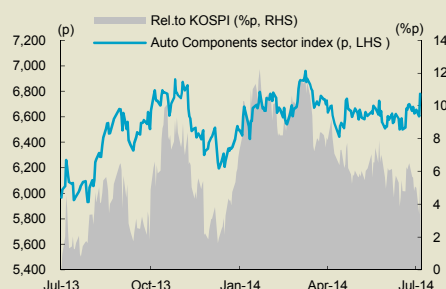


## Overweight (Maintain)

Company	Rating	TP (KRW)
Hyundai Mobis	BUY (Reinstate)	360,000
Mando	BUY	158,000
PyeongHwa Auto	BUY	31,000

## Sector performance (12M)



Source: WICS provided by WISEfn

## No accidents in Autopia

### Mobis: Reinstate as our top sector pick

Given the growing application of advanced driver assistance systems (ADAS) such as lane departure warning (LDW) and blind spot detection (BSD), we reinstate coverage of Hyundai Mobis (Mobis) with BUY and a TP of W360,000 (8.5x 12MF PE). Mobis has fallen below 7.0x PE due to 1) a lower sales weighting of core parts (40% of module sales in 2010 and 35% in 2013) and 2) concern about participating in an additional rights offer by subsidiary Hyundai Life Insurance (Hyundai Life) that continues to spill red ink (loss equaled 3.4% of Mobis' combined module and parts OP in 2013). However, greater availability of ADAS would help drive up the sales weighting of core parts (38% of module sales in 2015F and 40% in 2016F) while Hyundai Life is expected to make a quick turnaround in 4Q14. As such, we see a good buy opportunity for this undervalued stock. We select Mobis as our top pick among parts makers.

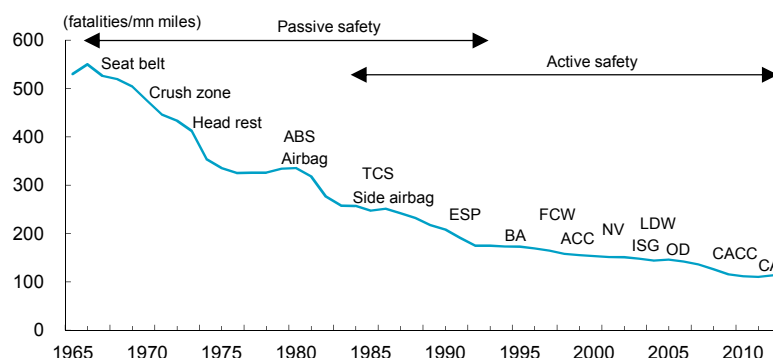
### Mando and PHA to benefit from safety advances

With the development of ADAS technology, vehicle safety is advancing from passive to active and from passenger protection to pedestrian. Accordingly, Mando should see the sales weighting of ADAS go up from 1.5% in 2014F to 5% in 2016F and the segment's EPS contribution would turn around from -0.8% to 9.3%. For PyeongHwa Automotive (PHA), its active hood system currently accounts for only 2% of sales and remains in the red. But as more models will come equipped with such systems, the segment's sales weighting should rise to 7% in 2015F and finally turn profitable (6% EPS contribution).

### ADAS penetrates mass market and emerging countries

The ADAS market is projected to grow 27% p.a. through 2016 with broader penetration from high-end cars to mass-market vehicles and from the advanced countries to the emerging. The market size is estimated at W6tn in 2013. Domestically, the application of ADAS is expanding from mid/full-size vehicles (the segments together account for 18% of Hyundai Motor's vehicle lineup) and sport utility vehicles (19%) to compact/sub-compact cars (55%). At present, 28% of 18 core ADAS functions are installed in compact cars and the rate should increase to 50% in 2016. (For reference, the midsize K5 and LF Sonata currently feature 50% and 72% of the core functions, respectively.)

### History of vehicle safety features: Adoption of safety technologies has helped reduce traffic fatalities worldwide



Note: Refer to glossary on pg. 25-26 / Source: NHTCA, Delft University of Technology, Korea Investment & Securities

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## Sector report focus

### What is the report about?

- Examine the technological trends in ADAS and analyze the features of each surrounding sensor
- Offer a market outlook by examining ADAS applications by vehicle type and country
- Examine major car technology options that are currently available and investigate when they started to be installed by vehicle type
- Analyze the ADAS technology of domestic firms and search for opportunities

### Key assumptions and valuation

- ADAS segment's growth will stand out among auto parts

**Auto parts market size (2012-2017F CAGR)** (% , USD bn)

	Engine	HEV/ EV mission	Trans-	Chassis	Safety	ADAS	Car body	Security	Info.
CAGR	6.9	25.8	4.9	4.8	5.4	22.3	6.1	4.8	5.4
2012	35	8	21	21	23	6	44	5	27
2017F	48	25	26	27	30	17	60	6	35

Source: Strategy Analytics, Korea Investment & Securities

- Applied 8.5x target PE to Mobis (considered its reliance on Hyundai Motor or Hyundai and Kia Motors or Kia; discounted to the average of global peers)
- Applied 12.0x target PE to Mando (despite strong in-house technological abilities, mid-cycle PE was discounted due to concern about governance structure)

### Sensitivity & scenario analysis

- Mobis' profitability is affected by core parts sales weighting
- Core parts accounted for 35% of module sales in 2013; See below for sensitivity to sales weighting changes

**Sensitivity to changes in core parts sales weighting** (W bn)

	32%	34%	36%	Base 38%	40%	42%	44%
2015F OP	3,282	3,323	3,365	3,407	3,449	3,491	3,532
2015F NP	4,048	4,080	4,112	4,145	4,177	4,209	4,242
OP sensitivity	-3.7%	-2.5%	-1.2%	-	1.2%	2.5%	3.7%
NP sensitivity	-2.3%	-1.5%	-0.8%	-	0.8%	1.6%	2.3%

Source: Korea Investment & Securities

### Risks

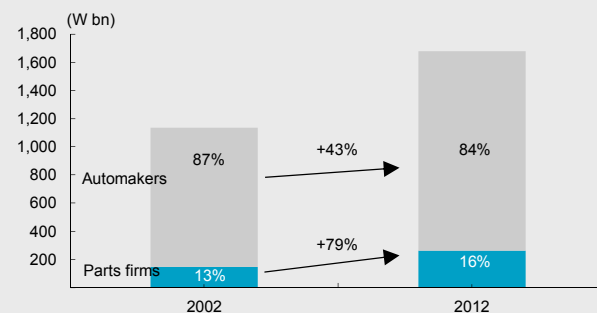
- Industry-wide
  - If firms cannot narrow the technological gap with global leaders
  - If firms maintain their dependence on Hyundai and Kia
- Mobis
  - If after-service (AS) parts segment contracts sharply due to less usage of genuine (OEM) parts
  - If Hyundai Life's losses grow more or the loss-making phase lasts longer than expected
- Mando
  - If governance restructuring is done in a way that infringes on shareholder interests

### Sector highlights

#### 1) Auto parts makers gaining influence over finished automakers

- Automakers find it difficult to ensure quality and stay competitive without cooperation and technological help from parts makers
- While the top 10 global finished automakers saw their combined sales increase 43% over 2002-2012, the top 10 parts makers combined for a 79% spike during the same stretch

#### Sales growth: Finished automakers vs. parts makers

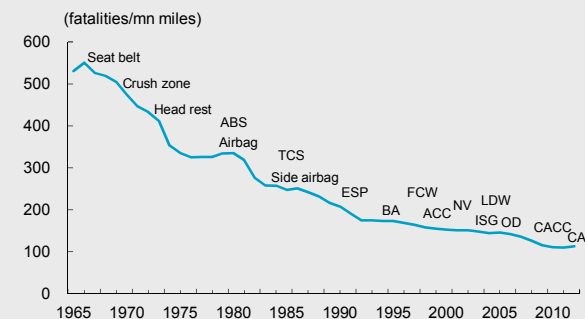


Source: Bloomberg, company data, Korea Investment & Securities

#### 2) Emergence of active safety systems that use ADAS

- Traffic fatalities started going down after major passive safety technologies such as safety belts and airbags were introduced
- Active safety systems that use ADAS to drive vehicle safety in the future

#### History of vehicle safety features: Adoption of safety technologies has helped reduce traffic fatalities worldwide



Source: NHTCA, Delft University of Technology, Korea Investment & Securities

### Peer comparison

- Domestic firms trade at a lower valuation than global peers
- The reason is their R&D spending-to-sales is low and they have a high sales dependence on Hyundai and Kia
- See peer comparison, PB-ROE and EV/IC-ROIC/WACC on pg. 4

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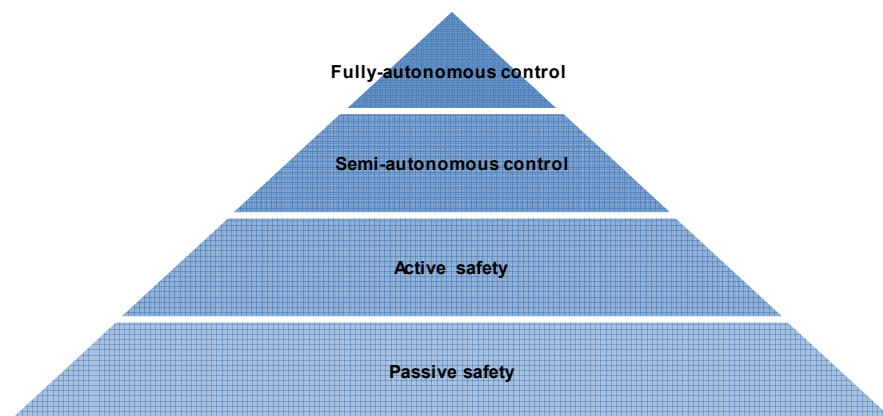
## I. Investment points & valuation

### 1. Investment points

#### **ADAS penetrating the mass market and emerging countries**

The advanced driver assistance systems (ADAS) market is projected to grow 27% p.a. through 2016 with broader penetration from high-end vehicles to the mass market and from the advanced countries to the emerging. The market size is estimated at W6tn in 2013. Domestically, the application of ADAS is expanding from mid/full-size vehicles (the segments together account for 18% of Hyundai's vehicle lineup) and sport utility vehicles (19%) to compact/sub-compact (55%). At present, 28% of 18 core ADAS functions are installed in compact cars and the rate should increase to 50% in 2016. (For reference, the midsize K5 and LF Sonata currently feature 50% and 72% of the core functions, respectively.) Automotive safety requirements are shifting focus from passive to active and from passenger to both passenger and pedestrian in line with the evolution of ADAS technology. To catch up with the world's leading parts makers possessing advanced technology, a captive demand base is essential for late entrants. Having major carmakers such as Hyundai and Kia at home, Korean parts makers are projected to achieve rapid technological advances. This report aims at coming up with an investment idea by reviewing the trend of ADAS technology, penetration by market and vehicle segment and the Korean makers' technological status, as well as providing explanations of various sensors, a key part of ADAS. We recommend BUY for Mobis, Mando and PHA among auto parts makers.

**Figure 1. Evolution of vehicle safety**



Source: Korea Investment & Securities

#### **Reinstate coverage; Mobis is top pick**

We reinstate coverage of Mobis with BUY and a TP of W360,000 (8.5x 12MF PE). The company slipped to below 7x PE due to a falling sales contribution of core parts (down from 40% of module sales in 2010 to 35% in 2013) and concern about participating in an additional rights offer by its loss-making subsidiary Hyundai Life (loss equaled 3.4% of Mobis' total OP in 2013). However, we forecast the growing penetration of ADAS will help drive up the sales weighting of core parts (38% of module sales in 2015 and 40% in 2016) and Hyundai Life will quickly turn profitable in 4Q14. As such, we believe the current weak price presents a bargain-hunting opportunity. We mark Mobis as our top auto parts pick.

**Mando and PHA will also benefit from the evolution of vehicle safety standards**

For Mando, the ADAS sales weighting is projected to grow from 1.5% in 2014 to 5% in 2016. Accordingly, its EPS contribution would improve from -0.8% to +9.3% over the same period. Mando plans to bolster its weaker area, sensor/electronic control unit (ECU), by establishing a technological partnership agreement or a joint venture (JV) on the back of its technological prowess in driving units. For PHA, the company now makes a loss from its active hood lift system as its sales contribution is trivial at 2%. But the new product should turn profitable in 2015 with a 7% sales weighting for the active hood system (which lifts EPS by 6%). New products such as the active hood system and a power trunk system will drive up PHA's OPM by 0.3%p annually with sales rising from W12bn in 2013 to W30bn in 2014F before passing the break-even point of W100bn in 2015F.

## 2. Valuation

**Wider range of customers and more R&D spending will resolve undervalued status**

While Korean auto parts makers are undervalued, the situation will be gradually resolved by a widening customer base and the development of electronics technology for automobiles. Korean auto parts makers currently trade at a low PB despite high ROE and are undervalued for their EV and ROIC levels. We attribute the discount to their dependence on Hyundai and Kia and relatively less R&D spending than global peers. Meanwhile, the domestic companies' supply to overseas OEMs is rapidly increasing amid the strengthening presence of Hyundai and Kia in the global market and greater recognition of the Korean parts' advantage: lower prices than Japanese and better quality than Chinese. Korean parts makers are aggressively expanding R&D spending to accelerate the development of ADAS technology.

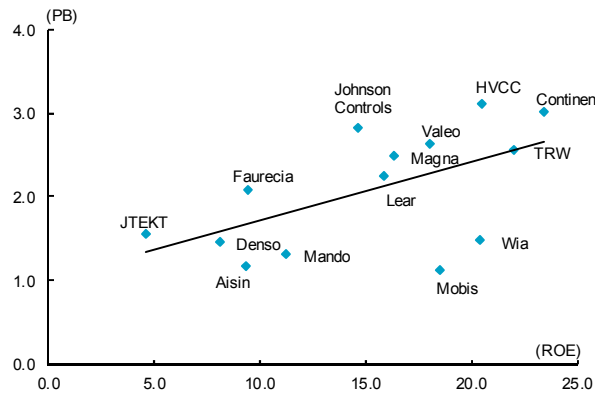
**Table 1. Global peer valuation**

(USD mn, x, %)

	Denso	Conti	Magna	Aisin	Johnson	Faurecia	Lear	Delphi	TRW	Valeo	Mobis	Hyundai Wia	HVCC	Mando	Avg.
Market cap	42,156	44,127	23,839	11,700	32,172	4,643	7,758	20,634	11,637	9,766	28,650	4,684	5,253	2,223	
PE															
2011	27.1	21.1	25.1	17.5	20.1	9.0	18.8	26.0	15.0	17.2	9.2	15.1	10.4	16.7	18.6
2012	44.1	15.4	21.1	23.1	19.3	21.6	18.4	18.3	17.8	18.9	7.7	10.6	10.9	14.2	19.9
2013	22.6	14.7	17.2	16.4	18.3	21.6	16.7	15.9	15.8	17.4	8.2	11.7	14.0	12.5	17.8
2014F	13.5	12.9	13.2	12.8	15.3	14.3	12.7	13.7	14.0	13.0	7.4	10.9	17.1	10.7	13.9
PB															
2011	1.9	4.7	3.2	1.6	2.9	3.2	3.6	16.6	4.7	3.6	2.0	2.5	1.9	2.7	3.8
2012	2.0	3.8	2.8	1.6	2.8	2.8	3.3	9.3	3.5	3.2	1.6	2.4	1.8	1.5	3.0
2013	1.8	3.3	2.6	1.5	2.5	2.1	2.9	7.1	3.3	3.0	1.4	2.2	2.8	1.3	2.6
2014F	1.5	3.0	2.5	1.2	2.5	2.0	2.4	5.6	2.7	2.6	1.2	1.8	3.4	1.3	2.3
ROE															
2011	7.1	20.6	13.1	9.5	14.9	43.1	20.6	37.1	36.1	22.5	24.5	19.8	18.7	17.4	20.7
2012	4.5	25.4	12.4	7.0	15.1	15.3	20.1	54.2	21.8	18.3	23.2	25.5	17.5	11.4	18.4
2013	8.1	23.4	16.3	9.3	14.6	9.4	15.8	48.2	22.0	18.0	18.5	20.4	20.5	11.3	17.4
2014F	11.5	24.4	19.3	9.9	16.6	13.9	19.4	45.3	19.9	21.2	17.3	17.7	20.7	12.4	18.3
EV/EBITDA															
2011	9.6	9.3	11.7	5.2	13.4	4.8	7.9	11.4	7.5	6.8	9.3	10.6	5.3	9.2	8.8
2012	11.5	8.2	9.9	5.9	13.0	5.1	8.1	10.8	7.9	6.7	7.2	7.5	5.3	7.4	8.3
2013	8.6	7.8	8.3	5.1	11.6	5.0	7.3	9.7	7.5	6.4	6.9	7.9	7.9	6.4	7.8
2014F	6.4	7.0	7.1	4.5	10.6	4.3	6.3	8.7	7.0	5.6	5.8	7.0	8.3	5.9	6.8
OPM															
2011	6.5	8.5	4.4	6.4	5.3	3.9	5.5	9.5	7.7	6.3	10.0	5.0	8.2	6.6	6.5
2012	4.6	10.3	5.0	5.1	5.3	2.9	5.3	10.8	7.4	6.0	9.4	7.7	8.5	5.1	6.5
2013	7.2	10.1	5.1	6.0	5.8	2.9	5.3	11.1	7.5	6.4	8.6	7.5	7.0	5.6	6.6
2014F	9.3	11.3	6.4	6.4	6.4	3.4	5.7	11.7	7.7	7.1	8.5	7.2	7.4	6.2	7.3

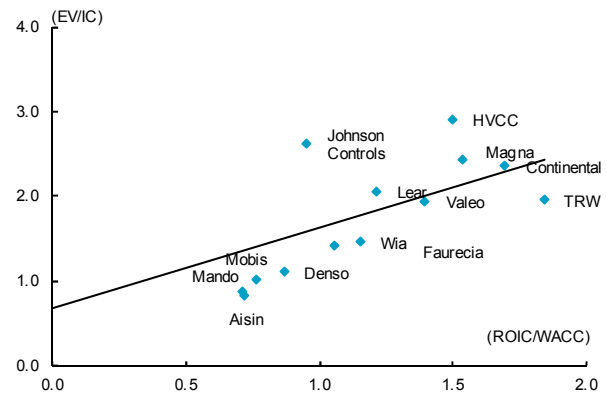
Source: Bloomberg, Korea Investment & Securities

Figure 2. PB vs. ROE



Note: Based on 2014F PB and 2013 ROE  
Source: Bloomberg, Korea Investment & Securities

Figure 3. EV/IC vs. ROIC/WACC



Note: Based on 2014F EV and 2013 IC and ROIC; Assuming 10% WACC  
Source: Bloomberg, Korea Investment & Securities

Table 2. KIS coverage valuation

Recommendation & TP			Earnings & valuation									
Company				Sales	OP	NP	EPS	BPS	PE	PB	ROE	EV/EBITDA
				(W bn)	(W bn)	(W bn)	(KRW)	(KRW)	(x)	(x)	(%)	(x)
Hyundai Mobis (012330)	Recommendation	BUY	2012A	30,789	2,906	3,559	37,239	174,900	7.7	1.6	23.2	7.2
	TP (KRW)	360,000	2013A	34,199	2,924	3,422	35,804	207,722	8.2	1.4	18.5	6.9
	Price (Jul 28, KRW)	295,500	2014F	36,626	3,127	3,791	39,673	244,729	7.4	1.2	17.3	5.8
	Market cap (W bn)	28,765	2015F	39,848	3,407	4,145	43,374	285,535	6.8	1.0	16.1	4.9
			2016F	42,910	3,670	4,489	46,973	329,936	6.3	0.9	15.0	3.9
Halla Visteon Climate Control (HVCC) (018880)	Recommendation	Hold	2012A	3,653	310	232	2,169	13,082	10.9	1.8	17.5	5.3
	TP (KRW)	-	2013A	5,189	364	296	2,776	13,995	14.0	2.8	20.5	7.9
	Price (Jul 28, KRW)	52,500	2014F	5,618	426	328	3,069	15,614	17.1	3.4	20.7	8.3
	Market cap (W bn)	5,604	2015F	6,120	476	363	3,405	17,569	15.4	3.0	20.5	7.2
			2016F	6,806	558	426	3,989	20,109	13.2	2.6	21.2	6.2
Hyundai Wia (011210)	Recommendation	BUY	2012A	7,021	540	418	16,262	71,238	10.6	2.4	25.5	7.5
	TP (KRW)	206,000	2013A	7,092	529	417	16,224	87,626	11.7	2.2	20.4	7.9
	Price (Jul 28, KRW)	185,500	2014F	7,621	552	437	16,982	104,757	10.9	1.8	17.7	7.0
	Market cap (W bn)	4,772	2015F	8,173	604	494	19,182	124,088	9.7	1.5	16.8	6.2
			2016F	8,839	665	547	21,272	145,509	8.7	1.3	15.8	5.4
Mando (060980)	Recommendation	BUY	2012A	5,059	256	163	9,065	85,456	14.2	1.5	11.4	7.4
	TP (KRW)	158,000	2013A	5,634	313	178	9,999	93,225	12.5	1.3	11.3	6.4
	Price (Jul 28, KRW)	130,000	2014F	5,837	360	216	12,152	103,957	10.7	1.3	12.4	5.9
	Market cap (W bn)	2,339	2015F	6,439	407	242	13,621	116,140	9.5	1.1	12.4	5.2
			2016F	7,158	453	275	15,435	130,118	8.4	1.0	12.5	4.8
Kolao Holdings (900140)	Recommendation	BUY	2012A	276	29	29	709	2,956	24.5	5.9	27.8	22.9
	TP (KRW)	38,000	2013A	334	34	28	678	5,926	39.9	4.6	14.3	32.0
	Price (Jul 28, KRW)	21,750	2014F	443	47	42	893	6,532	24.4	3.3	14.4	21.3
	Market cap (W bn)	1,041	2015F	546	64	58	1,228	7,719	17.7	2.8	17.0	15.9
			2016F	670	79	73	1,538	9,211	14.1	2.4	17.9	12.9
SL (005850)	Recommendation	Hold	2012A	1,162	37	58	1,715	17,351	8.3	0.8	10.2	6.8
	TP (KRW)	-	2013A	1,242	35	73	2,158	19,422	7.6	0.8	11.7	7.0
	Price (Jul 28, KRW)	20,400	2014F	1,343	55	84	2,474	21,794	8.2	0.9	12.0	6.5
	Market cap (W bn)	690	2015F	1,446	63	95	2,798	24,491	7.3	0.8	12.1	5.7
			2016F	1,512	62	95	2,815	27,204	7.2	0.7	10.9	5.3
S&T Motiv (064960)	Recommendation	BUY	2012A	905	34	22	1,942	31,420	12.1	0.7	4.9	6.1
	TP (KRW)	38,000	2013A	960	52	34	2,446	36,191	11.2	0.8	6.9	6.1
	Price (Jul 28, KRW)	35,300	2014F	1,088	66	54	3,776	39,246	9.3	0.9	9.8	5.6
	Market cap (W bn)	508	2015F	1,225	77	53	3,755	42,417	9.4	0.8	9.0	4.7
			2016F	1,382	88	62	4,342	46,130	8.1	0.8	9.6	4.0
PyeongHwa Automotive (043370)	Recommendation	BUY	2012A	883	57	38	1,827	16,097	8.6	1.0	11.9	4.5
	TP (KRW)	31,000	2013A	999	69	47	2,256	18,203	9.5	1.2	13.2	4.9
	Price (Jul 28, KRW)	22,500	2014F	1,104	79	56	2,654	20,697	8.5	1.1	13.6	4.4
	Market cap (W bn)	472	2015F	1,245	93	66	3,126	23,663	7.2	1.0	14.1	3.9
			2016F	1,393	104	74	3,537	27,039	6.4	0.8	14.0	3.6
Dongyang Mechatronics (013570)	Recommendation	BUY	2012A	733	46	42	1,360	10,366	7.8	1.0	13.6	6.0
	TP (KRW)	12,500	2013A	751	39	32	1,055	11,177	10.7	1.0	9.8	7.0
	Price (Jul 28, KRW)	9,570	2014F	820	50	37	1,207	12,181	7.9	0.8	10.3	5.5
	Market cap (W bn)	303	2015F	871	51	41	1,344	13,315	7.1	0.7	10.4	5.2
			2016F	926	55	43	1,410	14,512	6.8	0.7	10.0	4.9

Source: Company data, Korea Investment & Securities

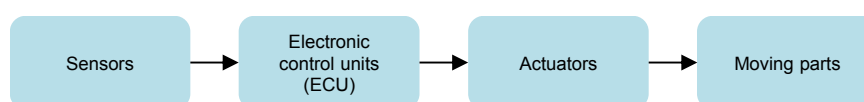
## II. ADAS technology overview

### 1. What is ADAS?

**Approaching ADAS  
from a safety point of  
view rather than  
convenience**

ADAS lets a driver rapidly respond to changes in the driving environment. While ADAS could be approached in terms of safety and convenience, our focus is on the safety aspect because the efforts to meet regulatory requirements would be vital in the rapid development and penetration of the technology (convenience is not a matter of regulation). ADAS starts from a sensor that recognizes a vehicle's surroundings. Information received from a sensor is transmitted to driving units via ECU and an actuator, which converts electronic signals into motion. ADAS is essential in reducing the risk of accidents and damage and it provides a base to move toward driverless vehicles.

**Figure 4. Mechanism of ADAS**

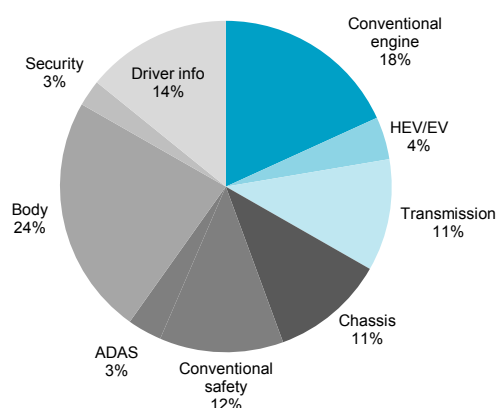


Source: Korea Investment & Securities

**ADAS the fastest  
growing auto parts  
segment**

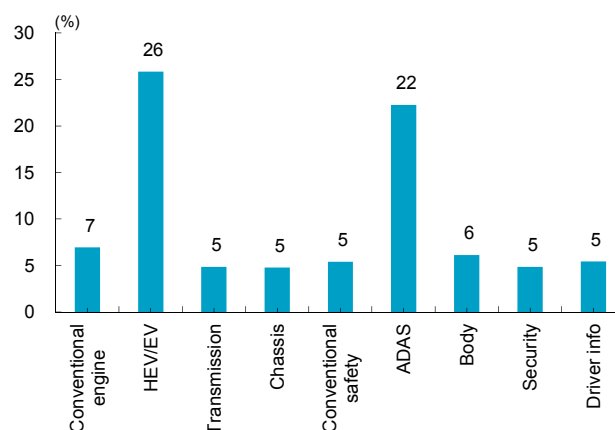
Although ADAS accounted for a mere 3% of the auto parts market in 2012, it is one of the fastest growing segments (along with HEV/EV) with a projected 22% CAGR through 2017. While ADAS had been installed in a few vehicles in the past, the technology has passed a “tipping point” for rapid penetration thanks to falling prices of sensors and ECU chips. Of note, the ADAS market is expected to grow 27% p.a. over the next three years, propelled by the adoption of the technology in mass-market vehicles. The front monitoring and rear-end collision preventing device segments, which are directly linked to safety issues, will likely show the fastest growth among ADAS technologies.

**Figure 5. Auto parts market size (2012)**



Note: W190tn as a whole in 2012  
Source: Strategy Analytics, Korea Investment & Securities

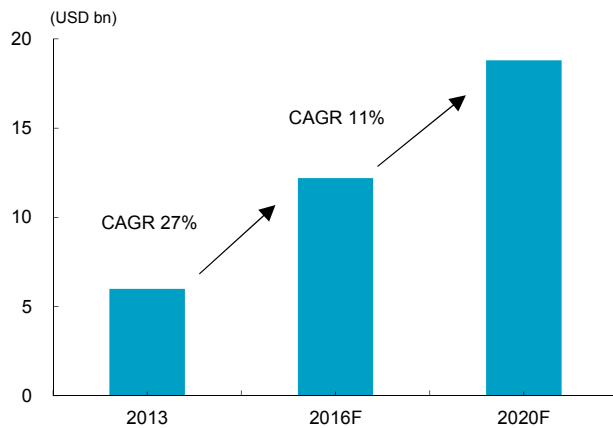
**Figure 6. Auto parts market size (2012- 2017F CAGR)**



Source: Strategy Analytics, Korea Investment & Securities

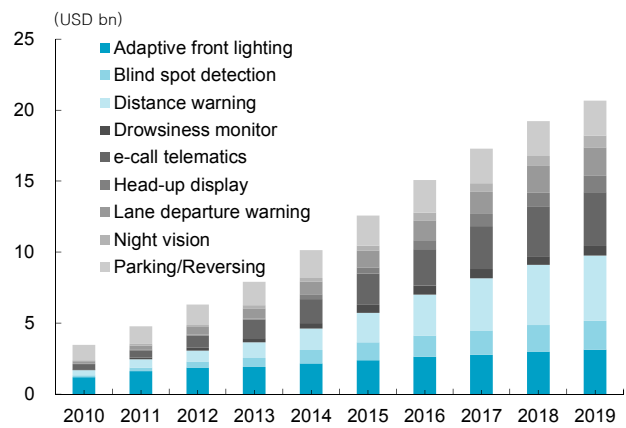


Figure 7. ADAS demand outlook



Source: Continental, Strategy Analytics, Korea Investment &amp; Securities

Figure 8. ADAS demand by segment



Source: Strategy Analytics, Korea Investment &amp; Securities

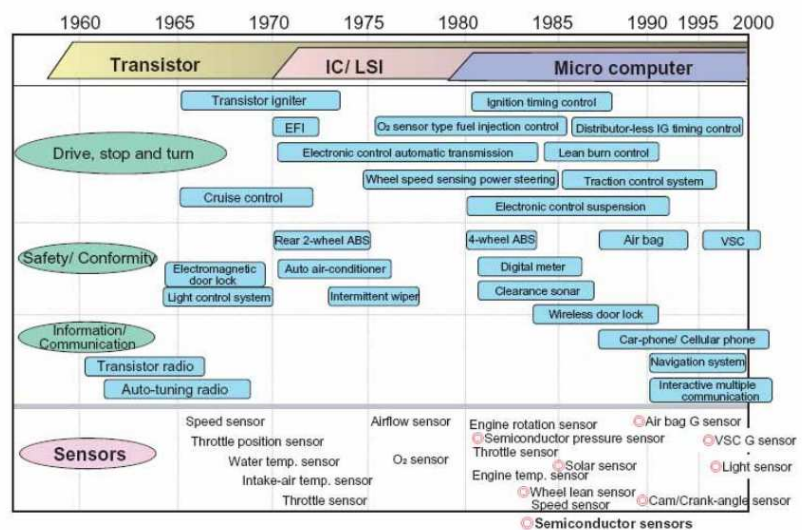
## 2. Sensor technology is critical in ADAS

### 1) Evolution of sensors

**Evolves into intelligent sensors with comprehensive decision-making ability**

Sensors convert a physical or chemical property (e.g., temperature, speed, pressure and distance) of an object into electronic signals. Recently, intelligent sensors, a combination of multiple sensors, are gaining popularity. Sensor technology is evolving from a simple mechanical sensor (first generation) into a semiconductor sensor with autonomous self-configuring/regulating capacity (second generation) and an intelligent sensor that combines multiple semiconductor sensors (third generation). ECU containing the algorithms, which enable comprehensive decision-making based on information received from multiple sensors, has become a core element of sensor technology.

Figure 9. Development of automotive electronic technologies and sensors



Source: Hyundai Autonet, Korea Investment &amp; Securities

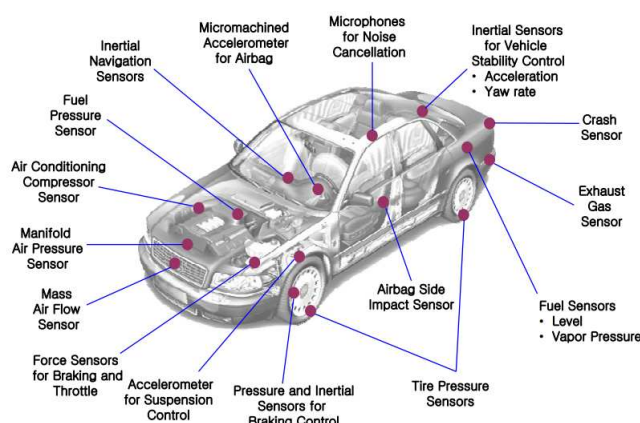


**Automotive sensors need to meet tight quality requirements; As more are installed, integrated control becomes more crucial**

## 2) Characteristics of automotive sensors

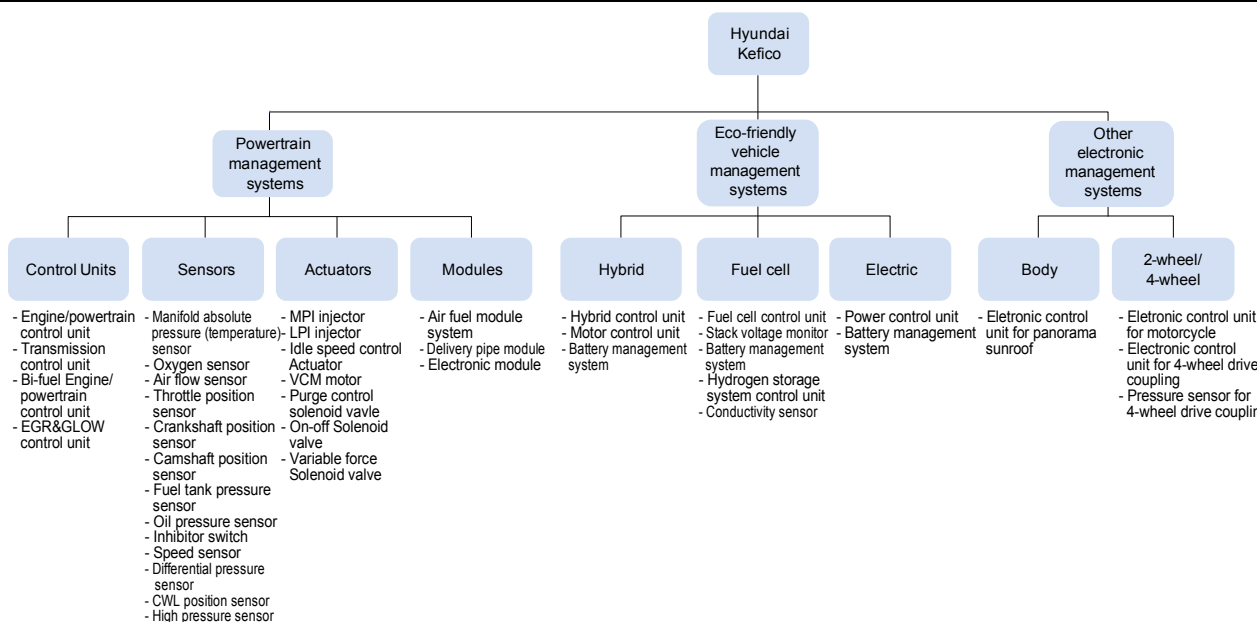
Automotive sensors must be durable in a wide range of operating conditions: for example an engine sensor in high temperature, high humidity, greasy and corrosive environment. With vehicles going electronic, the number of sensors installed in a car is growing fast. As such, technology that minimizes interference between sensors and ensures integrated control over multiple sensors will become more crucial to ensure vehicle safety. Hyundai KEFICO, an affiliate in the Hyundai Motor Group, is a domestic leader in making electronic control systems.

**Figure 10. Application of automotive sensors**



Source: Hyundai Autonet, Korea Investment & Securities

**Figure 11. Hyundai KEFICO's business area**



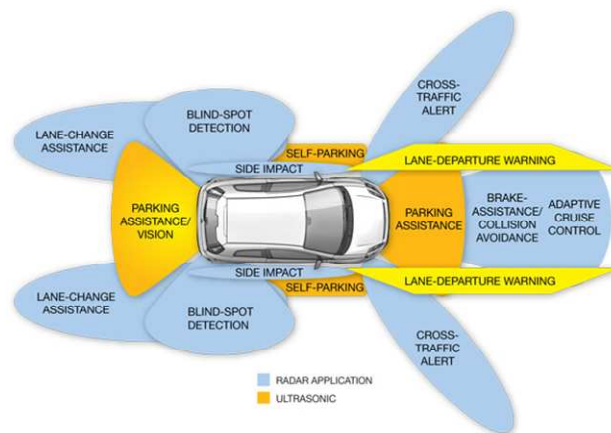
Source: Company data, Korea Investment & Securities

### Sensors that recognize surroundings are key for ADAS

### 3) Sensors that recognize the surrounding environment

A sensor that recognizes the surrounding environment is at the heart of interest among automotive sensors as it constitutes the core element of ADAS and provides a starting point for future progress toward driverless vehicles. Sensors recognize the surroundings using radar, laser, ultrasound and camera, all of which identify an object and its distance by analyzing the signals reflected back. The biggest difference is what is bounced off an object: electromagnetic waves for radar, light for laser, sound waves for ultrasound. Information reflected from the object is used in diverse ADAS technologies. The main functions of sensors are provided below. Meanwhile, multiple sensors are integrated in the actual application to maximize complementary effects.

**Figure 12. Sensor types that recognize surroundings and recognition ranges**



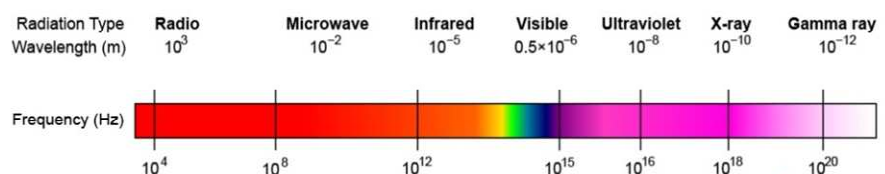
Source: Analog Devices, Korea Investment & Securities

**Radar sensors: Long-range detection and unaffected by time (pros) vs. high price and inability to determine shape (cons)**

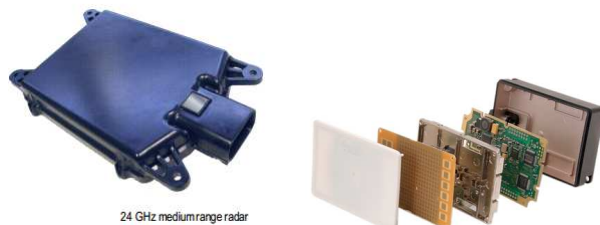
### Radio detection and ranging (radar) sensors

Radar sensors collect surrounding information such as distance, height, direction and speed by sending electromagnetic waves to an object and analyzing the signals reflected back. Radar sensors are used in nearly all ADAS such as next-generation cruise control, front/rear collision warning, blind spot detection, advanced emergency braking and so on. The biggest virtue of the radar sensor is that it is unaffected by weather conditions or time of day: Radar sensors can detect objects in the rain, fog or at night. In addition, radar sensors are capable of long-distance detection (200 metres max.) thanks to their millimetre wavelength. Radar sensors also feature cons: inability to determine shape and a high price (W1mn+ per module). With the price falling recently, a radar sensor is applied to a wider range of vehicles while it was installed mostly in luxury vehicles in the past. Automotive radar sensors in use today are evolving from band technology at 24GHz to 77GHz.

**Figure 13. Electromagnetic waves**

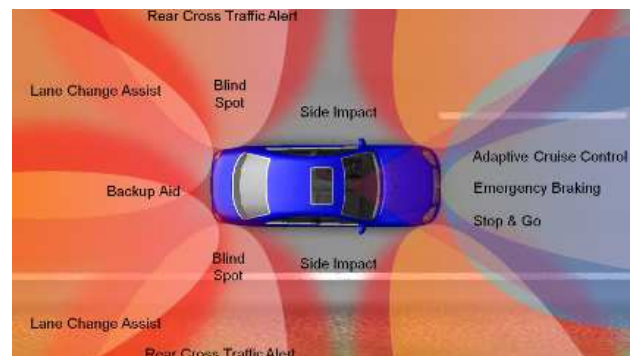


Source: HKDSE, Korea Investment & Securities

**Figure 14. Radar sensor system**

24 GHz medium range radar

Source: TRW, Autoliv, Korea Investment &amp; Securities

**Figure 15. Detection range of radar sensors**

Source: Autoliv, Korea Investment &amp; Securities

***Laser can be used during night and at cheaper prices than radar; Drawbacks are short recognition range and weather effects***

### **Laser (light amplification by stimulated emission of radiation)**

Laser emits photons, or light particles, in a very narrow range of frequencies. By using laser, information about the surrounding environment can be obtained by producing invisible ultraviolet or near-infrared radiation and analyzing the reflected light. Laser has a competitive edge in price (₩100,000-200,000) as it has been in commercial use for a long time. Moreover, the use of heat-sensitive near-infrared makes it even possible to recognize objects at night. However, laser has drawbacks such as shorter recognition distance (20-50m) than radar, susceptibility to weather conditions and difficulty determining object shapes. In vehicles, it is mainly used for light detection and ranging (LIDAR) technology.

***3D laser scanners to be used in driverless vehicles***

The laser technology that makes 3D images by capturing shapes via scanning has recently been in the spotlight. Such basic technology to make driverless cars is being led by Silicon Valley-based Velodyne and Israel's Mobileye. While Mobileye's LIDAR technology has already been applied to Google's driverless cars, 3D laser scanners will take some time to find applications in mass-market vehicles given their price tag of several tens of million KRW.

**Figure 16. LIDAR sensor**

Source: Continental, Google, Korea Investment &amp; Securities

**Figure 17. Google's self-driving car with LIDAR on roof**

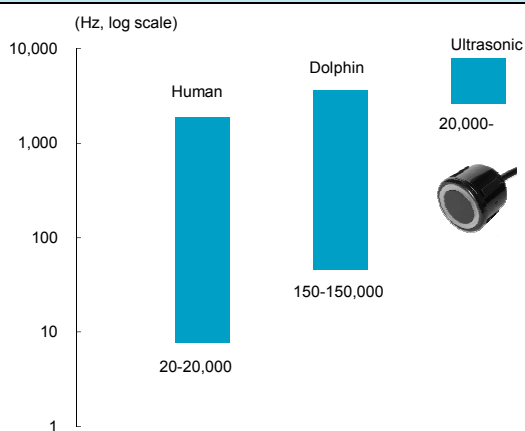
Source: Google, Korea Investment &amp; Securities

**Used to detect near objects while moving at slow speeds, thus suitable for parking assist; Cheap price is a pro**

### Ultrasonic wave

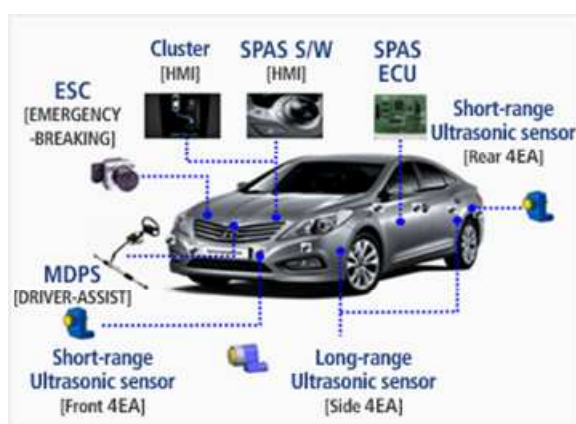
A sensor using ultrasonic waves is the simplest and cheapest. It emits high-frequency sonic waves above 20,000Hz that humans cannot hear and measures distance by calculating the time it takes for the reflected waves to return. It is mainly used when a vehicle is still or moving slowly. This is because sound waves are much slower than light, making it difficult to measure velocity between two objects. The measurable distance is also as short as 3-4m. Ultrasonic sensors have a price advantage as the related technologies have already matured. As such, for ultrasonic sensors, Korean parts makers produce internally or rely on outsourcing, for instance from Freescale. The sensors are most widely used in rear detection systems and also used in automated parking and anti-theft systems.

**Figure 18. Audible frequencies**



Source: Korea Investment & Securities

**Figure 19. Usage of ultrasonic wave sensors in SPAS**



Note: SPAS stands for smart parking assist system  
Source: Hyundai Autron, Korea Investment & Securities

**Popular for the ability to distinguish shapes**

### Camera

Although camera sensors have less accuracy than laser or radar and are affected by weather conditions and the time of day, they are popular as they can recognize object shapes. Thus, the sensors play a crucial role in lane-related functions, collision prevention and high beam assist (HBA), all of which require the ability to discern objects. They are in the stage of evolving from 300,000 pixels to 1mn. With 1mn-pixel sensors, objects as far as 100m ahead (50m for curved roads) can be detected (70m/30m for 300,000-pixel sensors). Players in the domestic vehicle-use camera market not only include auto parts suppliers such as Hyundai Mobis and Mando but Samsung Electro-Mechanics, LG Innotek and Sekonix supported by their camera technologies.

**Figure 20. Cameras mounted on vehicles**



Mono-vision camera

**Figure 21. Forward object detection using camera**



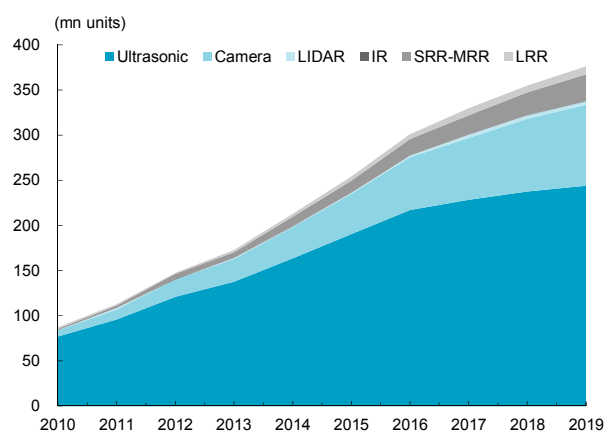
Source: Autoliv, TRW, Korea Investment & Securities

Source: Autoliv, Korea Investment & Securities

**Table 3. Surroundings sensors of global auto parts makers**

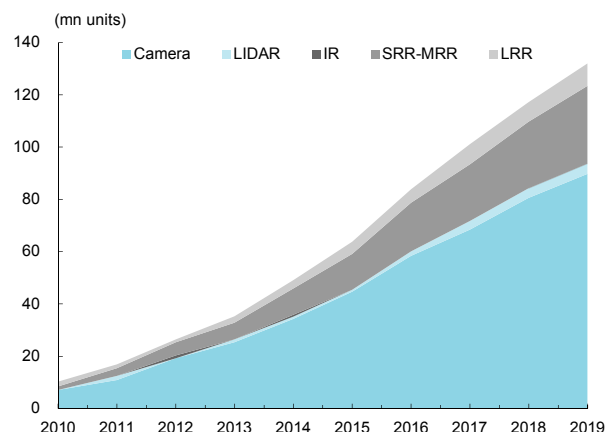
Supplier	Camera		Radar			Night vision		Potential market		
	Mono	Stereo	77 radar	24 NB radar	25 UWB radar	Far-infrared	Near-infrared	Rear view	Surround view	Stability control
Autoliv	•	•	•	•	•	•				2014
Continental	•	•	•	•	•			•	•	•
Bosch	•	•	•				•	•	•	•
Delphi	•		•				•	•	•	•
Magna	•							•	•	
Valeo	•			•				•	•	
Denso	•		•				•	•	•	•
Gentex	•									
Hella				•				•		
TRW	•		•	•						•
Takata	•	•								

Note: NB stands for narrow band and UWB for ultra-wide band  
Source: Autoliv, Korea Investment & Securities

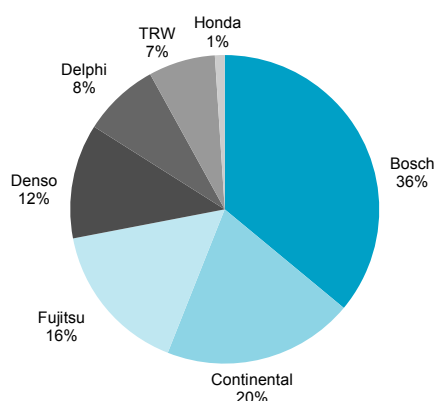
**Figure 22. Demand for surroundings sensors**

Note: IR stands for infrared radiation, SRR/MRR/LRR are all radar sensors (Short/Middle/Long range)

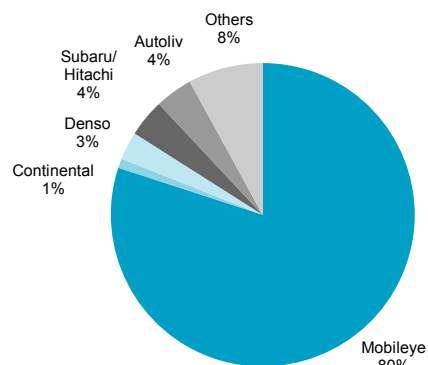
Source: Strategy Analytics, Korea Investment & Securities

**Figure 23. Sensor demand (excl. ultrasonic-based)**

Source: Strategy Analytics, Korea Investment & Securities

**Figure 24. Global radar sensor market share (2012)**

Note: Based on millimetre wavelength radar  
Source: Industry data, Korea Investment & Securities

**Figure 25. Global camera sensor market share (2012)**

Note: Based on forward-looking camera  
Source: Industry data, Korea Investment & Securities

**Image interpretation requires special algorithms; Mobileye commands 80% of global market and Mando is one of its key partners**

#### 4) Image interpretation technology

To interpret images and electric signals received via sensors, specific algorithms are necessary. In this area, Mobileye has the leading technology. It offers ADAS-related image-interpreting solutions to the world's 15 major automakers. Of note, its car front-view cameras command 80% of the global market. As the company does not engage in direct auto parts production, it sells products to finished car makers via nine parts suppliers worldwide. Its Asian partners are only two. One is Calsonic in Japan and the other is Mando in Korea.

**Table 4. Adoption of Mobileye's technology by carmaker and model**

	Release	2007	2008	2009	2010	2011	2012	2013	2014
GM	Function	LDW				LDW, FCW	LDW, FCW		LDW, FCW, SAS
	Model	Cadillac STS, DTS, Buick Lucerne				Terrain, Chevrolet Equinox, Chevy Volt, Cadillac XTS/DTS	Cadillac, Chevrolet and Buick		2014 Sierra
Mitsubishi	Function						LDW		
	Model						Outlander SUV		
Honda	Function						LDW, FCW		FCW, LDW, HBS, TSR
	Model						New Honda Accord		Civic Tourer and Civic Hatch
Yulon	Function			LDW				FCW, PDS, LDW	
	Model			Luxgen 7 vehicles				Luxgen Motor's luxury vehicles	
Mini Cooper	Function								ACC, TSR, AEB, HBA, TJA, SLI
	Model								Mini Cooper
Nissan	Function							AEB, TSR, no-entry detection and warning (one-way road), LDW	
	Model							Nissan vehicles	
Jaguar Range Rover	Function							LDW, LKA, HBS	
	Model							Jaguar Land Rover	
Scania	Function							AEB, LDW	
	Model							Trucks and buses	
Volvo	Function	FCW, AEB, LDW, DAC			FCW, AEB, DAC, LDW		LKA, RSI, AHB, ACC, FCW, AEB, DAC	LKA, RSI, AHB, ACC, FCW, AEB, DAC	
	Model	S80, V70, XC70, XC60			S60		V40	New 2014 Volvo vehicles	
Opel	Function					FCW, LDW, TSM, HBC	FCW, LDW		
	Model					Insignia, Zafira, Astra, Ampera	X, Y, Z and 1, 2, 3 models		
Hyundai	Function					LDW, LKA		AEB, LKA, HBA	
	Model					Sonata i40		Hyundai and Kia vehicles	
Ford	Function						LDW, LKA, AHBC		
	Model						Explorer, Fusion, Lincoln MKS, Lincoln MKT, Lincoln MKZ		
Chrysler Group	Function							LDW, IHC, FCW, AEB, ACC	
	Model							Jeep Grand Cherokee, Jeep Liberty	
BMW	Function	LDW	LDW, SLI, IHC			FCW, LDW, SLI, IHC		1) ACC, TJA, AEB, LDW, SLI 2) FCW, LDW, SLI, HBA	
	Model	5 series, 6 series	7 series			1 and 3 series		1) BMW i3 2) 1, 3, 5, 6, 7, x5, x6 series	
PSA	Function						AHB, LDW		
	Model						New Citroen DS5		

Note: In alphabetical order, ACC stands for adaptive cruise control, AEB for automatic emergency braking, AHB for active high beam, AHBC for automatic high-beam control, DAC for driver alert control, FCW for forward collision warning, HBA for high-beam assist, HBC for high-beam control, HBS for high-beam support, IHC for intelligent headlight control, LDW for lane departure warning, LKA for lane keeping assist, PDS for pedestrian detection system, RSI for road sign information, SLI for speed limit information, TJA for traffic jam assist, TSM for traffic sign memory and TSR for traffic sign recognition

Source: Mobileye, Korea Investment & Securities



**Table 5. Mobileye's partnering parts makers**

Company	Country	Global parts maker ranking (2013)
Magna Electronics	Canada	3
Continental / Siemens VDO	Germany	4
TRW Automotive	US	11
Delphi	US	13
Autoliv	Sweden	19
Calsonic	Japan	21
Mando	Korea	43
Leopold Kostal	Germany	72
Gentex	US	NA

Source: Mobileye, Korea Investment &amp; Securities

**Sensors recognizing driving status are also crucial for ADAS**

### 5) Acceleration/angular velocity/steering angle sensors

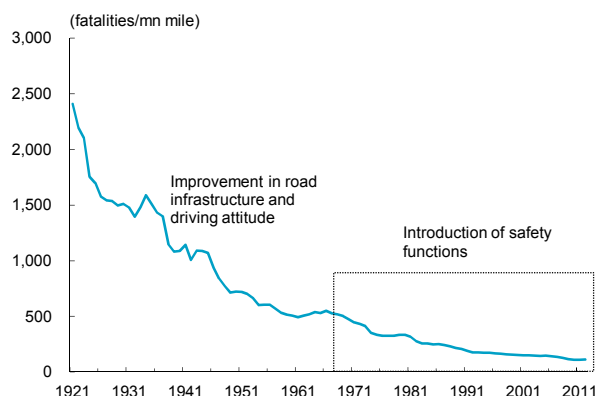
In ADAS, sensors to identify the mobility of vehicles are as critical as those to recognize surroundings. A good understanding of driving status is essential to taking necessary actions for braking, steering and suspension adjustment. The car mobility detection sensors include accelerometers, angular velocity sensors and steering angle sensors. Accelerometers instantly sense kinetic forces such as acceleration, vibration and shock on objects. Angular velocity sensors for the vacillation or direction of objects are installed in cars to detect where they are going (Korea Electronics Association). The difference between accelerometers and angular velocity sensors is the former detects movement between specific spots whereas the latter feels rotary motions by tracking changes in x, y, and z axes (e.g., a golf swing). Lastly, steering angle sensors calculate the angle of steering wheel while driving and transmit the information to installed ECUs. These three sensors play a key role in the operation of vehicle stability management (VSM), which combines vehicle dynamic control (VDC), electronic stability control (ESC) and electronic stability program (ESP), LKA, LDW and airbags.

**Key of future auto safety lies in active safety through ADAS**

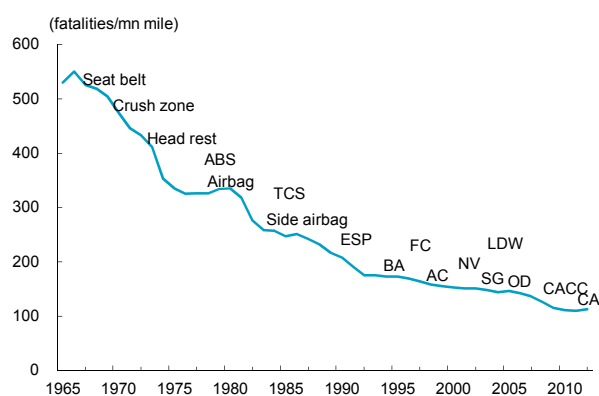
### 3. Evolution of auto safety backed by ADAS

Since the debut of automobiles long ago, the improvement in road infrastructure and driving attitude led to the sharp decline of traffic fatalities. The death toll saw big drops again when seatbelts were invented in 1965 and airbags and anti-lock braking systems (ABS) became available in the 1980s. But worldwide, 1.2mn still lose their lives and 10mn get injured every year due to car accidents. Going forward, we expect active safety enabled by ADAS will contribute to fewer fatalities. While mitigating shock in accidents was a main purpose of safety devices in the past (seemingly passive), the technological focus is moving toward preventing accidents with an active safety concept.

**Figure 26. Traffic accident fatalities per distance driven**   **Figure 27. Fall in fatalities with more safety measures**



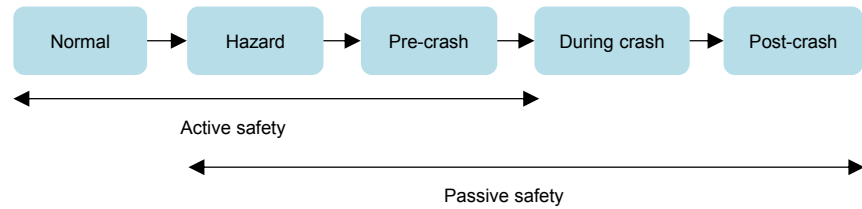
Source: NHTCA, Korea Investment &amp; Securities



Note: BA stands for brake assist. See glossary on page 25 for other acronyms  
Source: NHTCA, Delft University of Technology, Korea Investment & Securities

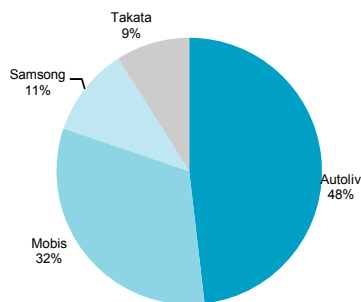


**Figure 28. Active/passive safety concept in a traffic accident**



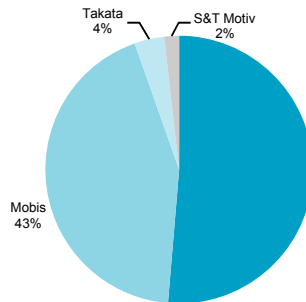
Source: Continental, Korea Investment & Securities

**Figure 29. Korea's safety parts market share by supplier (2012)**



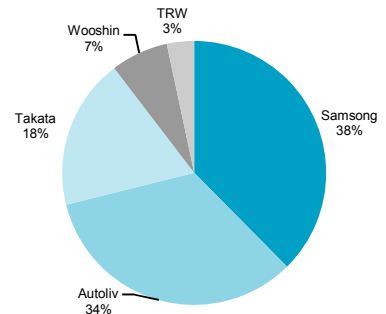
Source: Autoliv, Korea Investment & Securities

**Figure 30. Korea's airbag market share by supplier (2012)**



Source: Autoliv, Korea Investment & Securities

**Figure 31. Korea's seat belt market share by supplier (2012)**



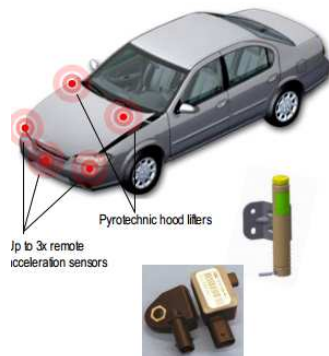
Source: Autoliv, Korea Investment & Securities

### 1) Passive safety

***In passive safety, focus of protection will tilt toward pedestrians from passengers***

In the concept of passive safety, main devices are seat belts and airbags, both of which are aimed at protecting passengers in cars. But recently, more attention is being paid to technologies to protect pedestrians who make up more than a third of traffic accident fatalities. The focus of regulations should also tilt toward pedestrian protection. Until now, the technological focus has been put on passenger safety due to the unpredictability of pedestrian position in traffic accidents. But with the recent development of front-view cameras and the easier recognition of pedestrians, passive safety will be reinforced toward pedestrians. For instance, the active hood made by PHA lifts the hood when a pedestrian is hit. This helps mitigate shock to the pedestrian and prevent windshield collision.

**Figure 32. Pedestrian protection 1: Active hood**



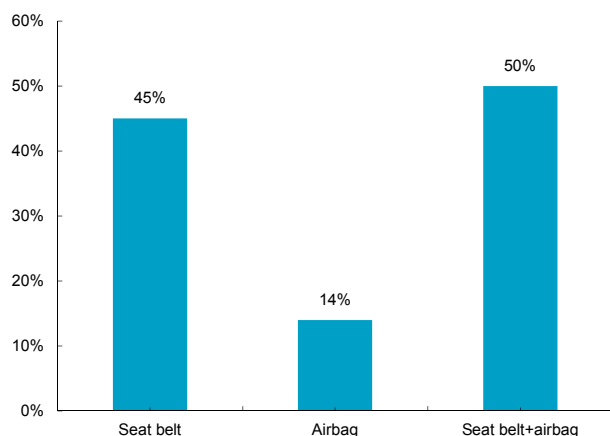
Source: TRW, Korea Investment & Securities

**Figure 33. Pedestrian protection 2: Pedestrian airbag**



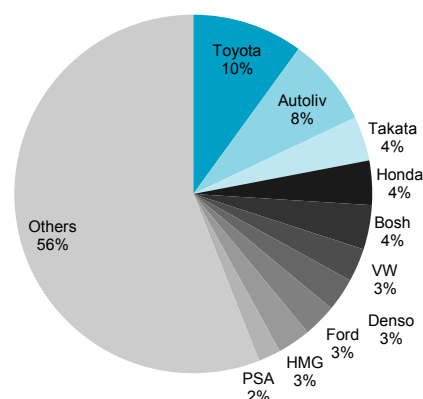
Source: Autoliv, Korea Investment & Securities

Figure 34. Safety features reduce fatality rate



Source: Autoliv, Korea Investment &amp; Securities

Figure 35. Safety parts patent ownership (2013)



Source: Autoliv, Korea Investment &amp; Securities

**Seat belts and airbags,  
key to passive safety,  
are evolving**

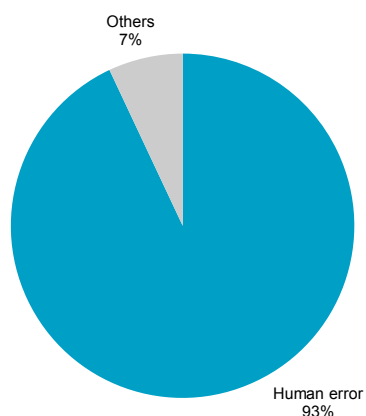
Seat belts and airbags, two pillars of the conventional passive safety concept, are evolving. For the former, driver drowsiness detection (DDD) technology is in wider use. In this technology, an interior camera monitors the driver's pupil and vibrates the seat belt when it senses drowsiness. The active safety belt (ASB) technology that tightens the belt in anticipation of a collision is already in commercial use (2014 Genesis, 2014 K9, LF Sonata, 2013 Equus, etc.). In the case of airbags, a mechanism that controls the vehicle's velocity through sensors tracking the driver's weight, body shape, posture and surrounding conditions has been commercialized. In such passive safety technologies, acceleration/angular velocity/steering angle sensors that assess the vehicle's mobility are crucial.

## 2) Active safety

**Active safety  
technology will take  
center stage in future  
safety regulations**

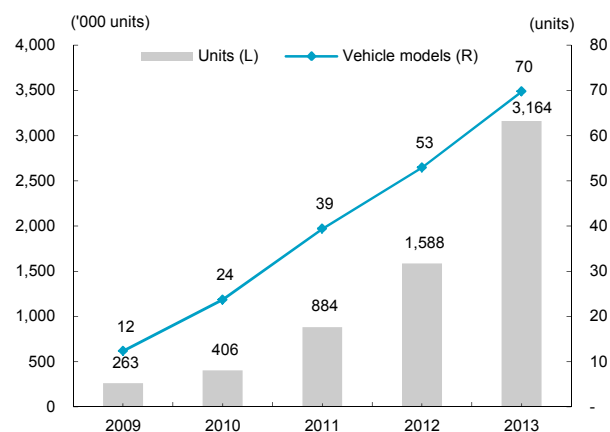
Active safety technology goes beyond minimizing damage toward preventing accidents. Active safety will be the crux of safety regulations in future as it has been reported that 93% of traffic accidents are caused by human error. Costliness has been an obstacle to the technological expansion of surroundings sensors and ECU chips. But lower costs and wider use of the technologies are accelerating their application. The main functions of ADAS, including active safety, are as follows.

Figure 36. Cause of fatal traffic accidents



Source: Autoliv, Korea Investment &amp; Securities

Figure 37. Active safety growth based on Autoliv



Source: Autoliv, Korea Investment &amp; Securities

**Table 6. Major ADAS functions**

Purpose	Function	Acronym	Description	Sensor
Safety	Blind spot detection	BSD	Detects approaching vehicles that cannot be viewed with side mirrors	Radar
Safety	Lane departure warning	LDW	Warns the driver if the vehicle begins to move out of its lane without making a turn signal	Camera
Safety	Lane change assist	LCA	Alerts the driver if there are vehicles approaching from behind when changing lanes and whether it is safe to do so	Radar
Safety	Lane keeping assist	LKA	Automatically controls steering if the vehicle begins to move out of its lane without making a turn signal	Camera
Safety	Around-view monitoring	ALM	Provides a 360° scene of the vehicle's surroundings through a virtual bird's-eye view from above the vehicle	Laser/camera
Safety	Forward collision warning	FCW	Alerts the driver if it is determined that the vehicle is about to collide with the car in front	Radar
Safety	Rear pre-crash	RPC	Alerts the driver if it is determined that the vehicle is about to get hit from behind	Radar/ultrasonic
Safety	Pedestrian collision warning	PCW	Warns the driver about potential collision with pedestrians	Radar/camera
Safety	Electronic stability control	ESC	Prevents the vehicle from rolling over or spinning out of control in unstable driving situations caused by sudden braking, sharp turns, slippery roads, etc., and helps the driver regain steering and braking control	Acceleration/ angular speed
Safety	Advanced emergency braking	AEB	Monitors the relative speed and distance between the host and target vehicles to activate brakes during an emergency situation	Radar/camera
Safety	Night vision	NV	Helps detect pedestrians in the dark by converting infrared radiation to thermal imaging	Laser
Safety	Driver drowsiness detection	DDD	Warns the driver if drowsiness is detected by monitoring the blinking of the eyelid, pupil size, etc. with an interior camera	Camera
Safety	Adaptive light control	ALC	Prevents glaring by controlling high beams according to the prevailing traffic situation (i.e. glares emitted by oncoming vehicles)	Laser/camera
Convenience	Smart cruise control	SCC	Helps maintain distance with the vehicle in front (advanced form of conventional cruise control)	Radar
Convenience	Traffic jam assistance	TJA	Assists the driver in stop-and-go traffic by automatically following the vehicle in front (advanced SCC)	Radar
Convenience	Smart parking assist	SPA	Detects empty parking spaces and helps with steering wheel operation while parking	Ultrasonic

Source: Korea Investment &amp; Securities

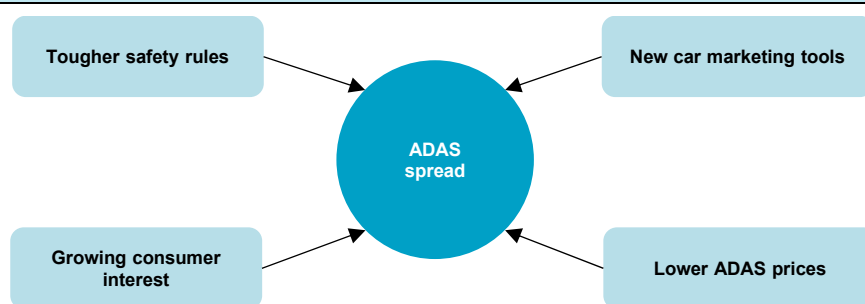
### III. ADAS spreading to mass and emerging markets

#### 1. How ADAS has spread

**ADAS could spread on regulation, marketing, consumer interest and lower prices**

There are four main factors that drove the fast spread of ADAS. 1) Tighter safety regulations worldwide. 2) Timely marketing for new vehicles. 3) Consumers' growing interest in cutting-edge technology. 4) Lower component system prices. In particular, automotive regulations could be largely divided in two categories: environmental and safety. And we believe safety-related regulations would have more direct and faster impacts on auto parts makers in terms of sales and profitability. While eco-friendly cars are the game changer that could shake the industry, they are pursued on a long horizon. Meanwhile, safety-related parts are being fast adopted on a wider range of models and in more regions.

**Figure 16. Factors promoting ADAS' spread**

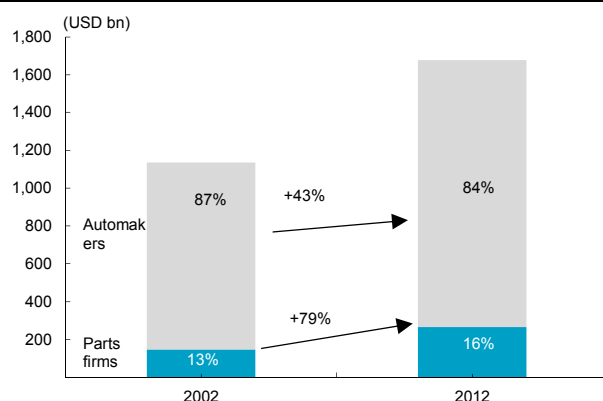


Source: Korea Investment & Securities

**ADAS spread to benefit parts makers more than finished carmakers**

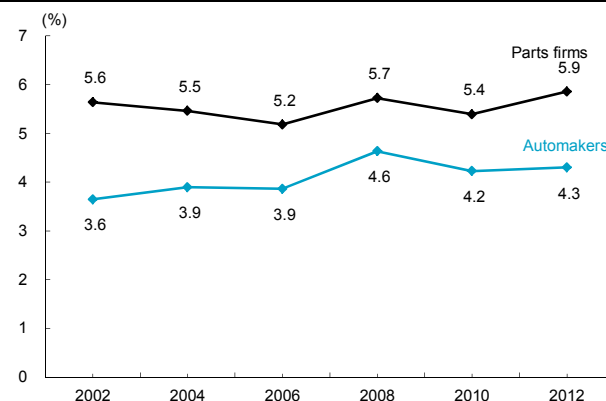
Auto parts makers should benefit more than automakers from the spread of safety-related ADAS. As we mentioned in our previous report, auto parts makers are leading automotive R&D in Korea (see our April 2 sector report *Specialized players gaining clout*). Automakers should focus on minimizing defects in the assembly process and quality control as tougher recall standards have recently been introduced. Also, they will spend more on advertising to enhance their brand image. As such, automotive technology advances will likely be led by parts makers that can concentrate on R&D with little direct contact with consumers. As their bargaining power strengthens, parts makers should enjoy more profits in the long-term.

**Figure 17. Sales growth: Automakers, parts firms**

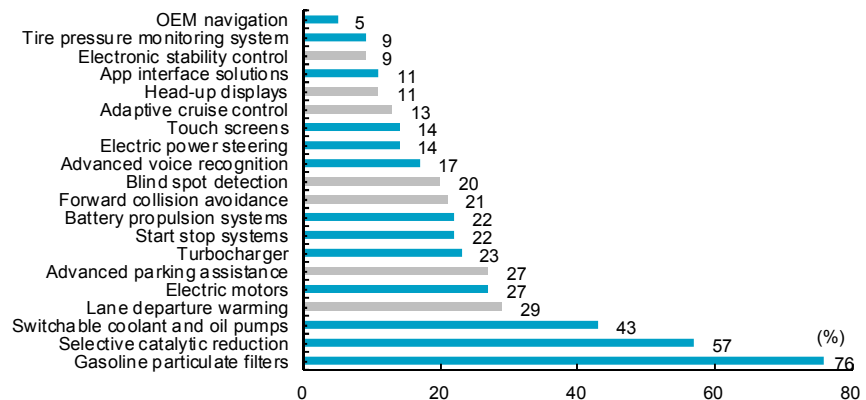


Note: Based on 2012 top 10  
Source: Bloomberg, company data, Korea Investment & Securities

**Figure 40. R&D spending % of sales**



Note: Based on 2012 top 10  
Source: Bloomberg, company data, Korea Investment & Securities

**Figure 41. Long-term growth of automotive technology (2013-2020 CAGR)**

Note: Gray bars are ADAS-related  
Source: Continental, Korea Investment & Securities

## 2. From luxury to mass-market vehicles

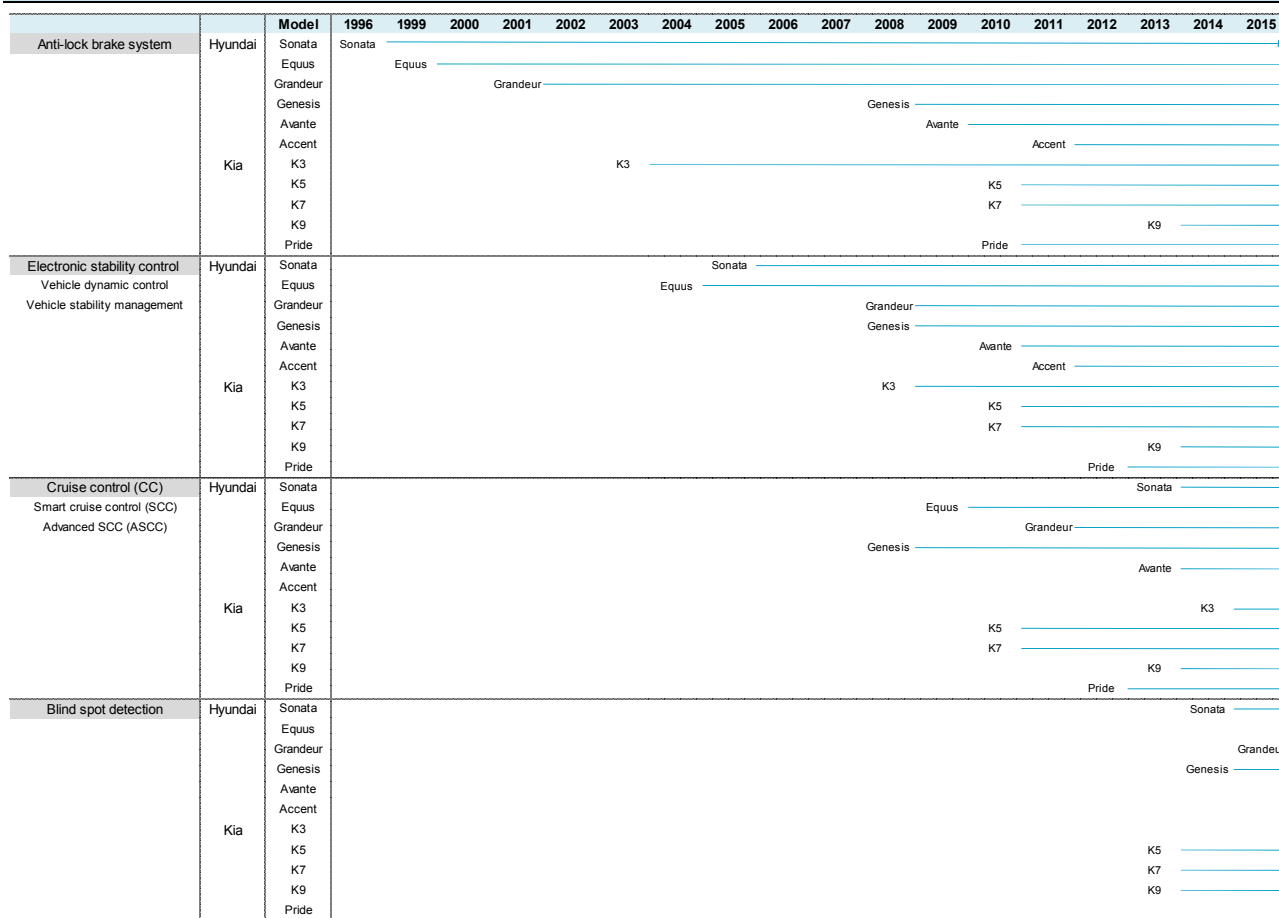
### ADAS features spreading from luxury to mass-market vehicles

Nowadays, ADAS is not only installed on luxury imported cars but the domestic carmakers' high-end vehicles and even lower-level models too. In Korea, ADAS features are spreading from mid/full-size cars (18% of Hyundai vehicles) and SUVs (19%) to compact/sub-compact (55%). Of 18 major ADAS features, 50% should be widely installed on Korean compact cars in 2016, up from the current 28% (at present, 50% for the K5 and 72% for the LF Sonata). More specifically, the new Genesis released at end-2013 is top-ranked among Hyundai and Kia models in the level of ADAS features. The LF Sonata rolled out in 2014 also has better ADAS than the 2009 Equus. By ADAS function, ABS was first adopted for the Sonata in 1996 and has become a basic part for all models. Electronic stability control (ESC) has also become a common component for the Accent and the Pride since it was first installed on the Equus in 2004.

**Table 7. Electronic parts installed on Hyundai/Kia vehicles**

		K3	K5	K7	K9	Avante	Sonata	Equus	Grandeur	Genesis
Drive	Vehicle dynamic control	x	x	x	x	x	x	x	x	x
Drive	Vehicle stability management (next-generation VDC); ESC, ESP	x	x	x	x	x	x	x	x	x
Drive	Electronic controlled suspension			x	x		x	x	x	x
Drive	Forward/backward sensors	x	x	x	x	x	x	x	x	x
Drive	Advanced smart cruise control (ASCC)			x	x		x	x	x	x
Drive	LDW			x	x		x	x	x	x
Drive	Lane keeping assist		x	x	x		x	x	x	x
Drive	Blind spot detection		x	x	x		x	x	x	x
Drive	Night vision									
Drive	Forward collision warning (FCW)		x	x	x		x	x	x	x
Brake	Advanced emergency braking (AEB)									x
Brake	Emergency stop signal	x	x	x	x	x	x	x	x	x
Safety	Attention assist system; DDD									
Safety	Pre-safety belt				x		x	x	x	x
Safety	Emergency fastening device									x
Safety	Active hood									x
Parking	Smart parking assist	x	x	x	x	x	x	x	x	x
Parking	Electric parking brake		x	x	x		x	x	x	x
Adoption rate		28%	50%	67%	72%	28%	72%	72%	72%	89%

Note: Based on full specification, FCW to be installed on the 2015 Grandeur  
Source: News reports, brochures, Korea Investment & Securities

**Figure 42. How electronic parts spread around Hyundai-Kia cars: From luxury to mass-market models**

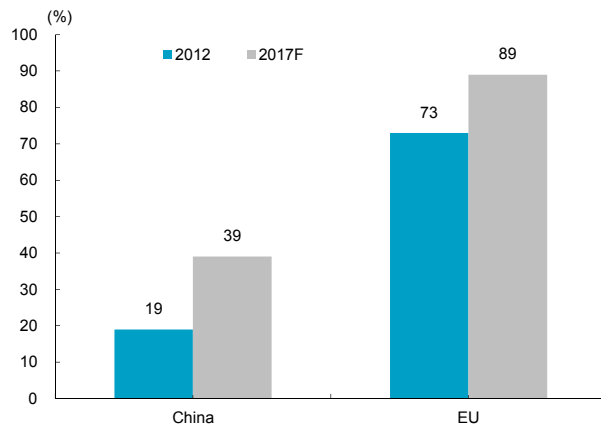
Note: Cruise control maintains speed of choice, SCC distance to the car in front (controls the accelerator), ASCC the distance and car departure/stop (accelerator and brake)  
Source: Media reports, brochures, Korea Investment & Securities

### 3. From developed to emerging countries

#### **ADAS spreading from developed to emerging countries**

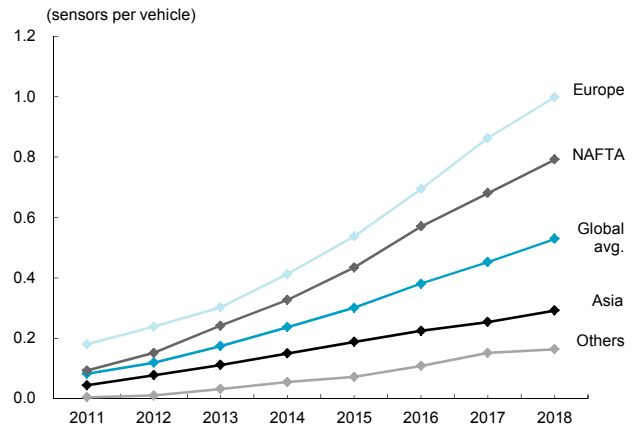
ADAS components are not only spreading among vehicle models but regions too – from developed to emerging countries. Advanced countries have led the development and application of ADAS. For example, Europe and the US are introducing safety-related ADAS functions in the new car assessment program (NCAP). As Korea, Brazil, Russia, etc. increasingly pursue mandatory installation of said ADAS components, the spread to emerging countries should accelerate. China, which has emerged as the world's largest auto market, is also rushing to place an ADAS category in its new car assessment. At present, the system awards an added point for ESC-equipped vehicles, and Beijing plans to make it mandatory by 2019. With the support, ESC should be installed on 39% of China's automotive lineup in 2017, up from 19% as of 2012.

Figure 43. ESC installation rises in China and Europe



Source: Continental, Korea Investment &amp; Securities

Figure 44. Average ADAS sensors per vehicle



Note: Excludes parking-related sensors  
 Source: Continental, Korea Investment & Securities

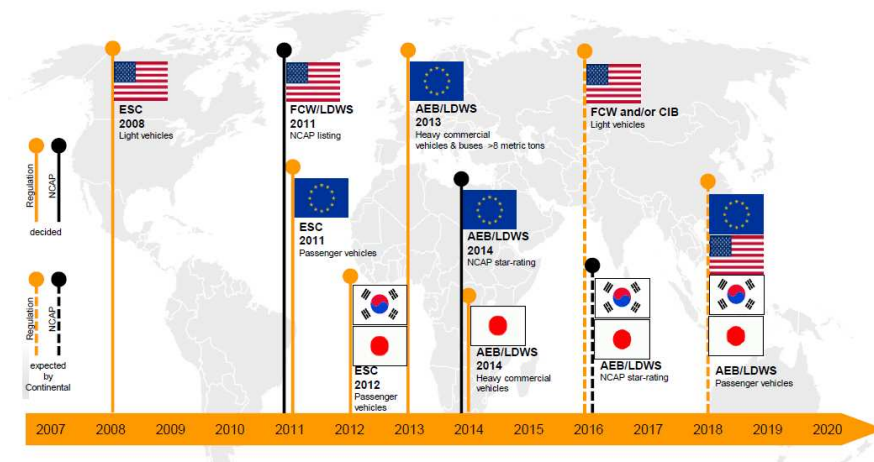
Table 8. ADAS-related safety rules by country

Country	Function	Description
Europe	ESC	- All new vehicle types from November 2011 - All new vehicles from November 2014
	Tire pressure monitoring system (TPMS)	- All new passenger vehicle types from November 2012 - All new passenger vehicles from November 2014
	AEB/LDW	- All new commercial vehicle types (incl. buses) from November 2013 - All new commercial vehicles (incl. buses) from November 2015
	Brake assist system	- All new passenger vehicle types from November 2009 - All new passenger vehicles from November 2011
	ABS for two-wheelers	- All new vehicle types from January 2016 - All new vehicles from January 2017
US	ESC	- All new light vehicles from 2011
	TPMS	- All new light vehicles from September 2007
Japan	ESC	- All new passenger vehicle types from October 2012 - All new passenger cars from October 2014
	AEB/LDW	- All new commercial vehicles (incl. buses; EU standard)
Korea	ESC	- All new light vehicles from January 2012
	TPMS	- All new passenger vehicles from January 2013
Brazil	ABS	- All new passenger vehicles from January 2014 (phased in since 2010)
Russia	ESC	- All new light vehicle types from January 2014 - All new light vehicles from January 2016
	TPMS	- All new light vehicle types from January 2016

Note: Light vehicles are 4.536 tonnes or less in the US, 4.5 tonnes or less in Korea and 5 tonnes or less for passenger cars/buses and 3.5 tonnes or less for light trucks in Russia

Source: EC, NHTSA, MoLIT, Continental, Korea Investment & Securities



**Figure 45. Safety regulation timeline by country**

Note: Crash imminent system (CIS) senses when a collision is likely and applies the brakes, similar to AEB  
 Source: EC, NHTSA, MoLIT, Continental, Korea Investment & Securities

**Table 9. Likely timeline to introduce ADAS-related items to NCAP**

Country (Program)	Item	2013	2014	2015	2016	2017	2018
Europe (EuroNCAP)	AEB City		Start rating AEB City				
	AEB Inter-urban		Start rating AEB Inter-urban				
	AEB Pedestrian				Start rating AEB Pedestrian		Night performance
	LDW/LKA		Start rating LDW/LKA			Upgrade with regards to LKA	
	Speed Assist	Start rating SAS					
Japan (JNCAP)	Crash avoidance technologies		LDW AEB for vehicles	Blind Spot (BS), Rear Crossing Traffic Alert (RCTA)	LKA; AEB for pedestrian	Night-time pedestrian warning	
Korea (KNCAP)	Crash avoidance technologies	FCW, LDW			AEB Inter-urban	AEB Pedestrian, AEB City, LKA, BSD, RCTA, ACC	
US (NHTSA/IIHS)	Crash avoidance technologies		FCW, LDW	AEB Inter-urban			

Note: SAS stands for speed assistance systems; Shaded boxes indicate items that have been confirmed or are very likely to be introduced; The rest are estimates by Autoliv  
 Source: Autoliv, Korea Investment & Securities

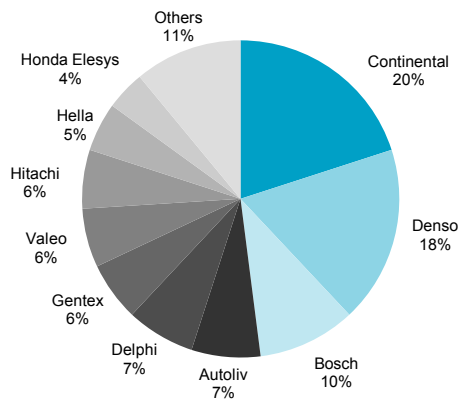
## IV. Impacts on Korean parts makers

### 1. Value of a captive market

**Korean firms to narrow technological gap with global peers backed by captive demand from Hyundai-Kia**

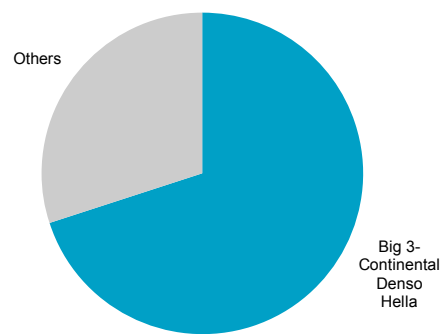
ADAS technology is still led by global firms. The global market is dominated by Continental and Denso, while the Continental/Denso/Hella troika is prominent in the Asia-Pacific region. That is because said companies have obtained related patents ahead of others thanks to their deep pockets for R&D spending. In such circumstances, a captive market is imperative for early followers to narrow the technological gap with leaders. Korean parts makers will likely catch up with the global firms since they have a reliable automaker, Hyundai-Kia, at their backs.

**Figure 46. ADAS market share: Global (2010)**



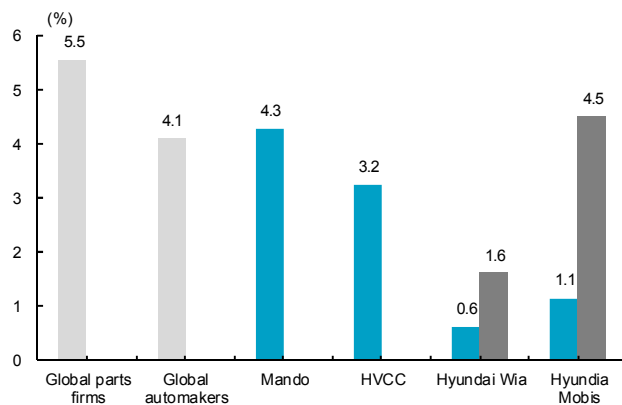
Source: Continental, Korea Investment & Securities

**Figure 47. ADAS market share: Asia-Pacific (2013)**



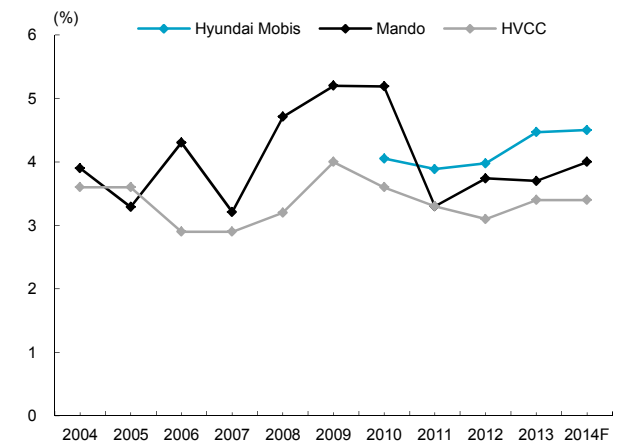
Source: Continental, Korea Investment & Securities

**Figure 48. R&D-to-sales: Parts makers vs. global automakers**



Note: 2002-2012 average; Red bars for Hyundai Wia and Mobis indicate their R&D spending compared with key component sales  
Source: Korea Investment & Securities

**Figure 49. R&D-to-sales: Korea's large parts makers**



Note: Based on key component sales for Mobis  
Source: Company data, Korea Investment & Securities

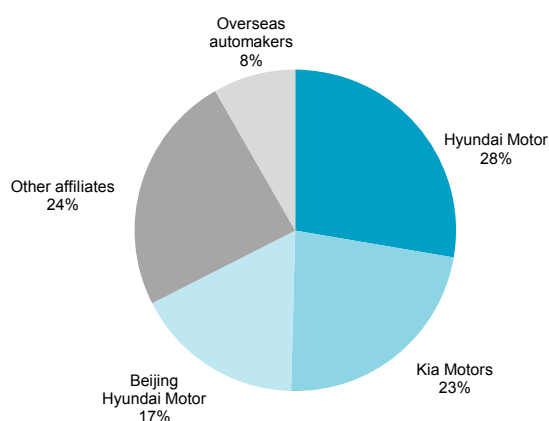
**Table 10. US patents by parts maker**

(patents)

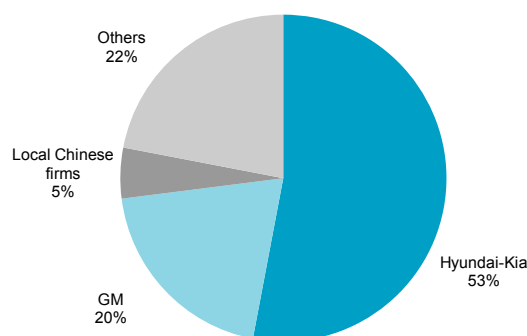
	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Denso	435	482	552	646	609	732	753	655	710	797	631	704	644
Bosch	700	679	753	903	756	646	568	413	465	586	615	743	884
Delphi	327	640	635	546	405	389	356	311	308	232	139	111	121
Mobis						43							
Mando												44	49
HVCC	202	185	243	273	193	137	80	41	49	41			
Toyota	330	296	273	268	271	384	351	387	453	721	898	1,173	1,171
Honda	562	653	647	736	698	778	677	703	725	987	963	1,074	1,070
GM	176	190	291	376	392	490	538	510	621	940	1,092	1,438	1,700
Ford	360	389	350	313	254	323	315	289	280	404	416	621	704
HMC	99	145	105	110	119	133	109	104	125	190	240	285	399

Note: Excludes 40 or fewer patents

Source: USPTO, Korea Investment &amp; Securities

**Figure 50. Mobis sales by customer (2013)**

Source: Korea Investment &amp; Securities

**Figure 51. Mando sales by customer (2013)**

Source: Korea Investment &amp; Securities

### ***In-house ADAS development in progress at Korean parts firms***

Korean parts firms have attained a considerable portion of ADAS technology. Mobis developed the nation's first HBA system in 2012 that is currently installed on an array of models including the K9. The company has also developed an integrated front-view camera (lanes, lamps and vehicles) mounted with one-megapixel image sensors and is now preparing mass production. Mando produces a camera module in close collaboration with Mobileye, a global firm specialized in image interpretation. Mando is developing its own image interpretation algorithm (MOSS, Mando Optical Safety System) that would reduce dependency on Mobileye once it reaches the commercialization stage in 2016.

**Table 11. Home-grown (Mobis/Mando) ADAS technology**

Type	Function	Acronym	Motion detection tool	Control areas
Safety	Around-view monitoring	ALM	Camera	Sends a warning signal
Safety	Blind spot detection	BSD	24GHz radar	Lamp switch, seat belt, neck rest
Safety	Lane change assist	LCA	24GHz radar	Lamp switch, seat belt, neck rest
Safety	Rear pre-crash	RPC	24GHz radar	Lamp switch, seat belt, neck rest
Safety	Lane departure warning	LDW	Camera	Sends a warning sign
Safety	Lane keeping assist	LKA	Camera	Steering wheel
Safety	Smart cruise control	SCC	24GHz radar	Automatic speed control (up and down)
Safety	Traffic jam assistance	TJA	24GHz radar	Automatic speed control (up and down)
Safety	Smart parking assist	SPA	Ultrasound	Steering wheel

Source: Company data, Korea Investment &amp; Securities

## 2. Beneficiaries of ADAS' spread

### ***Reinstate Mobis as our top pick***

At Mobis, the sales weighting of main components that triggered a de-rating before, should again expand spurred by the spread of ADAS. Shares have tumbled to below 7x PE due to concerns about participation in an additional rights offer for Hyundai Life that made a loss equal to 3.4% of Mobis' OP in 2013 and because of the lighter weighting of core parts sales (40% of modules in 2010, 35% in 2013). However, thanks to the growing popularity of ADAS, the core parts sales weighting should swell to 38% in 2015 and 40% in 2016, and Hyundai Life will likely to turn profitable, possibly in 4Q14. As such, the current undervalued status offers a bargain-hunting opportunity. We reinstate coverage of Mobis with BUY and a TP of W360,000 (8.5x 12MF EPS). We favor the company the most among parts makers.

### ***As vehicle safety technology evolves, Mando's ADAS-related loss turns to profit***

At Mando, the ADAS sales weighting should expand from 1.5% in 2014 to 5% in 2016 and its EPS contribution would jump from -0.8% to +9.3% over the same period. Although small in size, ADAS sales are fast growing from a 1% weighting in 2013 to 2% in 2015. Since Mando is a driving technology-focused business, the firm is positioned at a vantage point for ADAS development. The company will likely bolster the less-advanced sensor/ECU division with a technology partnership or establishing a joint venture.

### ***Wider adoption likely for PHA's active hoods to protect pedestrians***

PHA's new electronic components (active hoods, cinching doors, power trunks) are featured on more vehicles as Hyundai-Kia release new high-end sedans and SUVs. Although the new products are currently making a loss, they should drive up the OPM by 0.3%p p.a. once they break even in 2015. In particular, active hoods would be installed on far more vehicles when rules for pedestrian safety are toughened. Although the item stands in the red with a mere 2% sales weighting, the figure should reach 7% in 2015 as it is mounted on a wider range of models and turns profitable (EPS +6%).

## ■Glossary

- BSD (blind spot detection): Detects approaching vehicles that are in blind spots and cannot be viewed with side mirrors
- LDW (lane departure warning): Warns the driver when the vehicle begins to move out of its lane without making a turn signal
- LCA (lane change assist): Alerts the driver if there are vehicles approaching from behind when changing lanes and whether it is safe to do so
- LKA (lane keeping assist): Automatically controls steering if the vehicle begins to move out of its lane without making a turn signal
- ALM (around-view monitoring): Provides a 360° scene of the vehicle's surroundings through a virtual bird's-eye view from above the vehicle
- FCW (forward collision warning): Alerts the driver if it is determined that the vehicle is about to collide with the car in front
- RPC (rear pre-crash): Alerts the driver if it is determined that the vehicle is about to get hit from behind; Also called BWS (back warning system)
- PCW (pedestrian collision warning): Warns the driver about potential collision with pedestrians
- OD: Obstacle detection
- CA: Collision avoidance
- ESC (electronic stability control): Prevents the vehicle from rolling over or spinning out of control in unstable driving situations caused by sudden braking, sharp turns, slippery roads, etc., and helps the driver regain steering and braking control; Also called ESP (electronic stability program)
- VSM (vehicle stability management): If the vehicle loses stability, VDC (vehicle dynamics control) and MDPS (motor-driven power steering) systems are activated to provide integrated control of braking and steering functions; Includes VCD and steering control
- VDC (vehicle dynamics control): A device for VSM that along with ECU (electronic control unit) provide active control of engines and wheels (braking) in difficult driving conditions caused by sudden braking, sharp turns, etc.; Includes ABS (anti-lock braking system) + EBD (electronic brakeforce distribution) + TCS (traction controls system)
- EBD (electronic brakeforce distribution): Maximizes brake performance by distributing the amount of force applied to front and rear brakes based on the load (i.e., number of passengers, cargo, etc.)
- TCS (traction control system): Prevents loss of traction by limiting the driving force to slipping wheels
- ABS (anti-lock braking system): Helps maintain the ability to steer and reduce stopping distances under any road conditions by evenly distributing the braking force during sudden braking
- ESS (emergency stop signal): Automatically activates warnings lights to alert vehicles coming from behind if an emergency stop situation is detected
- AEB (advanced emergency braking): Monitors the relative speed and distance between the host and target vehicles to activate brakes in an emergency situation
- NV (night vision): Helps detect pedestrians in the dark by converting infrared radiation to thermal imaging
- DDD (driver drowsiness detection): Warns the driver if drowsiness is detected by monitoring the blinking of the eyelid, pupil size, etc., with an interior camera
- ALC (adaptive light control): Prevents glaring by controlling high beams according to the prevailing traffic situation (glares emitted by oncoming vehicles)
- SCC (smart cruise control): Helps maintain distance with the vehicle in front (advanced form of conventional cruise control). Cruise control maintains speed of choice
- TJA (traffic jam assistance): Assists the driver in stop-and-go traffic by automatically following the vehicle in front (advanced SCC)

- CACC (cooperative adaptive cruise control): Adaptive cruise control with a two-way communication system with nearby vehicles
- SPA (smart parking assist): Detects empty parking spaces and helps with steering wheel operation while parking
- ASB (active safety belt): Incorporates motors that automatically tighten the belt if an imminent collision is detected or a sharp turn is made, thereby minimizing harm to the passengers
- UIO (units in operation): The number of vehicles on the road; The figure increases when cars are delivered to customers and decreases when scrapped; Serves as the base for parts sales
- HBA (high-beam assist): Adjusts high beams to prevent glaring by using frontal sensors to detect the road ahead and the movement of oncoming traffic
- Active hood: Soften the impact between the pedestrian and the vehicle by rapidly moving the vehicle hood into an elevated position in the event of a pedestrian accident
- Power trunk: Automatically opens and closes the trunk via sensors without the need to press buttons
- Cinching door: Automatically closes the door if it is not fully closed
- TPMS (tire pressure monitoring system): Monitors the pressure in tires
- NCAP: New Car Assessment Program

## Top picks

Hyundai Mobis (012330) ..... 28

Mando (060980) ..... 36

PyeongHwa Automotive (043370) ..... 40



## Hyundai Mobis (012330)

**BUY (Reinstate), TP: W360,000**

Stock price (Jul 30, KRW)	301,500
Market cap (USD mn)	28,083
Shares outstanding (mn)	97
52W High/Low (KRW)	321,000/259,000
6M avg. daily turnover (USD mn)	48.6
Free float (%)	68.0
Foreign ownership (%)	48.2

Yr to	Sales	OP	NP	EPS	% chg	EBITDA	PE	EV/EBITDA	PB	ROE	DY
Dec	(W bn)	(W bn)	(W bn)	(KRW)	(YoY)	(W bn)	(x)	(x)	(x)	(%)	(%)
2012A	30,789	2,906	3,559	37,239	17.6	3,365	7.7	7.2	1.6	23.2	0.7
2013A	34,199	2,924	3,422	35,804	(3.9)	3,486	8.2	6.9	1.4	18.5	0.7
2014F	36,626	3,127	3,791	39,673	10.8	3,707	7.4	6.2	1.2	17.3	0.7
2015F	39,848	3,407	4,145	43,374	9.3	4,060	6.8	5.2	1.0	16.1	0.7
2016F	42,910	3,670	4,489	46,973	8.3	4,448	6.3	4.3	0.9	15.0	0.7

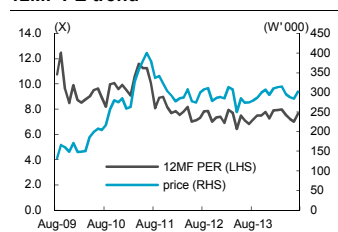
Note: NP and EPS attributed to controlling interest

### Profits advance while shares stand still

#### Performance

	1M	6M	12M
Absolute (%)	6.2	(2.7)	8.6
Rel. to Kospi (%p)	2.1	(10.0)	0.0

#### 12MF PE trend



**Reinstate with TP W360,000:** We reinstate coverage of Hyundai Mobis (Mobis) with BUY and a TP of W360,000 at 8.5x 12MF PE. Mobis has slipped below 7.0x PE due to 1) a lower sales weighting of core parts (40% of module sales in 2010 and 35% in 2013) and 2) concern about participating in an additional rights offer by its subsidiary Hyundai Life Insurance (Hyundai Life) that continues to spill red ink (loss equaled 3.4% of Mobis' combined module and parts OP in 2013). However, greater adoption of advanced driver assistance systems (ADAS) would help drive up the sales weighting of core parts (38% of module sales in 2015F and 40% in 2016F) while Hyundai Life is expected to make a quick turnaround in 4Q14. As such, we see a good buy opportunity for this undervalued stock. We select Mobis as our top pick among parts makers.

**Undervalued in terms of asset value as well:** While Mobis traded in a boxed range, profits made a steady rise and thus the stock is undervalued in terms of asset value. The book value of equity-method investment securities accounted for 18% of the market cap in 2010 and it spiked to 37% in 2013. When including cash and cash equivalents, the figure swelled from 28% to as much as 62% during the same period. Despite a high ROE, the stock trades at only 1.2x PB. So in terms of PB-ROE, Mobis is the most undervalued stock among global peers.

**Hyundai and Kia to be at the vanguard of ADAS technology:** Backed by the growing use of ADAS, core parts that accounted for 35% of module sales in 2013 should rise to 40% in 2016F. With ADAS starting to be deployed in mass-produced vehicles, the percentage of 18 main ADAS functions installed in compact cars should grow from 28% at present to 50% in 2016F. For reference, midsize vehicles K5 and LF Sonata currently feature 50% and 72% of the functions, respectively. Considering a large number of the latest new cars come equipped with Mobis' ADAS technology, the core parts sales have a bright future. Moreover, many more vehicles are loaded with high value-added electrical components. Specifically, Kia's K9 features an around-view monitor (AVM), Hyundai's Genesis has smart cruise control (SCC) and active safety belts (ASB) and the LF Sonata has SCC, lane departure warning (LDW), blind spot detection (BSD) and smart parking assistant (SPA). While Mobis currently imports engine control units (ECU) designed for use with ADAS, it plans internal mass-production after 2015.

**Mobis goes wherever Hyundai and Kia go:** Hyundai and Kia's new plant constructions lead to short/long-term earnings momentum for Mobis. In the short-term, Mobis enjoys greater module sales and in the long-term, more high-margin parts sales due to greater units in operation (UIO). With the completion of a plant in Turkey in September 2013, Mobis has entered all markets where Hyundai and Kia's overseas production bases are located. The parts maker will likely continue

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to follow the automakers wherever they build their plants in future.

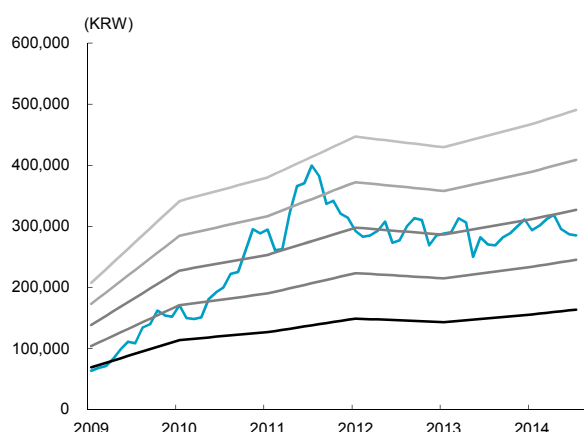
**R&D spending the wisest option:** Mobis is aggressively stepping up R&D investment to narrow the technological gap with global parts suppliers. The company's R&D spending-to-core parts sales has climbed to as high as 4.5%. Increasing R&D investment is the wisest decision for Mobis that is piling up cash. We believe Mobis will lift R&D spending-to-sales to more than 5% supported by cash holdings of ~₩9tn and aggressively seek buyout opportunities with parts makers that have technological prowess.

**Unlikely to participate in additional rights offer by Hyundai Life:** Hyundai Life (56.5% owned by Mobis) will likely turn around from 4Q14. While the insurer has seen flat growth in claims paid, expenses have risen sharply due to aggressive business expansion. But as the company will wrap up business infrastructure augmentation and take a breather from aggressive operations, spending should go down. In addition, Hyundai Life will have less need for additional financial aid from affiliates as past investment is bearing fruit in the form of higher persistency ratios (70% to 82% in 2013).

**Risk 1 – Aftermarket parts certification program:** Aside from genuine (OEM) parts, the Korean government will start certifying aftermarket (non-OEM) parts for performance and quality from 2015. Typically, OEM parts are dearer than non-OEM. So when the certification program is introduced, OEM parts may lose consumer preference regardless of their quality. Accordingly, we forecast parts sales will shrink at an annual average of 3% from 2014-2016F with OPM contracting to 20.4%, 19.8% and 19.2% across the period.

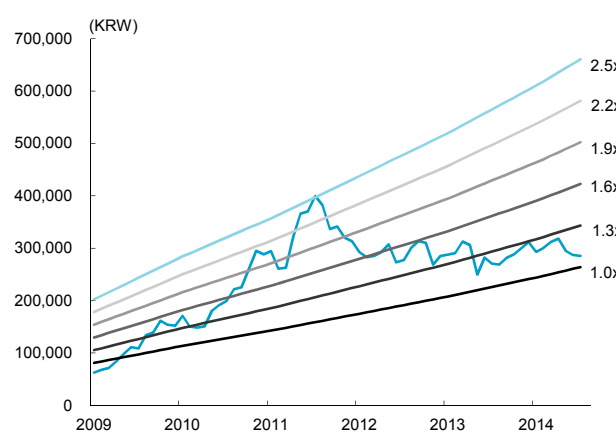
**Risk 2 – Corporate governance restructuring and uncertainty:** While the one certainty about the Hyundai Motor Group's governance restructuring is that nothing has been decided, the whole situation is unclear. Of course, Mobis that is at the center of the restructuring is not insulated from this uncertainty. If Mobis shares continue to pick up, such uncertainty could be used as a rationale that weighs on the upper-end of the trading range. However, it should have a limited impact in the current circumstances where the stock is undervalued relative to its fundamentals.

**Figure 52. PE band**



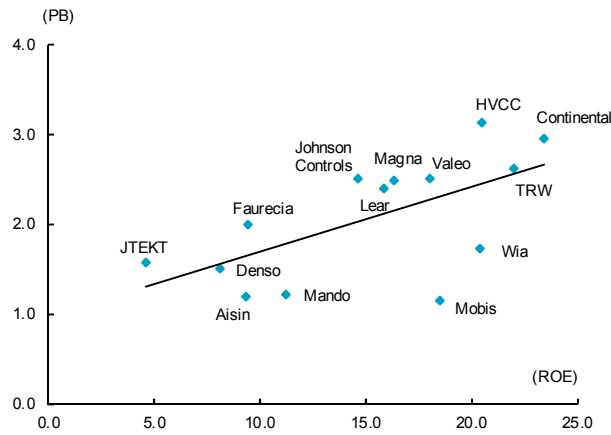
Source: Korea Investment & Securities

**Figure 53. PB band**



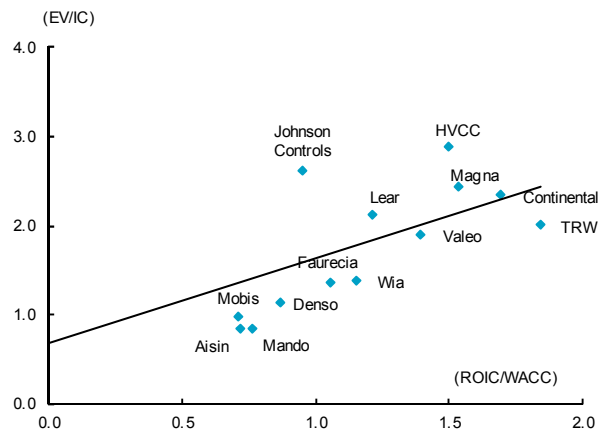
Source: Korea Investment & Securities

Figure 54. PB vs. ROE/COE



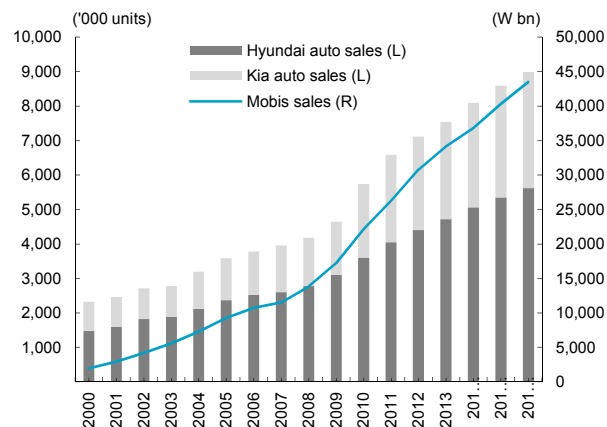
Note: PB is 2014F and ROE 2013  
Source: Bloomberg, Korea Investment & Securities

Figure 55. EV/IC vs. ROIC/WACC



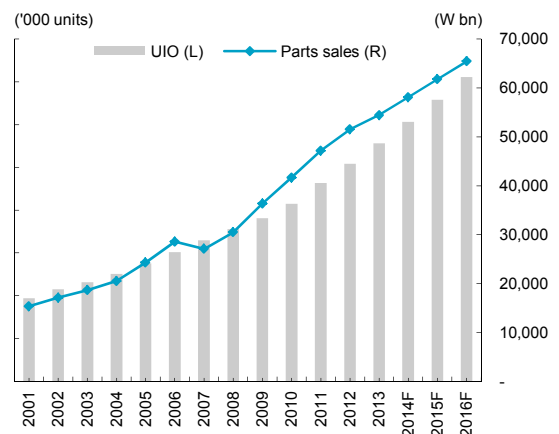
Note: EV is 2014F, IC and ROIC 2013 and WACC 10% uniformly  
Source: Bloomberg, Korea Investment & Securities

Figure 56. Hyundai-Kia auto sales and Mobis sales



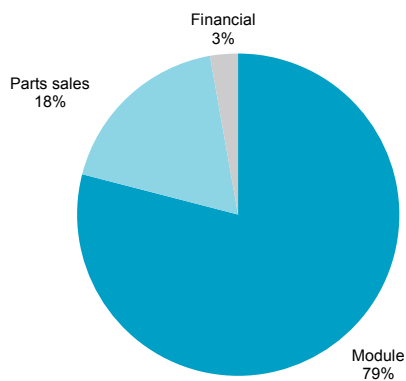
Source: Company data, Korea Investment & Securities

Figure 57. Hyundai-Kia UIO and after-service parts sales



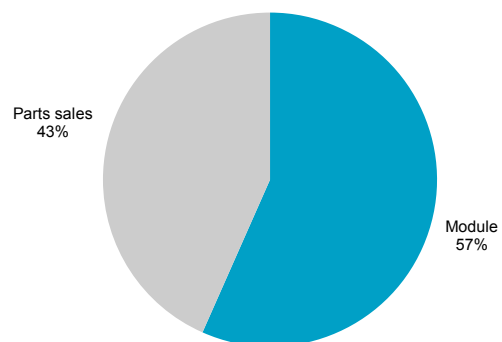
Source: Company data, Korea Investment & Securities

Figure 58. Sales by division (2013)

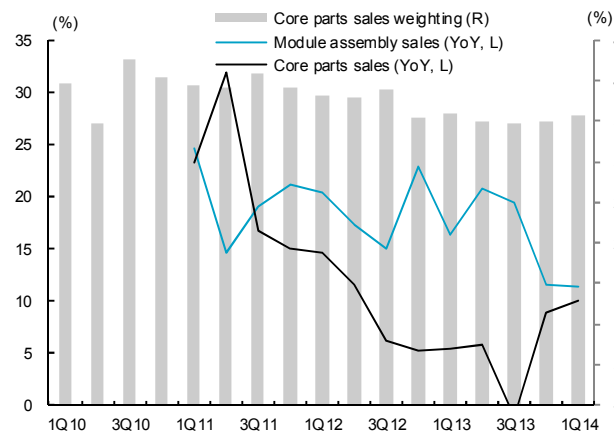


Source: Korea Investment & Securities

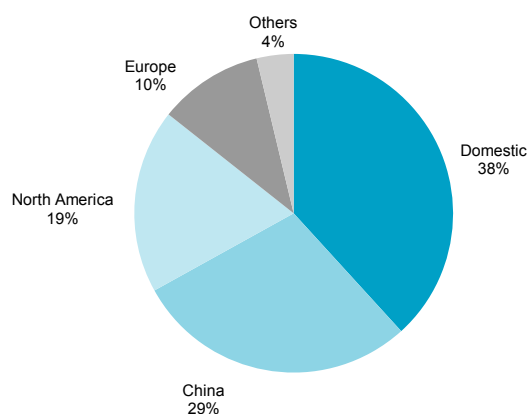
Figure 59. OP by division (2013)



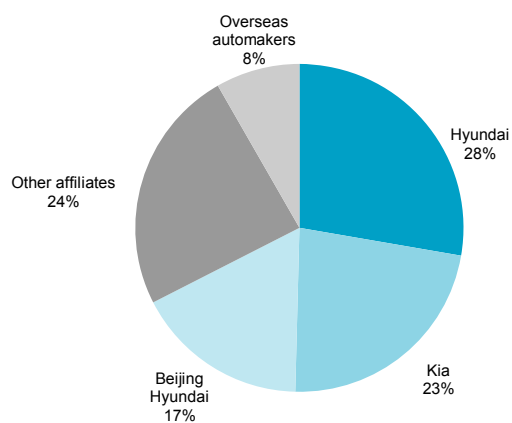
Note: Financial division's operating loss equals 3.2% of combined module and auto parts OP  
Source: Korea Investment & Securities

**Figure 60. Core parts sales weighting**


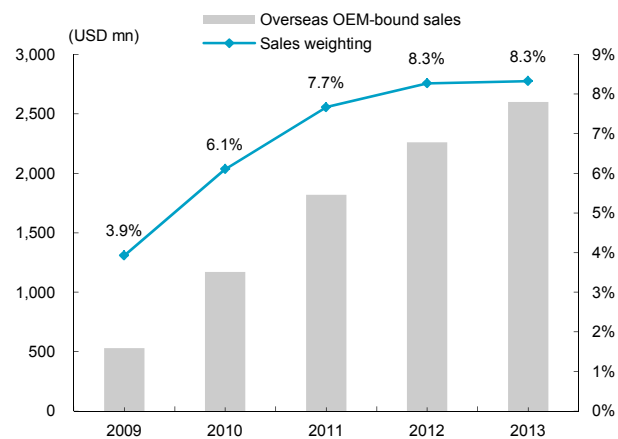
Source: Company data, Korea Investment &amp; Securities

**Figure 61. Sales by region**


Source: Korea Investment &amp; Securities

**Figure 62. Sales weighting by customer (2013)**


Source: Company data, Korea Investment &amp; Securities

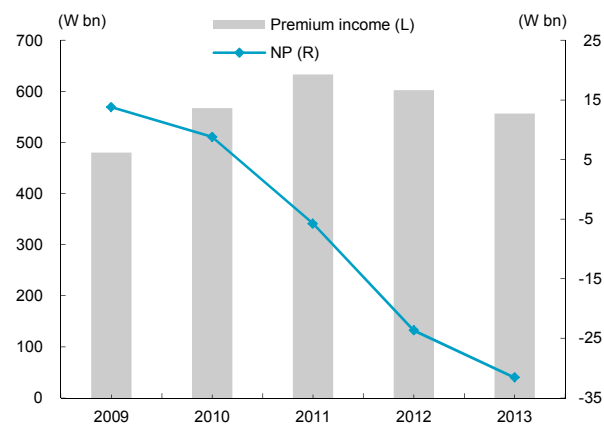
**Figure 63. Overseas OEM-bound sales and weighting**


Source: Company data, Korea Investment &amp; Securities

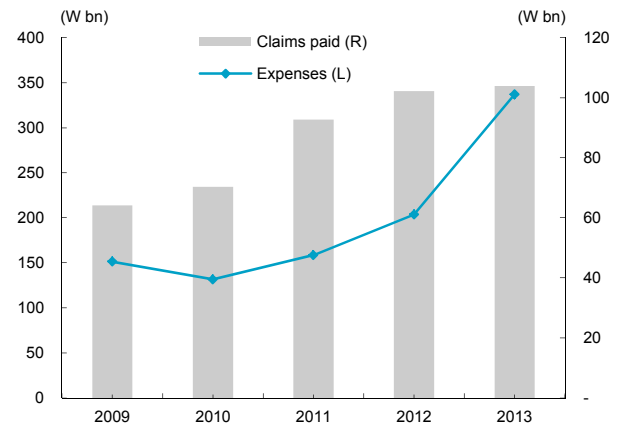
**Table 12. Mobis presence in markets where Hyundai and Kia have set up overseas plants**

Company	Country	Region	Plant	Completion date	Product	Remarks
Mobis	China	Shanghai		July 2002	Airbag	
		Jiangsu	Plant no. 1	December 2002	Chassis, driver's seat, front-end module (FEM)	Near Kia's Yancheng plant
			Plant no. 2	August 2013	Chassis, driver's seat, FEM	
			Plant no. 3	April 2014	Chassis, driver's seat, FEM	
		Beijing	Plant no. 1	October 2003	Chassis, driver's seat, FEM	
			Plant no. 2	August 2008	Chassis, driver's seat, FEM	
			Plant no. 3	December 2013	Chassis, driver's seat, FEM	
		Wuxi		July 2005	Brake system, steering pump	Acquired Seohan-Kasco Auto Parts Wuxi Ltd. in 2005
		Tianjin		June 2004	Multimedia (audio, etc.) parts	Started supplying GM Chevrolet in US and China
	India	Chennai	Plant no. 1	February 2007	Chassis, driver's seat, FEM, molded parts	Located in Tamil Nadu
			Plant no. 2	February 2008	Chassis, driver's seat, FEM, molded parts	
	US	Alabama		August 2005	Chassis, driver's seat, FEM	Started supplying Chrysler
		Georgia		June 2010	Chassis, driver's seat, front module	
		Ohio		August 2006	Chassis, FEM	
		Michigan		February 2010	Chassis, FEM	
	Slovakia	Zilina		April 2004	Chassis, driver's seat, FEM	
	Czech Rep.	Nosovice		September 2009	Chassis, driver's seat, FEM	
	Russia	St Petersburg		September 2010	Driver's seat, front module	
	Turkey	Kocaeli		September 2013	Chassis, driver's seat, FEM	Near Hyundai's Izmit plant
	Brazil	Piracicaba		November 2012	Chassis, driver's seat, front module	
Hyundai	China	Beijing	Plant no. 1	December 2002		
			Plant no. 2	April 2008		
			Plant no. 3	September 2012		
		Sichuan		June 2014		First commercial vehicles plant abroad
	India	Tamil Nadu	Plant no. 1	October 2010		
			Plant no. 2	January 2008		
	US	Alabama		May 2005		
	Czech Rep.	Nosovice		September 2009		
	Russia	Saint Petersburg		September 2010		
Kia	China	Yancheng	Plant no. 1	September 1999		
			Plant no. 2	December 2007		
			Plant no. 3	January 2014		
	US	Georgia		December 2009		
	Slovakia	Zilina		April 2007		

Source: Mobis, Hyundai, Kia, Korea Investment &amp; Securities

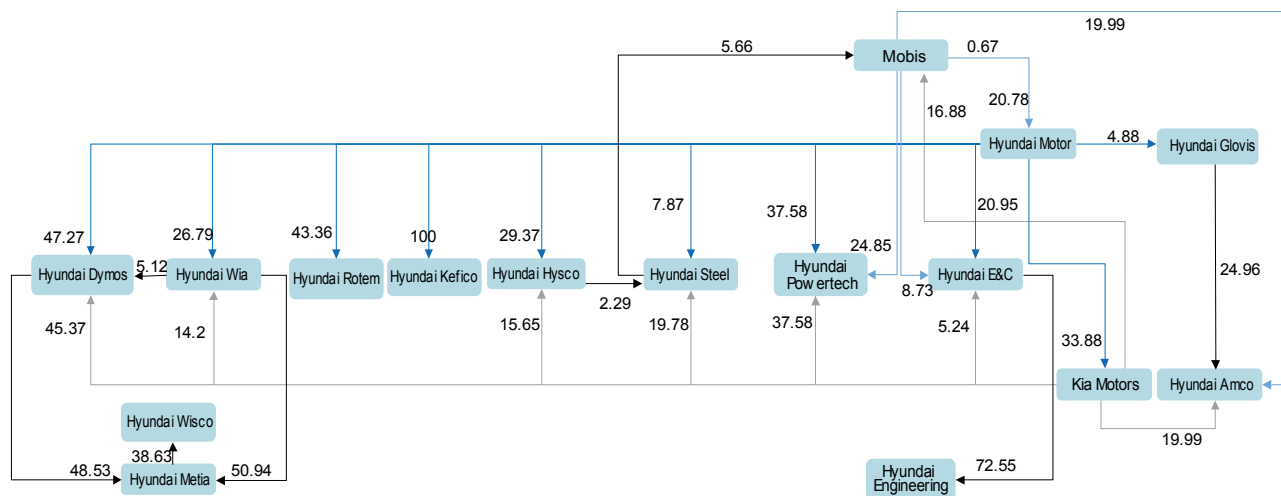
**Figure 64. Hyundai Life premium income and NP**

Source: Financial Statistics Information System, Korea Investment &amp; Securities

**Figure 65. Hyundai Life claims paid and expenses**

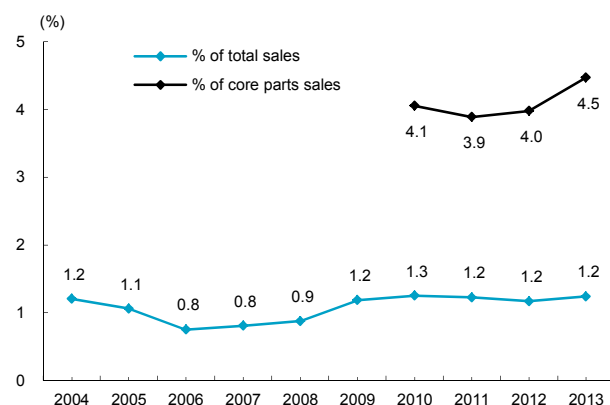
Source: Financial Statistics Information System, Korea Investment &amp; Securities

**Figure 66. Hyundai-Kia governance structure (as of June 30, 2014)**



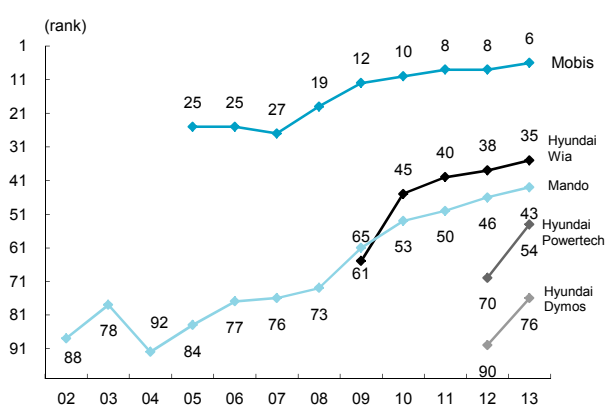
Source: Korea Investment &amp; Securities

### Figure 67. R&D spending-to-sales



Source: Company data, Korea Investment & Securities

**Figure 68. Global ranking by parts maker**



Source: Automotive News, Korea Investment & Securities

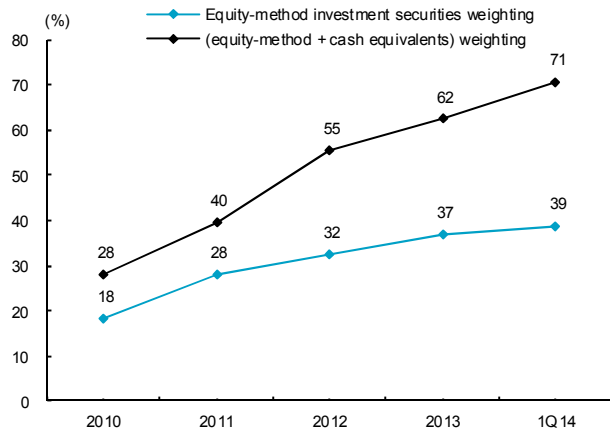
**Table 13. Equity-method investment securities**

(W bn)

	Business	Ownership	Book value					Equity-method gains (losses)				
			2010	2011	2012	2013	1Q14	2010	2011	2012	2013	1Q14
Hyundai Motor	Finished vehicles	20.78%	4,677	6,214	7,294	8,531	8,723	804	1,207	1,346	1,334	311
Hyundai E&C	Civil engineering/ construction	8.73%	-	1,255	1,260	1,271	1,272	-	24	19	26	5
Hyundai Amco	Civil engineering/ construction	19.99%	83	88	112	130	133	13	18	33	27	3
Hyundai AutoEver	IT solution	20.00%	27	32	37	44	45	6	7	9	9	2
Hyundai Powertech	Auto parts	24.85%	147	176	205	228	238	15	24	31	22	10
ZF Lemforder Chassis Technology Korea	Auto parts	27.34%	5	4	4	5	5	0	0	0	0	0
Hyundai Mnsoft	Software development	25.67%	13	16	20	24	25	3	3	4	4	1
Hyundai Autron	Electrical/electronic R&D	20.00%	-	-	19	19	20	-	-	-1	0	1
HL GreenPower	Auto parts	51%	14	15	16	17	18	-1	1	1	1	0
HMC Investment Securities	Brokerage	15.76%	-	-	-	109	116	-	-	21	58	3
Hyundai Motor Group China	Investment	20%	41	58	45	65	67	22	33	30	13	3
Beijing Hyundai Mobis Automotive Parts	Auto parts	50%	28	52	45	54	66	14	21	5	38	13
Mobis Parts Jiangsu Yueda Trading	Auto parts	50%	14	22	28	35	40	8	12	17	24	5
Powertech America	Auto parts	20%	16	16	16	19	20	0	1	1	3	1
Total			5,065	7,947	9,102	10,550	10,787	884	1,352	1,516	1,561	359

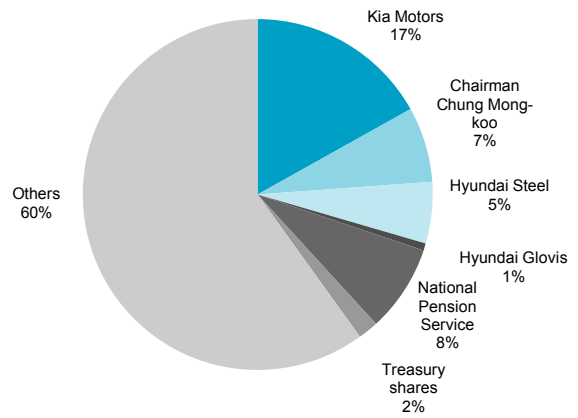
Source: Korea Investment & Securities

Figure 69. Equity holdings as % of market cap



Source: Korea Investment & Securities

Figure 70. Shareholder breakdown (as of July 2014)



Source: Korea Investment & Securities

Table 14. Quarterly sales estimates by division

(W bn)

	1Q13	2Q13	3Q13	4Q13	1Q14	2Q14P	3Q14F	4Q14F	2011	2012	2013	2014F	2015F	2016F
Sales	8,110	8,708	8,182	9,199	8,918	8,928	8,751	10,029	26,295	30,789	34,199	36,626	39,848	42,910
OP	634	733	686	871	721	745	710	951	2,637	2,906	2,924	3,127	3,407	3,670
OPM	7.8%	8.4%	8.4%	9.5%	8.1%	8.3%	8.1%	9.5%	10.0%	9.4%	8.6%	8.5%	8.6%	8.6%
EBT	1,034	1,185	1,098	1,217	1,113	1,286	1,165	1,399	4,063	4,607	4,535	4,963	5,367	5,812
NP	782	899	828	913	818	1,006	909	1,092	3,023	3,559	3,422	3,791	4,145	4,489
Sales chg. YoY									17%	11%	7%	9%	8%	
OP chg. YoY									10%	1%	7%	9%	8%	
NP chg. YoY									18%	-4%	11%	9%	8%	
<b>Sales by division</b>														
Module	6,413	6,895	6,361	7,353	7,114	7,095	6,909	8,282	20,903	24,060	27,022	29,400	32,220	34,926
Assembly	4,107	4,489	4,157	4,777	4,575	4,522	4,353	5,135	12,612	15,006	17,529	18,585	19,977	20,956
Core parts	2,307	2,406	2,204	2,576	2,539	2,573	2,556	3,147	8,292	9,054	9,493	10,816	12,244	13,970
Parts sales	1,449	1,577	1,588	1,607	1,575	1,583	1,570	1,552	5,391	5,889	6,220	6,279	6,593	6,898
Financial	248	236	233	239	229	251	251	254	-	840	956	985	1,034	1,086
<b>Sales weighting</b>														
Module	79%	79%	78%	80%	80%	79%			79%	78%	79%	80%	81%	81%
Assembly	64%	65%	65%	65%	64%	64%	63%	62%	60%	62%	65%	63%	62%	60%
Core parts	36%	35%	35%	35%	36%	36%	37%	38%	40%	38%	35%	37%	38%	40%
Parts sales	18%	18%	19%	17%	18%	18%			21%	19%	18%	17%	17%	16%
Financial	3%	3%	3%	3%	3%	3%			0%	3%	3%	3%	3%	3%
<b>OPM by division</b>														
Module	5.9%	6.1%	5.9%	7.3%	5.9%	6.2%	5.8%	7.6%	7.0%	6.8%	6.3%	6.4%	6.5%	6.6%
Parts sales	19.1%	21.2%	21.1%	22.7%	20.9%	20.4%	20.0%	20.5%	22.9%	22.6%	21.1%	20.4%	19.8%	19.2%
Financial	-7.4%	-9.2%	-11.6%	-12.8%	-12.7%	-6.4%	-2.0%	0.3%	0.0%	-7.7%	-10.2%	-5.0%	0.0%	2.0%
<b>OP weighting</b>														
Module	59%	57%	55%	62%	58%	59%	56%	66%	54%	56%	59%	61%	62%	63%
Parts sales	44%	46%	49%	42%	46%	43%	44%	33%	46%	46%	45%	41%	38%	36%
Financial	-3%	-3%	-4%	-4%	-4%	-2%	-1%	0%	0%	-2%	-3%	-2%	0%	1%

Source: Korea Investment & Securities

## Company overview & glossary

Hyundai Mobis was established as Hyundai Precision in 1977. The company was reborn as an exclusive module maker for Hyundai Motor and Kia Motors in 2000. Hyundai Mobis is now focused on after-service parts sales and the module business including automotive electrical components. Hyundai Mobis is Hyundai Motor's largest shareholder with a 20.78% stake. After Hyundai Mobis joined the world's top-10 OEM club in 2010, its rank climbed to sixth in 2013 on the back of Hyundai Motor and Kia Motor's continuing outperformance as well as mounting orders from overseas automakers.



**Balance sheet**

FY-ending Dec. (W bn)	2012A	2013A	2014F	2015F	2016F
Current assets	13,793	15,492	18,297	20,504	23,153
Cash & cash equivalent	2,796	2,476	3,663	4,583	6,007
Accounts & other receivables	5,289	5,759	6,593	7,173	7,724
Inventory	1,968	2,314	2,747	2,989	3,218
Non-current assets	16,096	18,714	20,210	22,632	24,901
Investment assets	10,323	12,077	13,172	14,530	15,647
Tangible assets	3,714	3,887	4,093	4,899	5,804
Intangible assets	1,047	979	1,049	1,141	1,228
Total assets	30,047	34,430	38,747	43,398	48,335
Current liabilities	7,066	7,159	7,483	7,637	7,757
Accounts & other payables	4,623	4,952	5,303	5,770	6,213
ST debt & bond	1,659	1,565	1,565	1,265	965
Current portion of LT debt	187	158	158	158	158
Non-current liabilities	2,464	3,309	3,460	3,660	3,850
Debentures	30	110	110	110	110
LT debt & financial liabilities	700	1,096	1,097	1,099	1,100
Total liabilities	13,007	14,237	14,980	15,689	16,336
Controlling interest	16,904	20,100	23,702	27,674	31,997
Capital stock	491	491	491	491	491
Capital surplus	1,384	1,384	1,384	1,384	1,384
Other Reserves	(142)	(142)	(142)	(142)	(142)
Retained earnings	15,627	18,917	22,578	26,609	30,990
Minority interest	135	94	66	35	2
Shareholders' equity	17,040	20,193	23,768	27,710	31,999

**Cash flow**

FY-ending Dec. (W bn)	2012A	2013A	2014F	2015F	2016F
C/F from operating	3,113	1,880	1,822	2,702	3,038
Net profit	3,542	3,396	3,819	4,186	4,534
Depreciation	350	403	416	475	585
Amortization	108	159	164	179	192
Net incr. in W/C	(387)	(1,430)	(910)	(326)	(322)
Others	(500)	(648)	(1,667)	(1,812)	(1,951)
C/F from investing	(2,014)	(2,403)	(477)	(1,329)	(1,162)
CAPEX	(858)	(652)	(630)	(1,289)	(1,500)
Decr. in fixed assets	10	9	9	9	9
Incr. in investment	(1,296)	(1,526)	494	377	756
Net incr. in intangible assets	(87)	(47)	(234)	(271)	(280)
Others	217	(187)	(116)	(155)	(147)
C/F from financing	(295)	206	(158)	(454)	(451)
Incr. in equity	40	0	0	0	0
Incr. in debts	(160)	391	(0)	(299)	(299)
Dividends	(170)	(185)	(186)	(186)	(186)
Others	(5)	0	28	31	34
C/F from others	(67)	(3)	0	0	0
Increase in cash	737	(320)	1,187	920	1,425

Note: Based on K-IFRS (consolidated)

**Income statement**

FY-ending Dec. (W bn)	2012A	2013A	2014F	2015F	2016F
Sales	30,789	34,199	36,626	39,848	42,910
COGS	26,245	29,386	31,447	34,209	36,836
Gross profit	4,544	4,813	5,179	5,640	6,074
SG&A expense	1,638	1,889	2,052	2,232	2,404
Operating profit	2,906	2,924	3,127	3,407	3,670
Financial income	304	285	353	386	423
Interest income	117	156	183	216	253
Financial expense	148	280	272	270	266
Interest expense	48	37	40	38	34
Other non-operating profit	(22)	44	47	51	55
Gains (Losses) in associates, subsidiaries and JV	1,567	1,561	1,648	1,793	1,931
Earnings before tax	4,607	4,535	4,963	5,367	5,812
Income taxes	1,065	1,138	1,142	1,181	1,279
Net profit	3,542	3,396	3,819	4,186	4,534
Net profit of controlling interest	3,559	3,422	3,791	4,145	4,489
Other comprehensive profit	(253)	(58)	(58)	(58)	(58)
Total comprehensive profit	3,289	3,338	3,761	4,128	4,476
Total comprehensive profit of controlling interest	3,299	3,377	3,789	4,159	4,509
EBITDA	3,365	3,486	3,707	4,060	4,448

**Key financial data**

FY-ending Dec.	2012A	2013A	2014F	2015F	2016F
per share data (KRW)					
EPS	37,239	35,804	39,673	43,374	46,973
BPS	174,900	207,722	244,729	285,535	329,936
DPS	1,900	1,950	1,950	1,950	1,950
Growth (%)					
Sales growth	17.1	11.1	7.1	8.8	7.7
OP growth	10.2	0.6	6.9	8.9	7.7
NP growth	17.7	(3.9)	10.8	9.3	8.3
EPS growth	17.6	(3.9)	10.8	9.3	8.3
EBITDA growth	12.5	3.6	6.3	9.5	9.5
Profitability (%)					
OP margin	9.4	8.6	8.5	8.6	8.6
NP margin	11.6	10.0	10.4	10.4	10.5
EBITDA margin	10.9	10.2	10.1	10.2	10.4
ROA	13.5	10.5	10.4	10.2	9.9
ROE	23.2	18.5	17.3	16.1	15.0
Dividend yield	0.7	0.7	0.7	0.7	0.7
Dividend payout ratio	5.1	5.4	4.9	4.5	4.1
Stability					
Net debt (W bn)	(3,833)	(4,327)	(5,853)	(7,522)	(9,674)
Debt/equity ratio (%)	15.1	14.5	12.3	9.5	7.3
Valuation (X)					
PE	7.7	8.2	7.4	6.8	6.3
PB	1.6	1.4	1.2	1.0	0.9
EV/EBITDA	7.2	6.9	6.2	5.2	4.3

## Mando (060980)

BUY (Maintain), TP W158,000 (Maintain)

Stock price (Jul 30, KRW)	126,500
Market cap (USD mn)	2,284
Shares outstanding (mn)	18
52W High/Low (KRW)	147,500/111,500
6M avg. daily turnover (USD mn)	16.6
Free float (%)	71.3
Foreign ownership (%)	10.3

Yr to	Sales	OP	NP	EPS	% chg	EBITDA	PE	EV/EBITDA	PB	ROE	DY
Dec	(W bn)	(W bn)	(W bn)	(KRW)	(YoY)	(W bn)	(x)	(x)	(x)	(%)	(%)
2012A	5,059	256	163	9,065	(26.6)	425	14.2	7.4	1.5	11.4	0.8
2013A	5,634	313	178	9,999	10.3	513	12.5	6.4	1.3	11.3	1.0
2014F	5,837	360	216	12,152	21.5	592	10.7	6.0	1.3	12.4	0.9
2015F	6,439	407	242	13,621	12.1	667	9.5	5.3	1.1	12.4	0.9
2016F	7,158	453	275	15,435	13.3	730	8.4	4.8	1.0	12.5	0.9

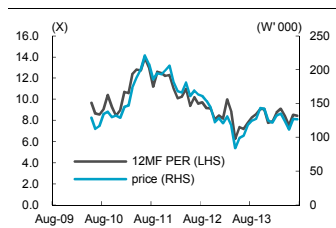
Note: NP and EPS attributed to controlling interest

## Rustproof competence

## Performance

	1M	6M	12M
Absolute (%)	(0.4)	3.7	4.5
Rel. to Kospi (%p)	(4.4)	(3.6)	(4.1)

## 12MF PE trend



**Time to pay renewed attention to technological prowess:** Backed by R&D investment that stands out among domestic peers, Mando once traded at an average 14x PE. But wrapped up in a corporate governance issue for the past two years, the multiple has fallen below 10x. But we expect concerns about the issue to gradually ease with Mando's transformation to a holding company structure. In addition, with ever-mounting installation of ADAS functions in compact cars (currently 28% of major 18 functions to 50% in 2016F), the ADAS sales weighting at Mando should rise from 1% in 2013 to 5% in 2016F. In line with a larger weighting, the ADAS sales contribution to EPS at the company should turn around from the current -0.8% to +9.3% in 2016F. Beyond 2016, its ADAS sales weighting is likely to exceed 10% with the implementation of tighter safety regulations in Europe and the US.

**Business structure favors ADAS:** In ADAS, cooperative control with drive mechanisms such as suspension, steering and braking is crucial. As such, Mando that runs divisions for all three is well-positioned to develop ADAS. Lacking technologies in sensors and electronic control units (ECU) are being compensated for through alliances or JVs with global parts makers. For global parts makers, a tie-up with Mando is also a tempting offer given their aggressiveness to secure application technologies for auto-driving devices. Specifically, Mando is among nine global partners with Israel's Mobileye armed with cutting-edge vision-processing algorithm technologies. Mando is also developing technologies for ADAS via JVs with KYB for suspensions, Brose for motors and Hella for ECUs and sensors.

**Striving to develop proprietary technologies:** Mando has been localizing overseas-dependent core technologies one by one. It first developed the automatic emergency brake (AEB) and lane-keeping assist (LKA) systems in Korea and supplies them to the new Genesis. Moreover, its sale of smart parking assist (SPA), smart cruise control (SCC) and blind spot detection (BSD) systems that started from 2010 is spreading from luxury cars to mass-market vehicles. For camera sensors to view surroundings, Mando is trying to reduce dependence on Mobileye by developing a proprietary vision-interpretation algorithm called Mando optical safety system (MOSS). The application timeline is set for 2016. For radar systems, Mando has completed the commercialization of both 24GHz and 77GHz after joint development with Mando Hella Electronics. With this, Mando has reduced its ECU dependence on Continental from 100% to 70%. Meanwhile, it depends on Freescale for most ultrasonic wave sensors as the devices are relatively cheap.

**New SUVs and new overseas plants to drive 2H14 growth:** Growth momentum in 2H14 would come from Hyundai-Kia's new SUVs and Mando's newly

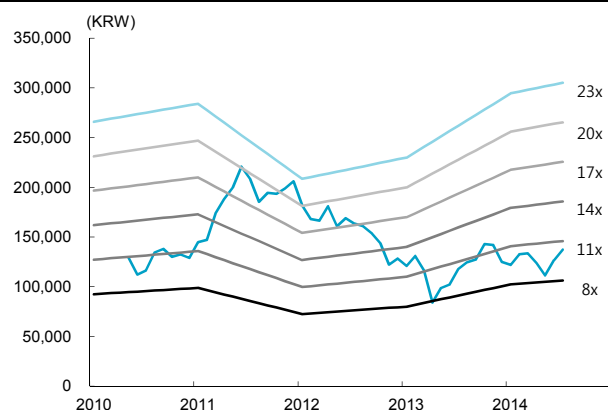
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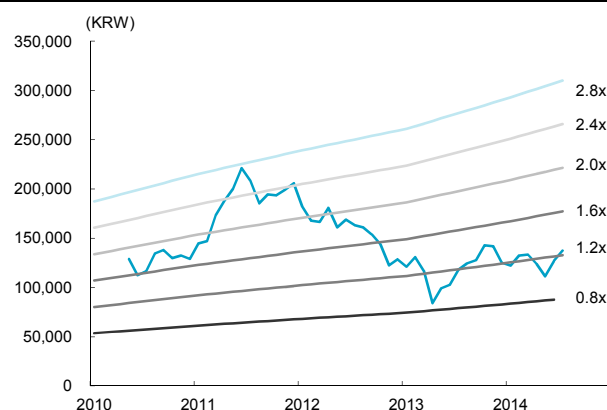
established overseas plants. Unlike the Sonata, Hyundai and Kia adopted Mando's products in their new SUV lineup (Carnival in June and Sorento in August). In addition, Mando expanded capacity at the Poland plant to 1.4mn units in May and finished building the Shenyang plant with 1.2mn capacity in June. The Poland plant has a wide customer base extending from Hyundai-Kia to the Volkswagen Group. The Shenyang plant is set to sell exclusively designed auto parts to Great Wall Motors that is placing more orders with Mando. We maintain BUY on Mando with a TP of W158,000 (12x 12MF PE).

Figure 71. PE band



Source: Korea Investment &amp; Securities

Figure 72. PB band



Source: Korea Investment &amp; Securities

Table 15. Mando JVs

Partners	Business	Stake (Mando:partner)	Location
Brose	Motors	50:50	Incheon, Korea
Stackpole	Power train	70:30	Ochang, Korea
Hella	ECU, sensors, radar	50:50	Incheon
KYB	Suspensions	50:50	Brazil
Cukurova	Suspensions	50:50	Turkey
AutoV	Steering	30:70	Malaysia

Source: Korea Investment &amp; Securities

Table 16. Post-spin-off valuations

(W bn)

	Pre-spin-off	Post-spin-off holding company	Post-spin-off operating company	Aggregate
Sales	5,837	1,500	4,337	
OP	360	45	315	
OPM	6.2%	3.0%	7.3%	
Controlling interest NP	216	36	180	
Multiple				
Best case		10	15	
Base case	12	8	13	
Worst case		6	11	
Subsidiary stake value		400		
Discount assumption		50%		
Market cap				
Best case		560	2,698	3,258
Base case		488	2,339	2,827
Worst case		416	1,979	2,395
Current market cap	2,340			
Applying spin-off ratio		1,123	1,217	
Upside				
Best case		-50%	122%	39%
Base case		-57%	92%	21%
Worst case		-63%	63%	2%
Outstanding shares		8,608,064	9,391,424	17,999,488
Fair price (KRW)				
Best case		65,055	287,314	181,021
Base case		56,691	249,005	157,033
Worst case		48,327	210,697	133,045

Note: Based on 2014F earnings; For Halla Holdings, only operating value and subsidiary stake value are reflected without consideration of brand royalties and dividends

Source: Korea Investment &amp; Securities

Table 17. Quarterly earnings outlook

(W bn)

	1Q13	2Q13	3Q13	4Q13	1Q14	2Q14P	3Q14	4Q14F	2013	2014F	2015F	2016F
Sales	1,366	1,455	1,351	1,462	1,422	1,421	1,430	1,564	5,634	5,837	6,439	7,158
OP	82	90	71	70	85	91	83	101	313	360	407	453
OPM	6.0%	6.2%	5.3%	4.8%	6.0%	6.4%	5.8%	6.5%	5.6%	6.2%	6.3%	6.3%
EBT	88	67	43	20	83	72	65	69	218	290	310	352
NP	70	51	36	20	64	48	51	54	178	216	242	274
Sales YoY chg.									11%	4%	10%	11%
OP YoY chg.									22%	15%	13%	12%
NP YoY chg.									10%	21%	12%	13%

Source: Korea Investment &amp; Securities

### Company overview

Mando is Korea's most advanced auto parts company in terms of technology. It was established in 1962 and started the production of internally developed anti-lock brake system (ABS) for the first time in Korea from 1993. But with the bankruptcy of Halla Group, the company was sold to SunSage in 2000 and Halla Corp. re-acquired Mando in 2008. Its global auto supplier rank has risen steadily and reached 43rd in 2013 (vs. Hyundai Mobis 8th, Hyundai Wia 35th). Mando has three plants in Korea and also operates business in China, India, Brazil, US, Europe, etc. China is a core market for the company as it accounts for 20% of sales and 51% of operating profit as of 2013.

**Balance sheet**

FY-ending Dec. (W bn)	2012A	2013A	2014F	2015F	2016F
Current assets	1,936	2,484	2,355	2,598	2,888
Cash & cash equivalents	215	718	525	580	644
Accounts & other receivables	1,116	1,050	1,088	1,200	1,334
Inventory	420	417	432	477	530
Non-current assets	2,099	2,593	2,954	3,123	3,358
Investment assets	230	557	577	636	707
Tangible assets	1,664	1,785	2,117	2,199	2,331
Intangible assets	105	127	132	146	162
Total assets	4,035	5,077	5,309	5,720	6,245
Current liabilities	1,511	1,855	1,885	2,002	2,146
Accounts & other payables	1,131	1,179	1,222	1,348	1,498
ST debt & bonds	216	330	330	330	330
Current portion of LT debt	121	289	289	289	289
Non-current liabilities	956	1,504	1,512	1,588	1,718
Debentures	399	618	618	668	768
LT debt & financial liabilities	332	647	647	647	647
Total liabilities	2,467	3,358	3,398	3,590	3,864
Controlling interest	1,505	1,653	1,846	2,066	2,317
Capital stock	91	91	91	91	91
Capital surplus	240	240	240	240	240
Other reserves	(53)	(26)	(26)	(26)	(26)
Retained earnings	1,191	1,322	1,517	1,738	1,991
Minority interest	62	66	65	65	64
Shareholders' equity	1,567	1,719	1,911	2,130	2,381

**Cash flow**

FY-ending Dec. (W bn)	2012A	2013A	2014F	2015F	2016F
C/F from operations	153	554	429	469	514
Net profit	162	178	216	242	274
Depreciation	153	180	209	235	248
Amortization	16	20	23	25	28
Net incr. in W/C	(224)	95	(28)	(55)	(61)
Others	46	81	9	22	25
C/F from investing	(655)	(851)	(601)	(444)	(529)
Capex	(489)	(320)	(548)	(324)	(387)
Decr. in fixed assets	5	7	7	7	7
Incr. in investment	(109)	(481)	(25)	(65)	(76)
Net incr. in intangible assets	(40)	(42)	(28)	(39)	(44)
Others	(22)	(15)	(7)	(23)	(29)
C/F from financing	389	802	(20)	30	80
Incr. in equity	22	9	0	0	0
Incr. in debt	404	832	1	51	101
Dividends	(22)	(18)	(21)	(21)	(21)
Others	(15)	(21)	0	0	0
C/F from others	(9)	(1)	0	0	0
Increase in cash	(121)	504	(193)	54	65

Note: K-IFRS (consolidated)

**Income statement**

FY-ending Dec. (W bn)	2012A	2013A	2014F	2015F	2016F
Sales	5,059	5,634	5,837	6,439	7,158
COGS	4,352	4,820	4,952	5,453	6,060
Gross profit	707	814	886	986	1,098
SG&A expenses	451	501	525	580	644
Operating profit	256	313	360	407	453
Financial income	18	26	34	33	35
Interest income	7	12	20	19	21
Financial expenses	40	69	83	84	87
Interest expenses	32	50	63	64	67
Other non-operating profit	(20)	(48)	(23)	(45)	(50)
Gains (Losses) in associates, subsidiaries and JV	(5)	(3)	(3)	(3)	(4)
Earnings before tax	208	218	285	307	348
Income taxes	46	41	53	57	65
Net profit	162	178	216	242	274
Net profit of controlling interest	163	178	216	242	275
Other comprehensive profit	8	(2)	(2)	(2)	(2)
Total comprehensive profit	171	176	214	240	272
Total comprehensive profit of controlling interest	174	177	215	241	273
EBITDA	425	513	592	667	730

**Key financial data**

FY-ending Dec.	2012A	2013A	2014F	2015F	2016F
Per-share data (KRW)					
EPS	9,065	9,999	12,152	13,621	15,435
BPS	85,456	93,225	103,957	116,140	130,118
DPS	1,000	1,200	1,200	1,200	1,200
Growth (%)					
Sales growth	10.9	11.4	3.6	10.3	11.2
OP growth	(14.8)	22.3	15.1	12.9	11.5
NP growth	(27.2)	9.2	21.5	12.1	13.3
EPS growth	(26.6)	10.3	21.5	12.1	13.3
EBITDA growth	(4.2)	20.6	15.3	12.6	9.5
Profitability (%)					
OP margin	5.1	5.6	6.2	6.3	6.3
NP margin	3.2	3.2	3.7	3.8	3.8
EBITDA margin	8.4	9.1	10.1	10.4	10.2
ROA	4.3	3.9	4.2	4.4	4.6
ROE	11.4	11.3	12.4	12.4	12.5
Dividend yield	0.8	1.0	0.9	0.9	0.9
Dividend payout ratio	11.0	11.8	9.7	8.7	7.6
Stability					
Net debt (W bn)	785	975	1,161	1,137	1,149
Debt/equity ratio (%)	68.1	109.7	98.7	90.9	85.5
Valuation (x)					
PE	14.2	12.5	10.7	9.5	8.4
PB	1.5	1.3	1.3	1.1	1.0
EV/EBITDA	7.4	6.4	6.0	5.3	4.8

## PyeongHwa Automotive (043370)

**BUY (Maintain), TP W31,000 (Maintain)**

Stock price (Jul 30, KRW)	23,750
Market cap (USD mn)	461
Shares outstanding (mn)	21
52W High/Low (KRW)	25,800/18,950
6M avg. daily turnover (USD mn)	1.4
Free float (%)	45.4
Foreign ownership (%)	15.6

Yr to	Sales	OP	NP	EPS	% chg	EBITDA	PE	EV/EBITDA	PB	ROE	DY
Dec	(W bn)	(W bn)	(W bn)	(KRW)	(YoY)	(W bn)	(x)	(x)	(x)	(%)	(%)
2012A	883	57	38	1,827	(13.4)	92	8.6	4.5	1.0	11.9	0.9
2013A	999	69	47	2,256	23.5	110	9.5	4.9	1.2	13.2	0.7
2014F	1,104	79	56	2,654	17.7	126	8.5	4.5	1.1	13.6	0.6
2015F	1,245	93	66	3,126	17.8	144	7.2	4.0	1.0	14.1	0.6
2016F	1,393	104	74	3,537	13.2	159	6.4	3.6	0.8	14.0	0.6

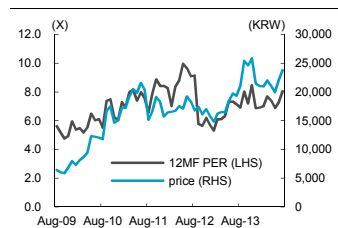
Note: NP and EPS attributed to controlling interest

### Focus on new electronic parts

#### Performance

	1M	6M	12M
Absolute (%)	7.7	13.1	18.8
Rel. to Kospi (%p)	3.7	5.8	10.1

#### 12MF PE trend



**New products loss to narrow on wider adoption:** At PyeongHwa Automotive (PHA), sales are swelling as its new electronic components (active hoods, cinching doors and power trunks) are featured on Hyundai-Kia's high-end sedans (Genesis AG) and sport utility vehicles (SUVs; Santa Fe, Carnival and Sorrento). New product sales should jump from W12bn in 2013 to W30bn in 2014F and pass the break-even point of W100bn in 2015F. The new products will then likely bump up the OPM by 0.3%p p.a. Of note, active hoods should turn out to be very profitable as safety rules are toughened to protect pedestrians. Although the item stands in the red with a mere 2% sales weighting, the figure should reach 7% in 2015 as it is mounted on a wider range of models and turns profitable (EPS +6%).

**Top-line growth to continue with additional capacity:** Since PHA products have no effect on a vehicle's outer appearance and can be widely installed, they can be sold to a range of customers. Indeed, PHA is adding capacity in India and China to handle a fresh line of orders from overseas automakers. With the construction scheduled to be completed in 3Q14 in India and 4Q14 in China, the non-Hyundai-Kia sales weighting should go up from the current 20% to 30% within three years.

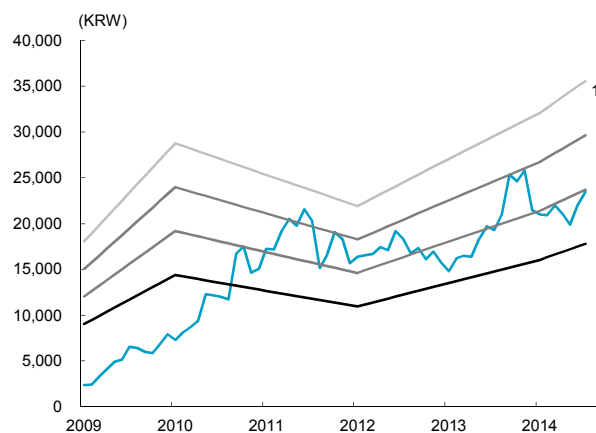
**More promising in 2H14:** PHA has several investment points: benefits from top-line growth at Hyundai-Kia Motors, wider customer base, bigger line of electronic products and stable earnings. The stock should be more promising in 2H14 when the construction of new plants will be completed and Hyundai-Kia release SUV models installed with new products. We maintain BUY and a TP of W31,000 (PE 11x and 12MF EPS).

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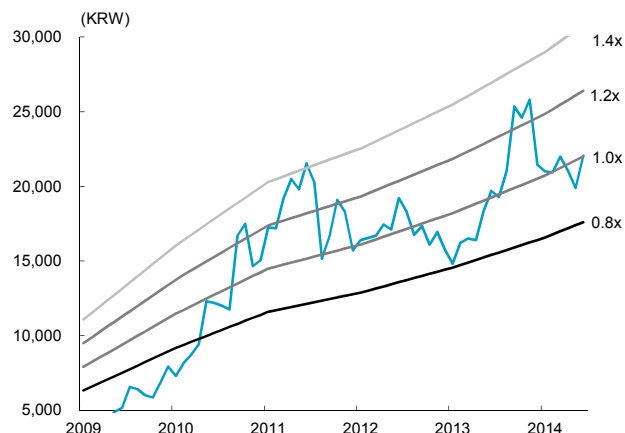
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Figure 18. PE band



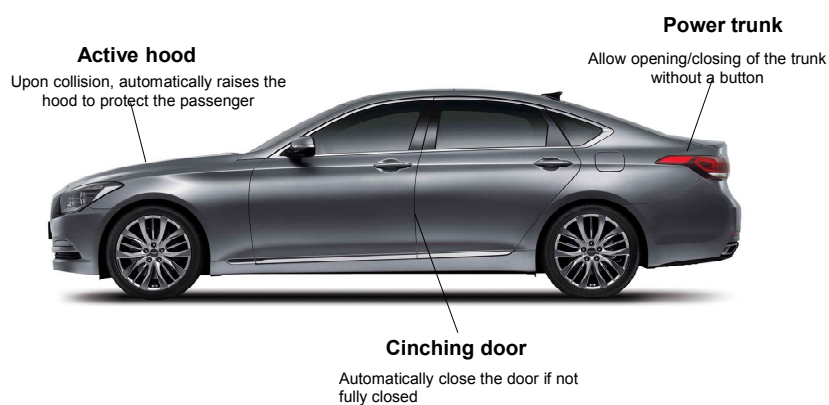
Source: Korea Investment &amp; Securities

Figure 74. PB band



Source: Korea Investment &amp; Securities

Figure 75. PHA new products



Source: Korea Investment &amp; Securities

Table 18. Quarterly earnings

(W bn)

	1Q13	2Q13	3Q13	4Q13	1Q14	2Q14F	3Q14F	4Q14F	2013	2014F	2015F	2016F
Sales	250	261	237	251	273	290	257	284	999	1,104	1,245	1,393
OP	16	21	15	17	17	23	17	22	69	79	93	104
OPM	6.3%	8.1%	6.4%	6.6%	6.3%	8.1%	6.7%	7.6%	6.9%	7.2%	7.5%	7.5%
EBT	18	22	10	11	18	21	15	17	61	71	84	95
NP	15	15	8	9	13	16	12	14	47	56	66	74
YoY sales									13%	11%	13%	12%
YoY OP									21%	16%	17%	13%
YoY NP									24%	18%	18%	13%

Source: Korea Investment &amp; Securities

**Balance sheet**

FY-ending Dec. (W bn)	2012A	2013A	2014F	2015F	2016F
Current assets	326	358	395	446	499
Cash & cash equivalents	25	42	47	53	59
Accounts & other receivables	184	185	204	230	257
Inventory	95	108	119	135	150
Non-current assets	314	356	413	460	507
Investment assets	74	81	90	102	114
Tangible assets	212	240	285	315	345
Intangible assets	15	15	17	19	21
Total assets	641	714	809	905	1,005
Current liabilities	256	280	320	350	375
Accounts & other payables	153	162	179	202	226
ST debt & bonds	75	89	104	114	119
Current portion of LT debt	1	3	5	8	10
Non-current liabilities	46	51	54	58	62
Debentures	0	0	0	0	0
LT debt & financial liabilities	17	22	22	22	22
Total liabilities	302	331	374	409	438
Controlling interest	338	382	435	497	568
Capital stock	11	11	11	11	11
Capital surplus	41	41	41	41	41
Other reserves	(0)	(0)	(0)	(0)	(0)
Retained earnings	240	285	337	400	472
Minority interest	0	0	0	0	0
Shareholders' equity	338	382	435	497	568

**Cash flow**

FY-ending Dec. (W bn)	2012A	2013A	2014F	2015F	2016F
C/F from operations	42	76	92	92	101
Net profit	38	47	56	66	74
Depreciation	34	40	45	50	53
Amortization	1	1	1	1	2
Net incr. in W/C	(37)	(24)	(10)	(24)	(27)
Others	6	12	0	(1)	(1)
C/F from investing	(55)	(81)	(102)	(97)	(100)
Capex	(59)	(59)	(94)	(83)	(87)
Decr. in fixed assets	6	3	3	3	3
Incr. in investment	1	(2)	(7)	(10)	(10)
Net incr. in intangible assets	(2)	(1)	(3)	(4)	(4)
Others	(1)	(22)	(1)	(3)	(2)
C/F from financing	7	21	15	10	5
Incr. in equity	0	0	0	0	0
Incr. in debt	10	23	18	13	8
Dividends	(3)	(3)	(3)	(3)	(3)
Others	0	1	0	0	0
C/F from others	(0)	0	0	0	0
Increase in cash	(5)	17	4	6	6

Note: K-IFRS (consolidated)

**Income statement**

FY-ending Dec. (W bn)	2012A	2013A	2014F	2015F	2016F
Sales	883	999	1,104	1,245	1,393
COGS	748	849	945	1,063	1,188
Gross profit	134	150	159	182	205
SG&A expenses	78	81	79	90	100
Operating profit	57	69	79	93	104
Financial income	6	9	9	9	9
Interest income	1	1	1	1	1
Financial expenses	15	15	16	17	17
Interest expenses	4	4	5	5	6
Other non-operating profit	1	(2)	(2)	(3)	(3)
Gains (Losses) in associates, subsidiaries and JV	2	2	2	2	2
Earnings before tax	51	61	71	84	95
Income taxes	13	14	16	19	22
Net profit	38	47	56	66	74
Net profit of controlling interest	38	47	56	66	74
Other comprehensive profit	(2)	(0)	(0)	(0)	(0)
Total comprehensive profit	36	47	55	65	74
Total comprehensive profit of controlling interest	36	47	55	65	74
EBITDA	92	110	126	144	159

**Key financial data**

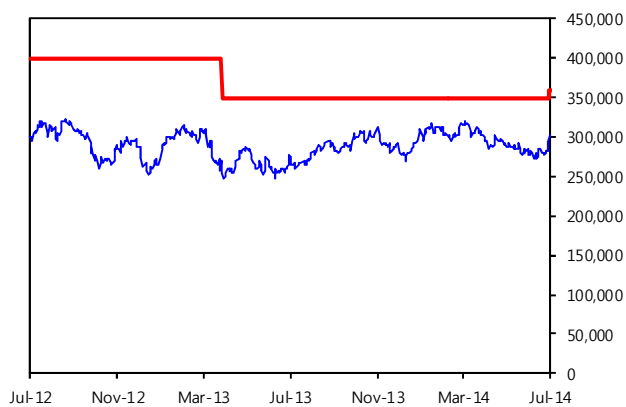
FY-ending Dec.	2012A	2013A	2014F	2015F	2016F
Per-share data (KRW)					
EPS	1,827	2,256	2,654	3,126	3,537
BPS	16,097	18,203	20,697	23,663	27,039
DPS	140	140	140	140	140
Growth (%)					
Sales growth	27.2	13.1	10.5	12.8	11.8
OP growth	3.7	20.6	15.6	17.0	12.5
NP growth	(12.6)	23.5	17.6	17.8	13.2
EPS growth	(13.4)	23.5	17.7	17.8	13.2
EBITDA growth	18.1	19.8	14.3	14.7	10.4
Profitability (%)					
OP margin	6.5	6.9	7.2	7.5	7.5
NP margin	4.3	4.7	5.1	5.3	5.3
EBITDA margin	10.4	11.0	11.4	11.6	11.4
ROA	6.3	7.0	7.3	7.7	7.8
ROE	11.9	13.2	13.6	14.1	14.0
Dividend yield	0.9	0.7	0.6	0.6	0.6
Dividend payout ratio	7.9	6.4	5.4	4.5	4.1
Stability					
Net debt (W bn)	80	84	98	104	106
Debt/equity ratio (%)	32.0	33.9	34.0	32.3	29.7
Valuation (x)					
PE	8.6	9.5	8.5	7.2	6.4
PB	1.0	1.2	1.1	1.0	0.8
EV/EBITDA	4.5	4.9	4.5	4.0	3.6



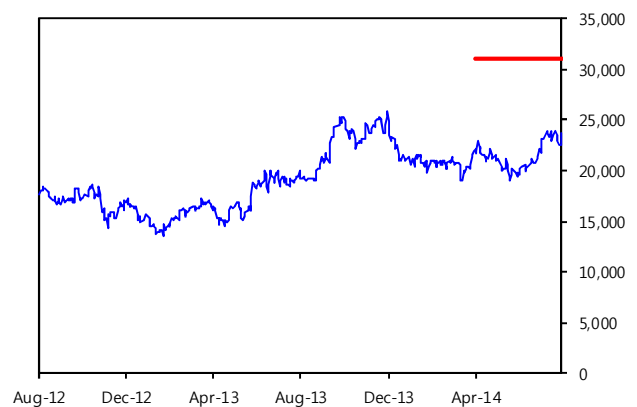
## Changes to recommendation and price target

Company (Code)	Date	Recommendation	Price target	Company (Code)	Date	Recommendation	Price target
Hyundai Mobis (012330)	10-22-12	BUY	W400,000		04-25-13	BUY	W110,000
	04-26-13	BUY	W350,000		06-05-13	BUY	W135,000
	07-30-14	BUY	W360,000		07-26-13	BUY	W150,000
Pyeong Hwa Auto (043370)	04-01-14	BUY	W31,000		10-25-13	BUY	W170,000
Mando (060980)	11-02-12	BUY	W200,000		04-01-14	BUY	W184,000
	02-08-13	BUY	W170,000		04-10-14	BUY	W158,000

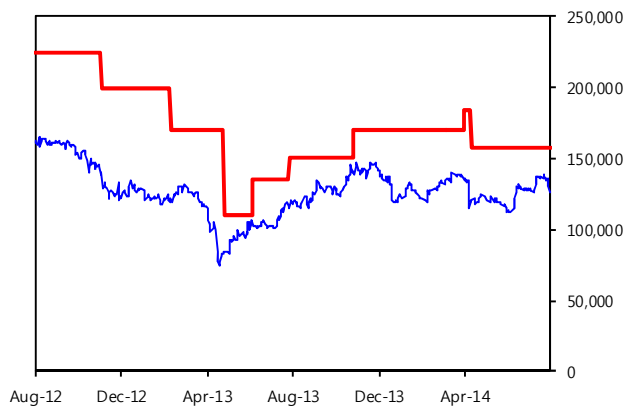
Hyundai Mobis(012330)



Pyeong Hwa Auto(043370)



Mando(060980)



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Prepared by: Jinwoo Kim

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