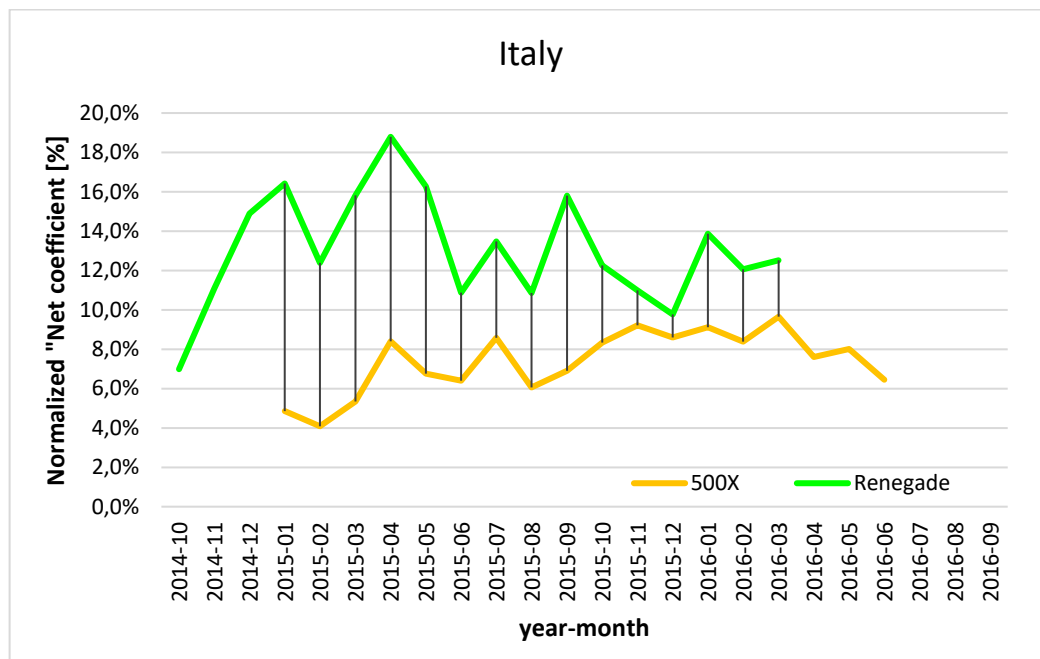


Figure 112 Graph of normalized "Net coefficient" of Jeep Renegade and Fiat 500X in Italy

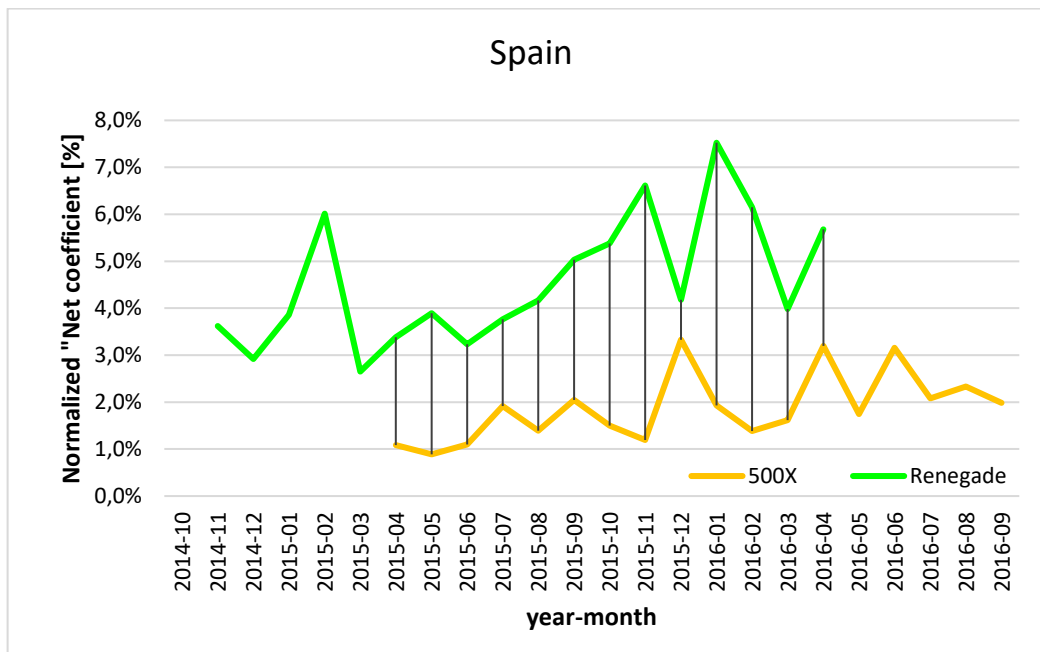


Figure 113 Graph of normalized "Net coefficient" of Jeep Renegade and Fiat 500X in Spain

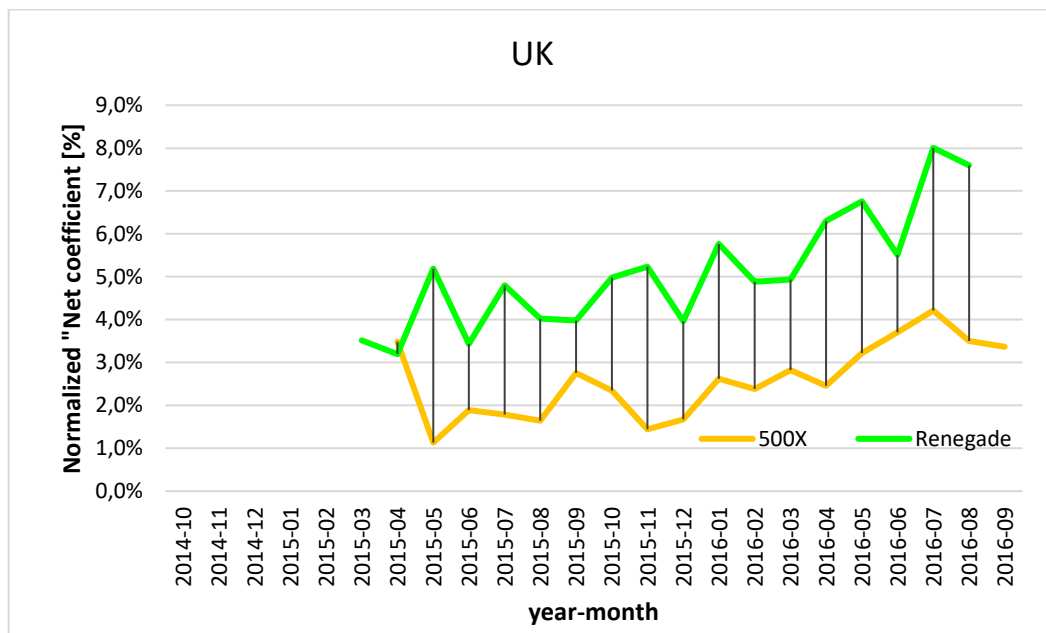


Figure 114 Graph of normalized "Net coefficient" of Jeep Renegade and Fiat 500X in UK

From these figures it is possible to identify two different behaviour:

- in France and Germany, the performances considered of the two models are similar and this is underlined by the fact that the green and orange lines cross each other several times;
- in Italy, Spain and UK, the Jeep renegade performances are better than the Fiat 500X ones; in these three cases the green line (Jeep model) is always above the orange one (Fiat model). Since the two models are analysed in the same period of time, the differences are mainly due to their performances and to their brand ones.

Considering the elements described it is possible to conclude that:

- Fiat 500X had good performances in its launch mainly in Germany considering the brand strength (Table 22);
- In terms of normalized "Net coefficients", and so of market share purged by the brand influences and segment crowd, in three markets over the five analyzed the Jeep Renegade performed better (Italy, Spain and UK);
- In terms of volume, in all the countries considered the Fiat 500X performed better (from 40% to 80% higher) than the Jeep Renegade.



## 6. What about the future

The elements considered in Chapter 3 and described in the specific cases must be the basis for a first approach launch analysis. It is able to provide some indicators such as the ratio between model and brand performances, the normalized “Net coefficient”, the peak of the volume’s trend that can be used to understand in an early phase of the launch of a new model or version if the expectations can be considered realistic or not.

As already mentioned they are and must be a first approach, because they do not consider deviation from the “cluster” characteristics and they do not investigate the main causes of the past data.

It could be interesting to expand the database results of this first approach with the main causes or characteristics of each launch figures; it would integrate the current work done with a further level of detail.

The author of this thesis would suggest anyone who has been fascinated by this topic, to use a kind of analysis that focuses on customers’ appreciation of the main characteristics of the models, such as the conjoint analysis that will be briefly described in Section 6.1.

### 6.1 Conjoint analysis

Conjoint analysis is a statistical technique of multivariate analysis that got a lot of success in particular in marketing researches.

It helps to better understand customer needs and wants, defining a quantitative method to qualify which product consumers prefer and which are the characteristics that most influence the buying process.

It is based on a “theoretical” profile of the product under analysis, that comes from a specific combination of different levels of the attributes. The attributes are the different characteristics of the product/service under analysis that the searcher checks during the analysis to verify the choice of buyers. The levels are the different ways a certain attribute can appear.

The key point of this method is the definition of *Utility* that represents the satisfaction level it is possible to obtain from an asset of a set of assets. During the choice process the decision maker will maximize his utility; this imply that he will use a trade-off or a compensatory offset in comparing the different attributes.





The biggest advantage of this testing is the similarity of its procedure with the real mental behavior during the choice and/or buying process: the respondent evaluates the product globally, then the preferences on attributes and levels are implicit and are estimated through the full profile method.

It is possible to define two different methods:

- Rating method: each respondent evaluates the profile with a score;
- Ranking method: respondents rank the profile according to their preferences.

Once collected the different evaluations it is possible to perform single analysis or conglomerate analysis and create some clusters that could be compared with the ones considered in Section 4 trying to explain the main reasons of the trends.



## 7. Conclusions

After having analyzed 128 models in 5 markets, divided among 10 groups, 23 brands and 12 segments it clearly appears that:

- launches trends in UK and France are similar, so once defined the volume target is possible to estimate the launch trend from the other country curve; this could be interesting considering that UK cars are RHD and usually carmakers launch this version from 3 up to 6 months after the LHD one: this could allow to refine the UK launch data starting from the actual ones got in the French market;
- in the increasing phase of the launch, Italy is the country that grows more respect to the other countries considered;
- in the 5MM Asian groups shows a quite horizontal trend line in the launch phase; this could be ascribed to the mistrust of European market in emerging not-Westernness corporates; in this period in which the new brands born every day or Asian brands try to land in Europe it could be interesting to refine the planned volumes of new model launches with this consideration, and so without expecting important increasing trends, but considering an almost horizontal behaviour;
- the “luxury” segments such as E and I3 shows a short increasing period during its launch phase: launching a new vehicle in this cluster it is possible to expect to reach the peak volume within the fifth month; this is valid for both the “luxury” brands and for those brands with a limited luxury portfolio.

These clusters analysis underlined some macro trends and characteristics and some starting points for a further deeper analysis. Some further details were obtained from the specificities study and other should be investigated through the use of specific analysis such as the conjoint in order to get the possible real causes and to disclose further similarities.

From the study performed on the specificities it is possible to underline:

- A segment is pulled mainly by the Italian market, that historically is the city car market. This is underlined also by the effort of Fiat brand in this segment that decided to compete on both sides of the segment: with 500 it focused on the stylish portion of potential customers, while with Panda it put the focus on the reliability and on the “all-conditions” usage of the vehicle. Furthermore, this segment is mainly driven by the “national” brands; to understand this trend it is necessary to



focus on the characteristics of the segment and of the potential customers: it is the cheapest segment and so inhabitants tend to promote the “national” companies.

- After a long decreasing period (started before 2001), B segment in the last three years restarted to increase the registrations in all the 5MM. The similar (in terms of characteristics such as comfort and accessible price) segment L0 instead, after a peak in 2005 was affected by a crisis in all the markets; since the two segments show similar trends just in different time periods, a slow restart of registrations could be possible also in the L0 segment. This consideration must also take into account the launch volume trend lines of the two families: the MPV segment shows a shorter increasing phase during its launch respect to the B in all the 5MM of about 3 months.
- C segment is highly influenced by the surrounding conditions; this means that the models launch and the related characteristics are influenced by the whole segment and economic trend. This aspect is underlined by the analysis of the three series of Volkswagen Golf, where the fifth series was launched in a decreasing phase for the segment and it showed a decreasing trend of the “Net” performances; the other two series instead were launched in a positive period and the launch showed for both the models a continuously increasing trend of the “Net coefficient”.
- The high-level segments in the last sixteen years lived a crisis period that is going to slow down in all the markets since 2015. Audi A4 can be considered as the symbol of this “collapse”: in three series it more than halved the volume, and at the same time it increased the market share; this means that it maintained its successfulness in relative terms.
- Due to the crisis of high-level segments, it is thus necessary for the brands to look to new opportunities in new prolific segments. It is the strategy that Jeep started in 2014, when decided to enter in the lowest of the I segments. To understand and replicate the strategy it is necessary to understand the brand pillars; it is considered as the premium brand of FCA group and it invested mainly on luxury SUVs and off-road vehicles up to 2014. From the foundation of the group, Jeep got the possibility to share the costs with the Italian partner to develop a I0 segment car; it allowed to apply the off-road principles (at least from an aesthetic point of view) to a small SUV offered as both 2WD and 4WD. The effect of this decision was a big



success if compared to the “Italian cousin” Fiat 500X; it allowed to catch a portion of the market that was unknown up to that moment: the youngest layer (and potential future customers) of the population.

At this point it is clear that carmakers have to face everyday difficulties that can be caused by an internal mistake or by the surrounding conditions; in many cases trying to react with corrective actions to these situations can be a complete bloodbath. What makes the difference is the ability to learn from the hitches, trying to catch the opportunity to change direction, to discover new segments and reach new customers or new markets: what makes the difference is to *see the opportunity in every difficulty*.

## Appendix 1 – FCA group models

A brief description of the main FCA mid-level models currently available in EMEA markets is reported here below divided by brand.

### *Fiat*



Figure 115 Fiat 500

**500:** presented in Turin the 4<sup>th</sup> July 2007, it position itself as a fashion A-segment car offering more than 500 thousand combinations of versions and accessories. The new 500 re-introduces many stylistic solutions of the previous edition presented in 1957. In March of the same year was presented the cabriolet version **500C** which maintains the structural pillars acting as a track, on which the canopy is electrically moving. Both the models were modified in 2015 with a restyling that mainly modified headlights.



Figure 116 Fiat Panda

version was introduced in the market as **Panda 4x4** and in 2014 the variant **Panda Cross** with specific aesthetic.



Figure 117 Fiat Punto

**Panda:** introduced in the market as A-segment in February 2012, substituting the previous model (2003). The mission of this model is the same of the previous 2 versions: rationality, comfort, habitability, versatility and practicality. In the same year the AWD

**Punto:** introduced in 2005 in B-segment, it is the third generation of this family. The actual model is a restyling introduced in 2012.



Figure 118 Fiat 500L

**500L:** introduced in market in 2012 in the L0-segment as member of the premium family “500”. The mission of this model is rationality, refinement and habitability. In 2013 the **500L Trekking** was introduced as a FWD Crossover, with dedicated aesthetic and “Traction plus” (device similar to the self-locking differential). In the same year was introduced also the **500L Living** (currently 500L Wagon), the long version with 7 seats. In 2017 was introduced a face lifting for the whole family.



Figure 119 Fiat 500X

**500X:** introduced in 2014 in the emerging IO-segment as part of premium family “500”. It born from a joint project with Jeep Renegade: the 2 models share the same mechanical structure with completely different aesthetic. The mission of this model is similar to Fiat 500, trying to join refinement, trend and comfort in this city SUV. It is characterized by two different looks, a City and an Off-road look.



Figure 120 Fiat Tipo

**Tipo:** introduced in 2015 in C-segment, it is present in the market with 3 different versions, 5 doors, 4doors and station wagon. Produced in Turkey it can be considered a world car since it is commercialized though several different countries in EMEA region and also in Mexico as Dodge Neon. Its mission is habitability, comfort and high load capacity.



Figure 121 Fiat 124 Spider

**124 spider:** introduced in the market in 2016, it is a RWD spider produced in collaboration with Mazda (Mx-5). Its name and style refers to Fiat 124 Sport Spider designed in 1966 by Pininfarina. It is also commercialized a sport version with Abarth brand.



Figure 122 Fiat Fullback

**Fullback:** introduced in 2016 in EMEA market, it is the result of the collaboration between Fiat and Mitsubishi. It has two different transmission configurations, 4WD and RWD.



Figure 123 Fiat Doblò

**Doblò:** introduced in the market in 2009, it substituted the previous series (2000-2009). It is commercialized in four different versions: the passenger car version, cargo, cabin and combi. The last versions are commercialized as Fiat Professional. In 2015 it was restyled and it started to be sold in NAFTA as RAM ProMaster City.



Figure 124 Fiat Qubo

**Qubo:** presented at Paris motor show in 2008, it uses the same modular platform of Fiat Punto. In 2016 a restyling was introduced.

## Jeep



Figure 125 Jeep Wrangler and 4-doors both 4WD.

**Wrangler:** produced since 1987, 3 versions were presented up to now. In 2018 the new JL version will be launched in EMEA market. It represents an indirect progression of Willys MB. The mission of this model is adventure, off-road, robustness and refinement. It is characterized by two different versions, 2-doors



Figure 126 Jeep Grand

**Cherokee:** full-size luxury SUV produced since 1993, currently it is the fourth edition. The main characteristics of this model are habitability, comfort and performance. This model represents the flagship of the brand since its launch.



Figure 127 Jeep Cherokee

**Cherokee:** mid-size SUV, produced since 1974 through several generations. The actual version was presented in 2013 in New York with a completely new style. It was the first model to be developed after the Fiat-Chrysler partnership, it was launched in the market as an urban SUV, it is characterized by both FWD and 4WD.



Figure 128 Jeep Compass

**Compass:** it is the second generation of this model (first generation 2006-2017), launched in 2017 in EMEA market, it represents an international model of brand Jeep. Produced in 4 different plants (Brazil, Mexico, India and China), it shares a stretched platform with Jeep Renegade. Due to its nature of urban SUV it is available in both FWD and 4WD versions.





Figure 129 Jeep Renegade

**Renegade:** launched in 2014, it represents the first model of brand Jeep produced out of USA (it is produced in Melfi on the same production line of Fiat 500X, with which it shares the platform). It was developed to enter in the growing I0-segment, it represents the entry model of the brand due to both price and dimensions.

### *Alfa Romeo*



Figure 130 Alfa Romeo MiTo

**MiTo:** introduced in B-segment in 2008, it is characterized by the sporty style of the brand. It represented a big change in the brand market target, since it was the first time Alfa Romeo entered the B-segment.

With MiTo also the DNA system entered the market, and nowadays it is part of all current models. In Ginevra motor show in 2016 was presented the restyle inspired to the new Alfa Romeo Giulia.



Figure 131 Alfa Romeo Giulietta

**Giulietta:** launched in 2010 in the C-segment to celebrate the 100<sup>th</sup> anniversary of the brand, the name resumes a symbol of Italian car industry. This model, respecting brand philosophy, focuses its mission on performances, style and efficiency.

**Giulia:** sport sedan launched in 2016, it represents a challenge for the brand that decided to focus again on RWD transmission (not used any more since 1993, with the build-out of Alfa Romeo 75). In September 2016 it became the fastest 4-doors sedan in Nürburgring circuit with the time lap of 7'32''.



Figure 132 Alfa Romeo Giulia



Figure 133 Alfa Romeo Stelvio

**Stelvio:** it is the first SUV presented by the brand at the end of 2016. It has both RWD and 4WD versions and it shares the same platform with Giulia. In September 2017 it became the fastest SUV in Nürburgring circuit with the time lap of 7'51''.





Figure 134 Alfa Romeo 4C

**4C:** this RWD sport vehicle is produced since 2013 by Maserati plant in Modena with Alfa Romeo brand. The structure is a carbon fiber monocoque inspired by Formula 1 technology. In 2015 the spider version was launched with an extra weight of just 10 kilograms.

### **Lancia**



Figure 135 Lancia Ypsilon

**Ypsilon:** introduced in the B-segment in 2011, it is a complete restyling of the previous model (2003 -2011). It shares most of the mechanical components with Fiat 500, but it is equipped with 5-doors. It is characterized by soft and round lines however, it has a slightly more

sporty and dynamic look respect to previous versions; it allows to expand the target of the market to men and families, thus disconnecting from the stereotype of almost totally female car.

Starting from 2017 it is sold only in Italy.

In Ireland and UK, it was commercialized as Chrysler brand.

### **Maserati**

Actual models are Quattroporte, Ghibli (the first Maserati model to be equipped with Diesel engine), GranTurismo, GranCabrio and Levante (first brand's SUV).




Figure 136 Maserati brand models



## Bibliography

OICA ([www.oica.net](http://www.oica.net))

ACEA ([www.acea.be](http://www.acea.be))

SCM academy (FCA) 

<https://en.wikipedia.org>

<https://www.fiat.it>

<https://www.fcagroup.com>

<http://www.carsitaly.net>

“Advanced Automotive Logistics” academic course material

*The evolution of competition in automotive industry* - Matthias Holweg

*The automotive chassis* – G. Genta, L. Morello

*Conjoint analysis* – G. Toscano, A. Vinci

*L'analisi delle serie storiche: un'introduzione alle tecniche statistiche classiche* - Simone Celant

*Market-Share Analysis, evaluating competitive marketing effectiveness* – Lee G. Cooper, Masao Nakanishi