

GROUND VIEW

pg 4. COVER STORY:
A story of the BS-6 catapault and EV sustainability

pg 38. INTERVIEW: Arun Jain

pg 40. Indian Economy - Trend Indicators

pg 42. PhillipCapital Coverage Universe - Valuation Summary



A story of the BS-6 catapault and EV sustainability

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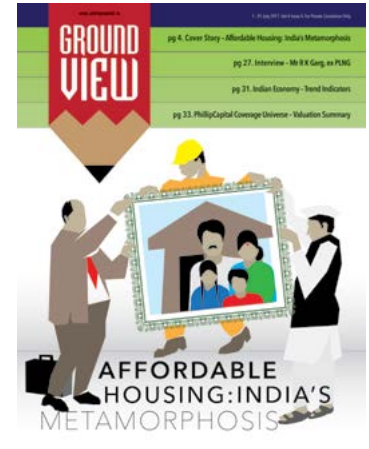
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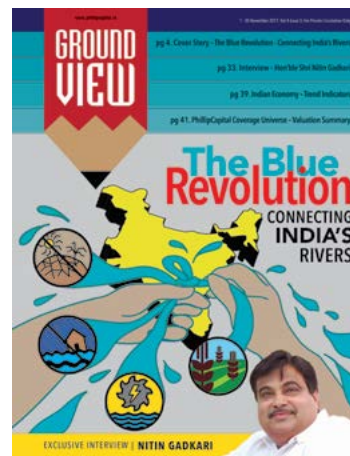
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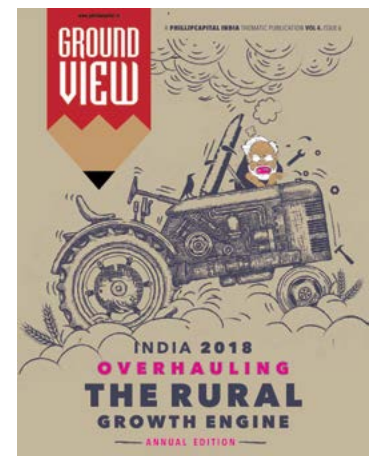
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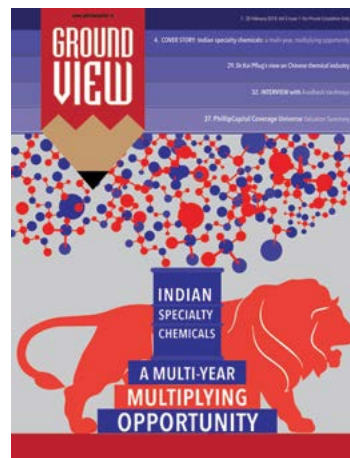
1st July 2017 Issue 4



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Letter from the MD

India overtook Germany as the fourth-largest automotive market in FY18 with +9% growth. However, this growth could hit a speed breaker called BS-6 beginning FY21. Vehicles are going to become expensive after BS-6. India's vehicles industry has been given only a three-year run up for the BS-6 transition – BS-4 was implemented in April 2017 and BS-6 will roll out from 1 April 2020. In contrast, Europe took nine years to transition to Euro-6 from Euro-4. Even in India, it took six years for implementing BS-4 norms. Tough times are inevitable for the automotive industry ahead, but along with challenges, they are likely to throw up great opportunities.

In this issue, Ground View has taken a long ride into the various technical and commercial alleyways of the BS-6 transition to estimate the impact on various OEMs. This is followed by many discussions with technology partners, global suppliers, auto ancillaries, R&D professionals, and OEMs.

GV has also tried to precipitate the question 'what after BS6' and it increasingly looks like the successors of BS6 are going to be electric vehicles. Global EV adoption estimates for 2030 range from as low as 15% to as high as 50%. Globally, opinions about how and when electric-vehicles will become truly mainstream vary. Therefore, to understand the concept of EVs better, auto analyst Nitesh Sharma took a 1,500km ride in a Tesla in Norway over five days – Norway has one of the best and most well-established EV ecosystems in the world. This experience helped forge a deeper understanding of 'living an EV life', whether it is achievable for India, and the forthcoming challenges in implementation of the government's plan to make India an EV nation from as early as 2030.

Best wishes

Vineet Bhatnagar

CONTENTS



**4. COVER STORY: Cleaner, greener, better
A story of the BS6 catapult and EV
sustainability**

**38. INTERVIEW: Arun Jain
Driving Digital Leadership
in the Global Product
Segment**



40. Indian Economy: Trend Indicators

**42. PhillipCapital Coverage Universe
Valuation Summary**



**CLEANER,
GREENER,
BETTER...**

BY NITESH SHARMA AND VIPUL AGRAWAL

A story of the BS-6 catapult and EV sustainability

pg. 6 CLEANER, GREENER, BETTER??

Run up to the big (BS-6) change

pg. 8 TWO WHEELERS: MIGHT HIT A SPEED BUMP

Changes for two wheelers post BS6

pg. 13 PVS: NOT A MAJOR DENT

Four wheelers – industry to shift more towards petrol after BS-6

pg. 18 BURNING THE MIDNIGHT OIL

MHCVs – on a tight rope

pg. 22 EV ADOPTION COULD SURPRISE - GV VISITS NORWAY

Are electric vehicles viable in India?

pg. 30 IN A NUTSHELL

Why is EVs/Tesla successful in Norway

pg. 33 APPENDIX

Paul Quayle / Alamy Stock Photo

Run up to the big (BS-6) change

GV met with a range of industry participants to understand the changes and impact of BS-6

The Indian automobile industry is in the midst of a paradigm change in technology

- Transition to BS-6 norms directly from BS-4 (skipping BS-5)
- Potential structural change in demand patterns with electric vehicles (EV) gaining traction

The decision taken in 2017 to implement BS-6 from 1st April 2020 implied that India's vehicles industry had only three years left to transition. This is a very short period compared to the nine years that Europe took to transition to Euro-6 (for passenger and commercial vehicles) from Euro-4. It can be recalled that the implementation of BS-4 norms on a pan-India basis took six long years. In any case, the government's decision to skip the implementation of BS-5 and directly implement BS-6 norms has led to India's vehicle industry luminaries making a beeline for their drawing boards with various product plans, and sorting out their supply-chain management with vendors.

From all angles, it looks like the road ahead for OEMs is daunting and that the transition phase is going to be difficult. In this issue, Ground View has taken a long ride into the various technical by-lanes and commercial alleyways of the BS-6 transition motorway and tried to estimate the impact on various OEMs. This follows many discussions with technology partners, global suppliers, auto ancillaries, R&D professionals, and OEMs.

Later in the issue, GV also shares its experience of a 1,500km EV ride in Norway over five days and gets into the details of that country's EV ecosystem. This experience helped get a deeper understanding of 'living an EV life', whether it is achievable

for India, and the forthcoming challenges in implementation of the government's plan to make India an EV nation from as early as 2030.

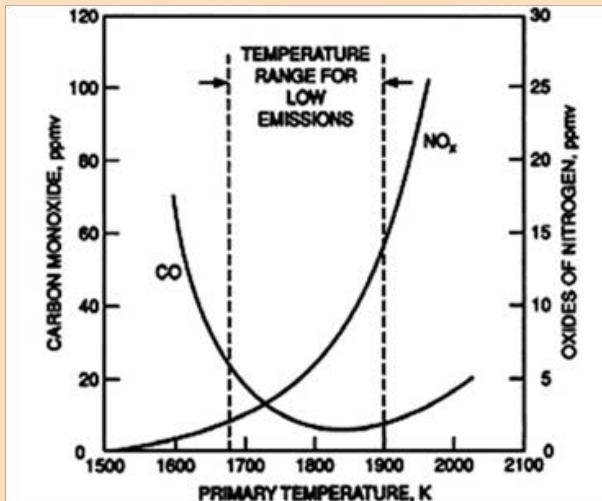
BS-4 to BS-6: An expensive yet mandatory journey

GET SET GO.....This is what the Ministry of Road Transportation basically asked of automobile manufacturers a couple of years ago, when it advanced the deadline for implementation of BS-6 norms in India. Shocked initially, the industry quickly started devising plans for its implementation. This rollout is not going to be a simple affair. Not only will it need considerable effort from auto OEMs, but also from the entire ecosystem – ranging from vendors to fuel availability. While technology implementation has precedents in the developed world (except for two-wheelers), which is already producing Euro-6 vehicles, customising the rollout for Indian conditions and establishing a supply chain remains daunting.

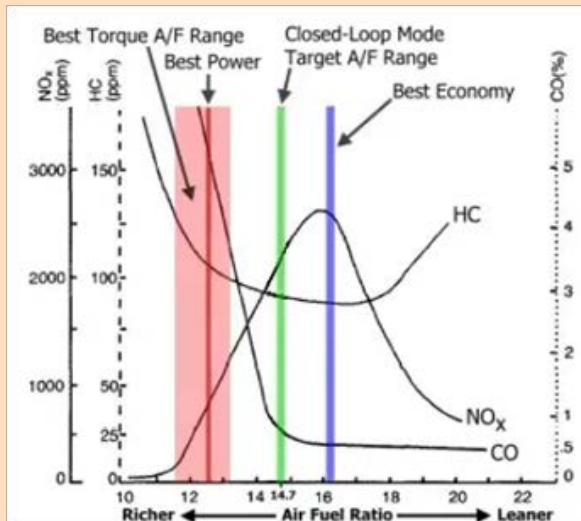
Some clear winners and losers are already visible in the transition process. Consumers are set to lose some, gain some. The green lobbies rejoiced when the government decided to skip BS-5 and implement BS-6 (better for the environment) directly; however, this fresh(er) air will also burn a hole in consumers' pockets, given high costs (especially during the initial years) due to high import content.

The main change that will be needed will be managing engine temperature – in fact, it's of the utmost importance. It determines the emissions from a vehicle. Lower engine temperatures will entail higher carbon monoxide emission while higher temperature will mean excess nitrogen oxides (NOx) release.

Controlled engine temperature and air/fuel ratio is of utmost importance to control emissions



The main change that will be needed will be managing engine temperature - in fact, it's of the utmost importance. It determines the emissions from a vehicle. Lower engine temperatures will entail higher carbon monoxide emissions while higher temperature will mean excess nitrogen oxides (NO_x) release.



Air-fuel ratio plays an important role in particulate matter emission, power and mileage of the vehicle

TWO WHEELERS MIGHT HIT A SPEED BUMP



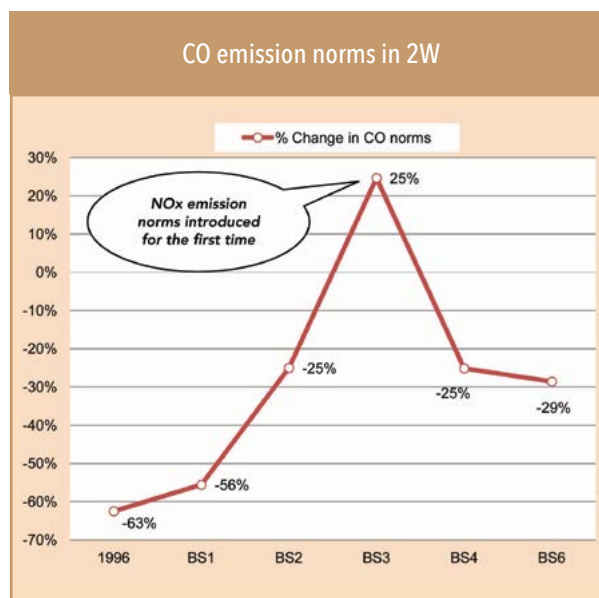
Changes for two wheelers post BS6

The lower end might see pressure. Bajaj's price aggression could prove fruitful after BS6

In terms of (lower) emissions, the Indian 2W industry will be at par with the most advanced globally, even vs. developed nations such as the US and the EU. While the EU is still working with Euro-5 norms (implementation date for Euro-6 norms not yet decided), the US is substantially behind in terms of emission limits. Advanced technology will come at higher costs and will hit the lower end of the industry more.

NOx to be contained in a big way: The entire system will have to be altered

The NOx emission limit, introduced in BS-4, has to be reduced by 83% under BS-6. In addition, the Non Methane Hydrocarbon (NMHC) emission limit has been introduced for the



*NOx norms were introduced for the first time with BS-3, hence the increase in CO emissions

first time. In order to adhere to these norms, OEMs are shifting from mechanical fuel injection systems (carburettor-based) to electronic fuel injection systems. This requires tweaking the exhaust system – which means the engine and after-treatment system has to be altered. These changes would imply an additional cost of Rs 5000-8000 per vehicle, says Mr Singh who works with the R&D department of a leading two-wheeler manufacturer. He says that all OEMs are working with different partners and are at different stages of this transition. “One thing is clear – that 2W volumes will fall sharply due to price hikes. Which OEMs will sail through smoothly...only time will tell,” he philosophises.

There will be two major areas that will be modified to complete the migration

- Intake system
- Exhaust system

Intake system



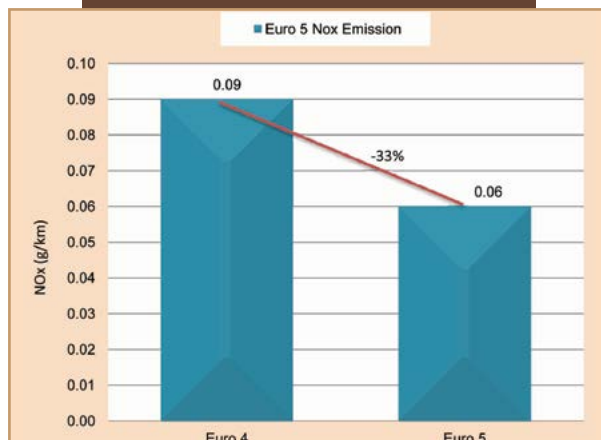
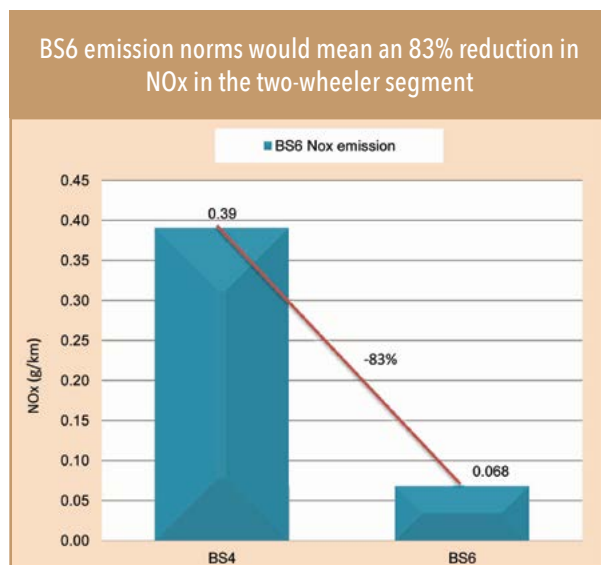
• Currently, two-wheelers are able to adhere to BS-4 norms by using carburetors as fuel-intake systems. These are priced at c.Rs 400-800 by OEMs, depending on the variant. Their cost has decreased significantly with ageing and localisation of technology. For example, this part was sold for Rs 1,600 for Yamaha FZ in 2010 (OEM supply), said an employee of an auto component company. But with localisation of parts and increased volumes, prices have plummeted by as much as c.60% over the years.



• After BS-6, OEMs will shift to ‘fuel injection’ systems, which will prove costly due to their high import content. However, costs should reduce with localisation of parts. While component manufacturers will be increasingly localised, some of the sophisticated parts such as fuel injector nozzles would be imported from Thailand and Japan because they are unlikely to be available in the desired quantity in India.

“One thing is clear - that 2W volumes will fall sharply due to price hikes.”

- Mr Singh (R&D department at a leading two-wheeler manufacturer)



Fuel-injection system: Consists of three parts

1) Throttle body



It would cost c.Rs 700. It is used for controlled intake of air. In fuel injected engines, it controls the amount of air flowing into the engine, in response to the driver's accelerator-pedal input.

2) Fuel injector:

Would cost c.Rs 500. Works like a spray nozzle of a hose, ensuring that the fuel comes out as a fine mist. The fuel mixes with the air passing through the inlet manifold or port and the fuel/air mixture enters the combustion chamber.



3) Fuel pump

Costs about Rs 1,000. Used to pressurise the fuel to the fuel injector as the input from the ECU.



ECU (Engine control unit) - The brain of a bike

Would be priced at Rs 1,000 according to Mr Bharadwaj. The main difference between electronic injection and mechanical injection

is that the former is controlled by a complex microprocessor unit. The ECU is fed with information from sensors mounted on the engine and measures air pressure, engine temperature, accelerator position, engine speed, throttle position, and crankshaft position.

All this information is used by the ECU to meter the fuel far more accurately than the old mechanical system, which relies on sensing the pressure alone. Simply put, the ECU takes inputs from multiple sensors and runs the engine in the most efficient way, resulting in controlled emissions - thereby meeting BS-6 norms.

Proposed EFI suppliers to OEMs

OEM	Suppliers
Hero	Multiple sourcing partners 2 models sourced from Continental 2 from Keihin 1 from Mikuni Will source electronic systems through its JV with Magneti Marelli
Bajaj Auto	Keihin and Bosch are its sourcing partners
TVS	Keihin, Mikuni and Continental
RE	Mikuni for throttle body and FI system from Bosch
Yamaha	Mikuni for throttle body and FI system from Bosch
Suzuki	Mikuni for throttle body and FI system from Keihin

Proposed cost of parts for BS6

System	Cost per part for a Fuel Injection System	
Intake System	Parts	Cost (Rs)
	Throttle Body	700-1200
	Fuel Injector	500-700
	Fuel Pump	1000-1300
Functional parts	ECU	1000-1300
	OBD	700-1350
Exhaust	Oxygen Sensor	200-350
	Muffler	1000-1500
Total		5000-8000*

* Price would vary per OEM per model

Exhaust system

In a two-tea hour-long discussion, Mr Bhardwaj revealed that in order to meet BS-6 emission requirements, two-wheelers would have to undergo two changes in their exhaust systems:

1. Use oxygen sensors
2. Upgrade mufflers to three-way loading

Oxygen sensor: O2 sensors are mounted in the exhaust manifold, which monitors the quantum of unburned oxygen in the exhaust. This helps the ECU understand if the fuel mixture is rich (less oxygen) or lean (more oxygen). This sensor is generally cheaper and would cost OEMs Rs 200-350.

Muffler (silencer): The bigger change in exhaust systems would be the up-gradation of mufflers to three-way loading, to control NOx emission, apart from reducing carbon monoxide and unburned hydrocarbons – which the existing two-way muffler does. This up-gradation would cost additional Rs 1,000-1,500.

BS-6 requires two-wheelers to be fitted with ‘on board diagnostic’ (OBD) systems to keep a check on emission levels.

OBD stage 1 is applicable from 2020, and stage 2 will be made compulsory from 2023. The transition also coincides with the mandatory usage of CBS/ABS braking systems. “All this means OEMs grappling with additional pressure,” muses Mr Bharadwaj.

OBD requirements post BS6

Monitoring items	OBD Stage 1 1 April, 2020	OBD Stage 2 1 April, 2023
Circuit continuity for all emission related power train component (if equipped)	Yes	Yes
Distance travelled since MIL (malfunction indicator lamp) ON	Yes	Yes
Electrical disconnection of electronic evaporative purge control device (if equipped and if active)	Yes	Yes
Catalytic converter monitoring	No	Yes
EGR system monitoring	Yes	Yes
Misfire detection	No	Yes
Oxygen sensor deterioration	No	Yes

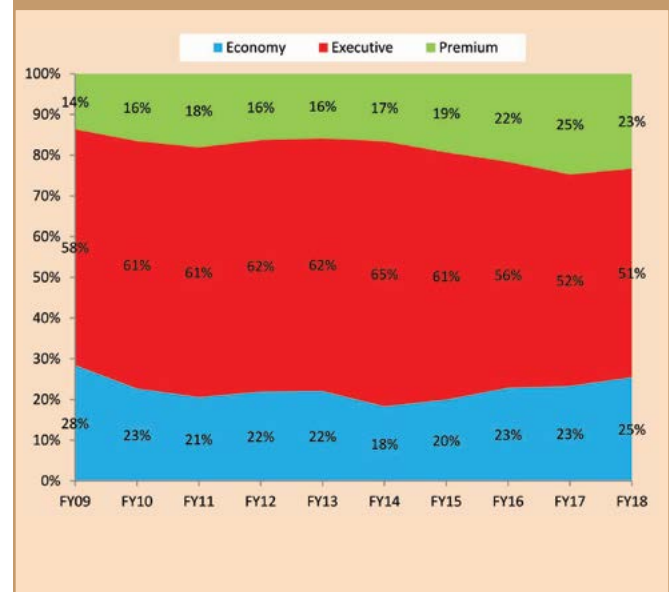
What it means for the two-wheeler industry...

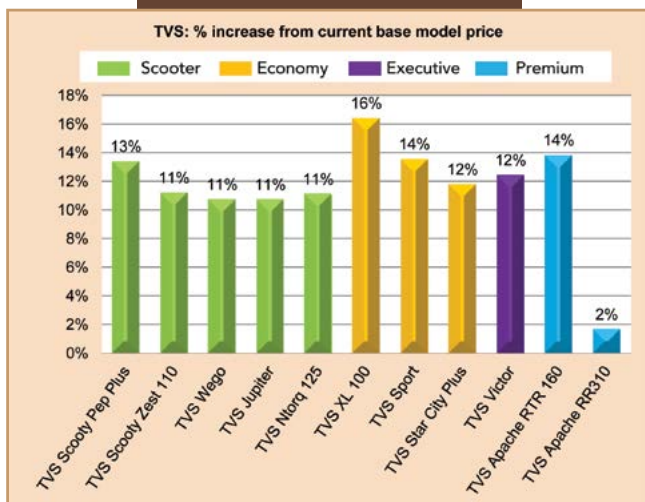
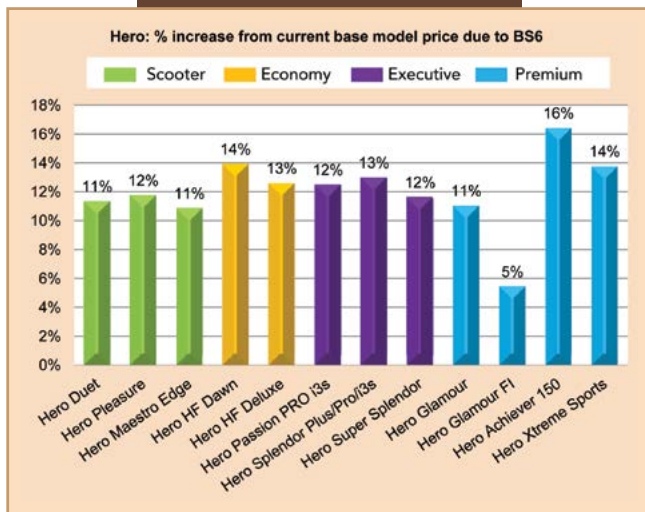
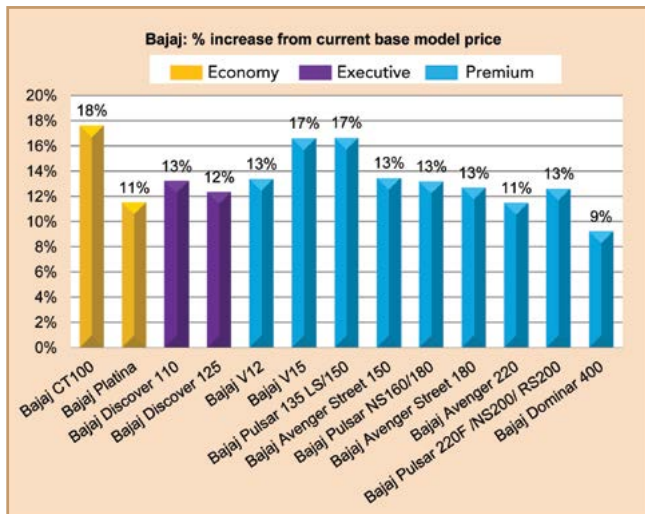
Price hikes could be sharp, Bajaj’s strategy might work post BS6

A range of experts believe that scooters/motorcycles would undergo a 10-18% price hikes (including ABS/CBS norms). It seems like Bajaj’s price aggression might become logical after shifting to BS-6, as executive segment motorcycles would cost about Rs 8,000 more, which could lead to customers down-trading.

Among the three listed players (Hero, Bajaj, TVS) only five two-wheeler models would be priced under Rs 50,000 (ex-showroom) after BS-6 vs. 15 models currently.

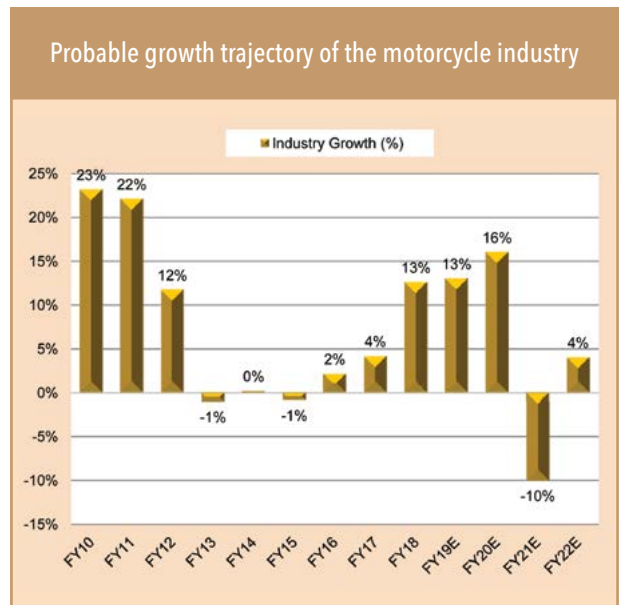
The executive segment has been getting consistently squeezed in favour of economy and premium segments. This will exacerbate with sharp price hikes after BS-6 as customers on a tight budget would prefer economy bikes and customers with more budgets might look at premium motorcycles as a better proposition.





Overall growth could stall for a year or two

The motorcycles segment, which clocked double-digit growth in FY18 after a long period, could see a sharp dip in FY21 as demand is impacted due to a sharp price hike after BS-6 rolls out.



Four wheeler – greater shift towards petrol after BS-6

While two-wheelers are likely to be more dented due to BS6, things are not so bad for the passenger vehicles segment

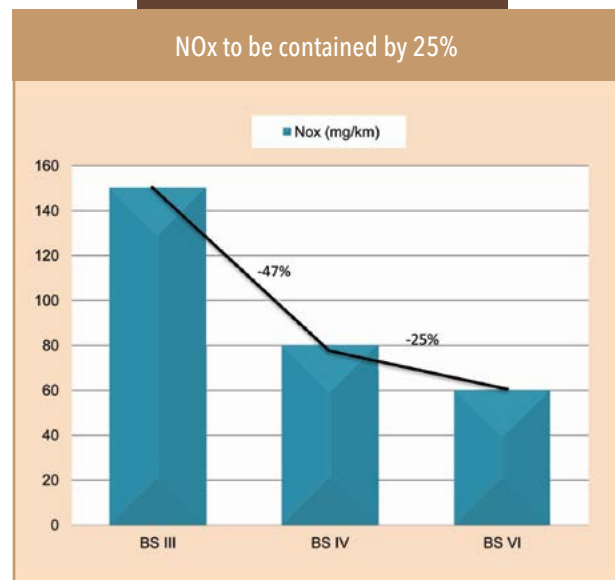
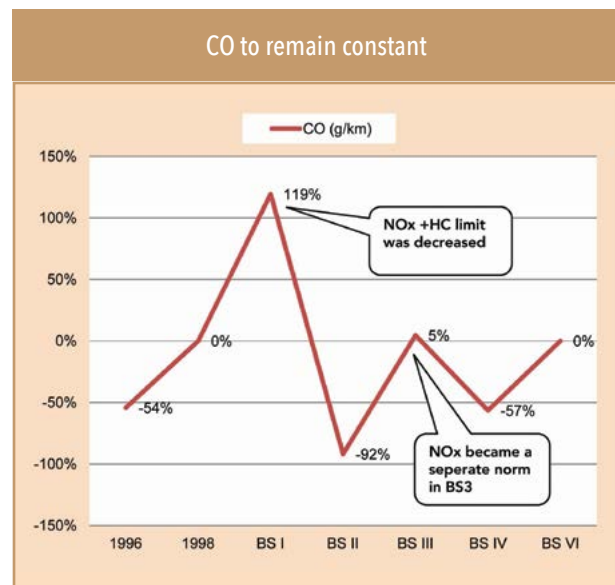
Gasoline cars – Minor ‘make-up’ needed

What’s changing in gasoline PVs after BS6?

- 1) Non Methane Hydro Carbon (NMHC) parameter has been introduced for the first time in BS6.
- 2) Mass of particulate matter has also been introduced for the first time.

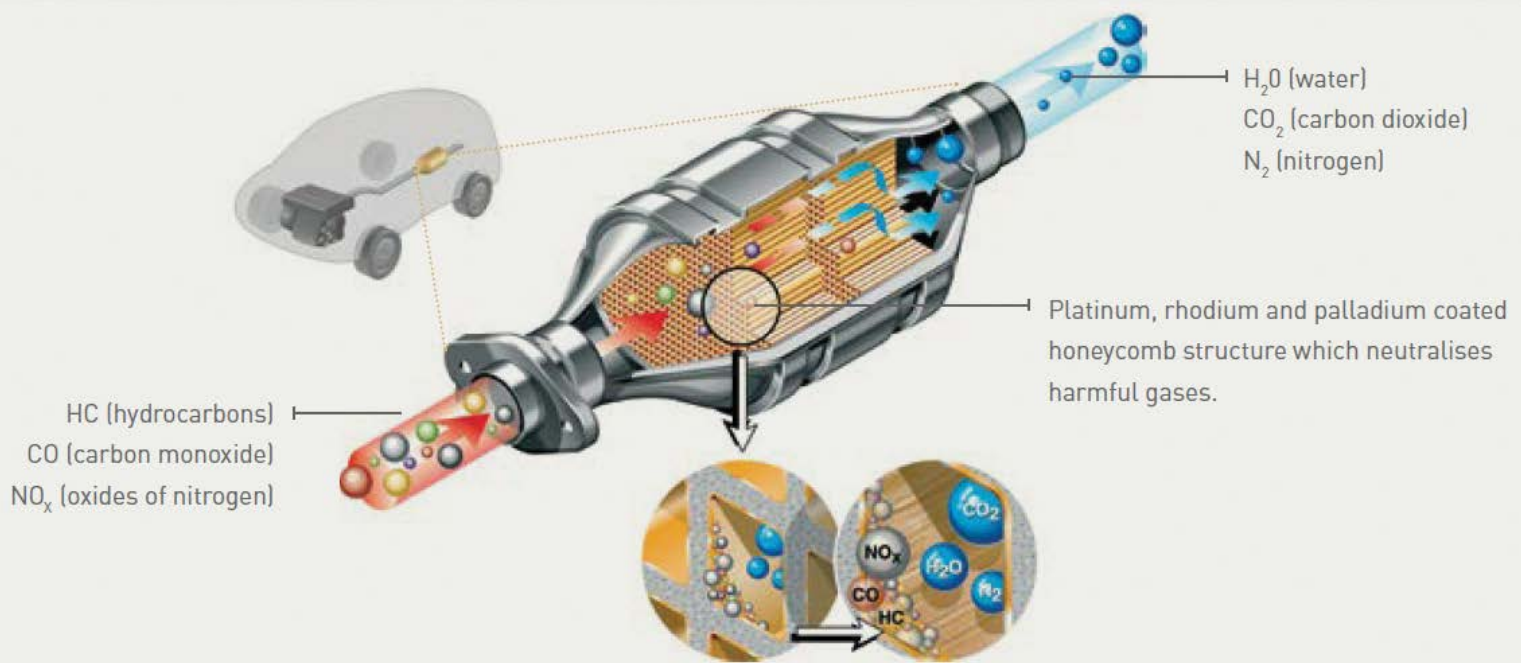
Industry veterans said that gasoline cars would need only mild changes to adhere to BS-6 norms. In the petrol engine, major changes have been made for carbon monoxide (CO), and hydrocarbons (HC) and Non Methane Hydrocarbon is added as separate category. “This is a minor challenge and can be controlled by increasing the thickness of the catalyst coating on the substrata of the honeycomb structure in the three-way muffler,” says an R&D expert at a leading OEM.

Palladium group metals (PGM) – namely platinum and palladium – are coated on the muffler to capture excess CO and HC, while rhodium reduces NOx. In BS-6, PGM coating will be increased by 50-100% leading to a cost pressure of c. Rs 12,000-24,000. Mr Matthew Beale, CEO of CDTi Technologies, a USA-based leader in exhaust emission control technologies said that with strict BS-6 norms, the demand of PGMs will increase substantially, making India a very good market for his company. CDTi would supply its advanced material technology to Indian OEMs through its JV with Sud-chemie, he was happy to note.



Industry opinion - BS-6 to be a cake walk for petrol cars compared with diesel cars

Palladium group metals (PGM) are coated on the muffler to capture excess CO and HC, while rhodium reduces NO_x

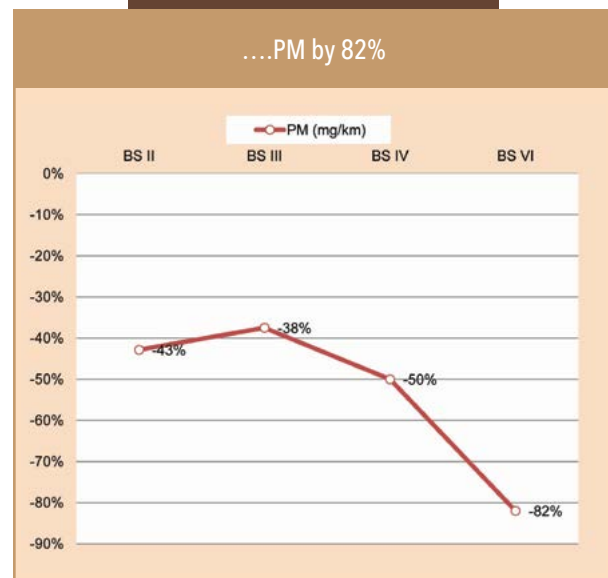
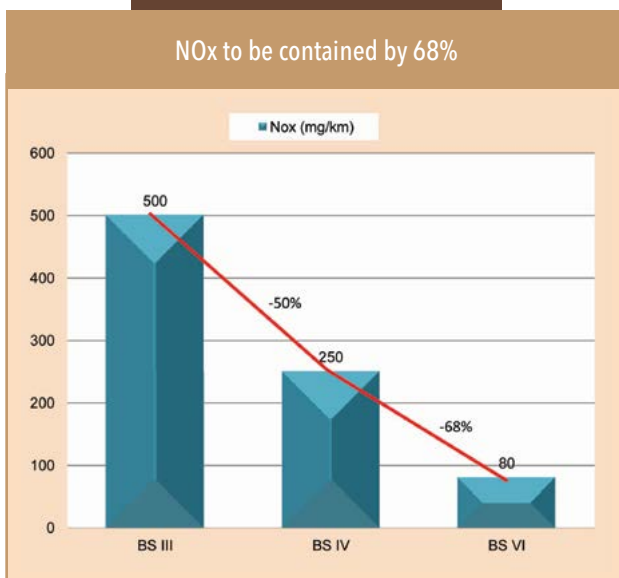
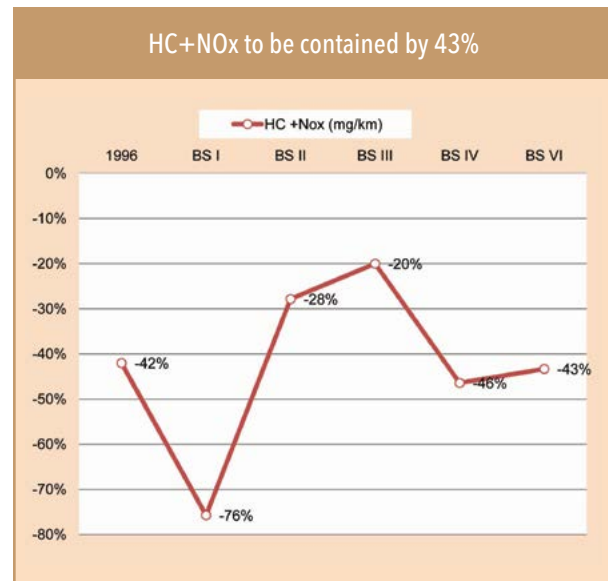
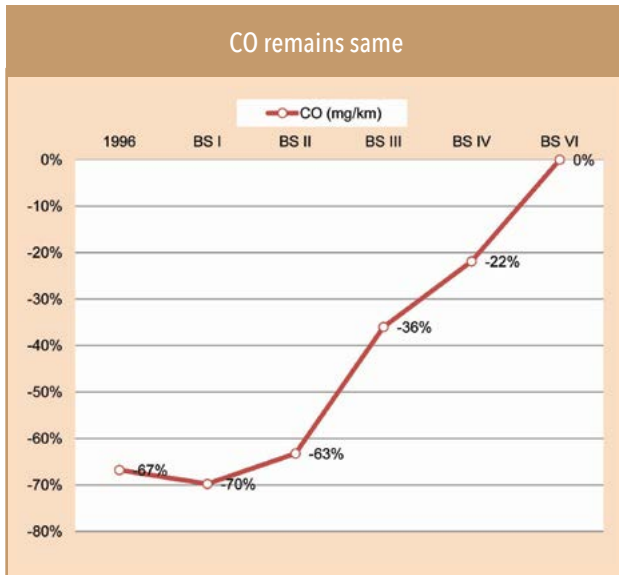


The structure and function of an autocatalyst

NO_x limit has to be reduced by 25% only in the case of petrol vehicles. NO_x is produced at high combustion temperatures in the engine. Temperature in the petrol engine is relatively lower (vs. diesel) so no additional 'after treatment' is needed for NO_x control. Extra sensors would be installed for monitoring the temperature at exhaust and emissions. "Keeping the engine temperature will be one of the key focus areas for gasoline. Overall, the cost impact on gasoline vehicles would be very minimal," said Atul, an R&D person working with an OEM. Turbocharger usage would also increase in petrol cars after BS-6. Turbocharger will help to produce the same BHP with a smaller engine, hence decreased PM emission.

Diesel PVs: To undergo significant changes

What's changing in diesel PVs post BS6?



There will be significant tightening in the emission norms of diesel passenger vehicles. NOx limit has to be reduced by c.70%, particle matter by 92.5%. In order to comply with these norms, OEMs would need to take quantum leap in technological advancement. Diesel vehicles above 1.5-litres capacity will be impacted the most. An industry expert from a global OEM who is currently working on its fleet conversion to BS-6 said, "Many diesel cars would be a totally new machine in the same body with the same name, with SCR fitting being the biggest challenge."

Many diesel cars would be a 'totally new machine' with the same brand name

These reforms can be divided broadly into two categories

A) Intake system and engine reforms: Control the generation of NOx and particulate matter

B) Improving of exhaust system: Filter the exhaust gases before finally releasing them in the environment

Intake system and engine reforms: Led by changes in fuel injection systems and more sensors

In order to comply with BS-6 norms, two things need to happen – (1) fuel combustion has to increase to the maximum extent in order to decrease the particulate matter, and (2) temperature must be controlled inside the chamber in order to decrease the NOx emissions (NOx is generated at high temperature). This will be done by managing air/fuel ratio in the mixture in combustion cylinder using electronic fuel injectors. “Companies currently using mechanical fuel pumps will now shift to electronic fuel pumps. The quantity of fuel will be controlled by ECU for a particular air fuel ratio in order to maintain the combustion temperature within a particular range, which will minimise NOx emission and maximise fuel combustion to minimise particulate matter generation,” said a technical expert. Even fuel injectors will undergo an upgrade. For example, Bosch will upgrade its fuel injectors to the ‘KS’ series from its ‘K’ series with the aim of reducing friction by changing the nozzle diameter.

Currently, most engines have just one sensor on top to measure the temperature of the entire engine. Going forward, there will be multiple sensors to measure the temperature of cylinders individually. This is to manage the temperature per cylinder, which will help reduce NOx generation even further. The data from these sensors will work as an input for the electronic fuel injector.

A production manager at a leading global fuel injection company said: “While sophisticated fuel intake systems are already developed in western countries, for India it will be more of a

technology transfer. However, it will still need a lot of investment in machinery and validation OEMs. Due to time constraints in developing products locally, initially, import content in the products will be high. But localisation of parts will increase eventually, thereby decreasing costs.”

Intake system and engine reforms would mainly imply improving piston rings, engine linings, turbochargers, fuel pumps, and adding more heat and pressure sensors. Cylinder profile in the engine is being improved by using special coating to decrease friction. However, the cost implication of this will be minimal compared to the overall cost. EGR coolers will be introduced to control the air temperature at intake, hence the combustion temperature. Traditional pneumatic turbo chargers will be replaced by electronic turbo chargers in BS-6 diesel passenger vehicles in order to control the intake of air, thus managing the temperature.

Exhaust system reforms: Might lead to the squeezing of sub-4mtr diesel cars

Exhaust gases need to be more filtered (within the prescribed limit) under BS-6, with the aim of causing minimum harm to the environment.

Passenger cars running on diesel will have to undergo a major upgrade in their exhaust system. Currently, lower horsepower cars do not sport a diesel particle filter, but they will have to add this under BS-6 in order to decrease the particulate matter in the exhaust. While the cost implications are small (c. Rs 3,000), DPF might mean an increase in bonnet and car size, thereby losing the excise benefit that a sub-4-mtr car enjoys. OEMs are working hard to customize DPF as per a model's requirement so that they don't have to increase the size of the vehicle. Larger diesel engines (1,600cc+) face big challenges as they would have to adopt SCR, which is expensive, along with additional catalyst coating. Mr Jain, an employee with a leading SUV manufacturer says, “Additional catalyst coating itself would cost us at least Rs 15,000. SCR cost is even higher. We are dealing with a total cost pressure of over Rs 60,000.”

While these technological changes seem as simple as 'plug and play' from developed nations, it really isn't that easy. For instance, urea used in SCR technology becomes very dense at colder (sub-zero) temperatures, therefore it comes with a pre-fitted heating system in Europe. However, this is not needed for most Indian geographies. DPF is widely used in diesel cars, but it can't be used straight away in India as most cars sold in the country are less than 4mtrs long. Customisations are not only time consuming, but also entail higher investment and R&D.

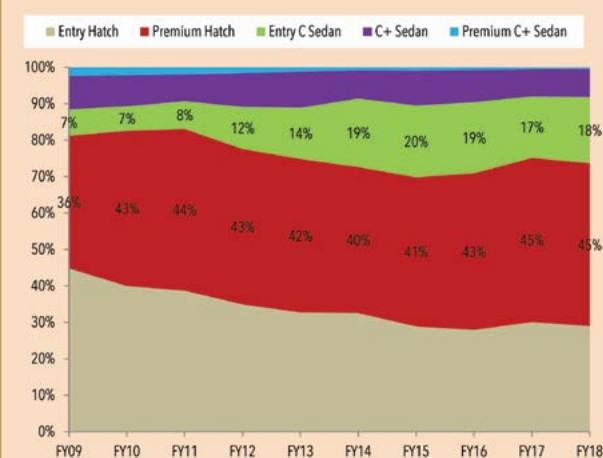
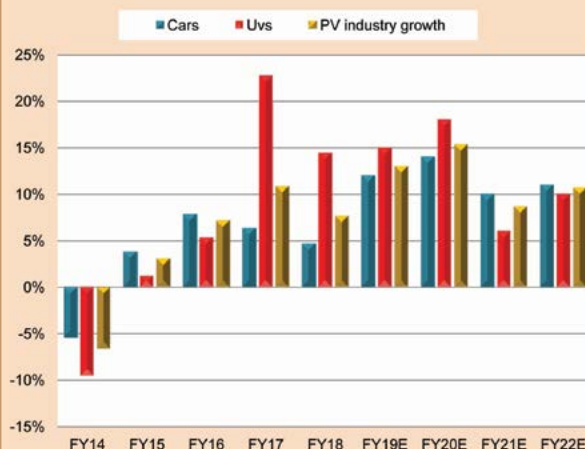
Implications for the PVs sector

PVs might be the least impacted segment due to the BS-6 transition, but there could still be two major shifts:

- (1) The compact sedan segment, which currently forms c.20% of passenger car sales, could see a substantial shift towards petrol, if Indian OEMs are unable to customize DPF and fit it in smaller diesel cars (maintaining the 4mtr length).
- (2) SUVs might also see a shift to petrol as diesel SUVs would need to take a Rs 75,000-100,000 price hike, which would further increase the price differential between a gasoline vs. diesel engine SUV. A case in point – the difference between a petrol Hyundai Creta and a diesel one is c. Rs 200,000 currently. This will increase to nearly Rs 300,000 after BS-6, leaving no incentive for a buyer to go for the diesel version.

If this is the outcome of BS-6, Maruti, who is the king in gasoline vehicles in India today, could win a big share of the SUV segment. There could also be a pickup in the sales of 'mild' hybrids.

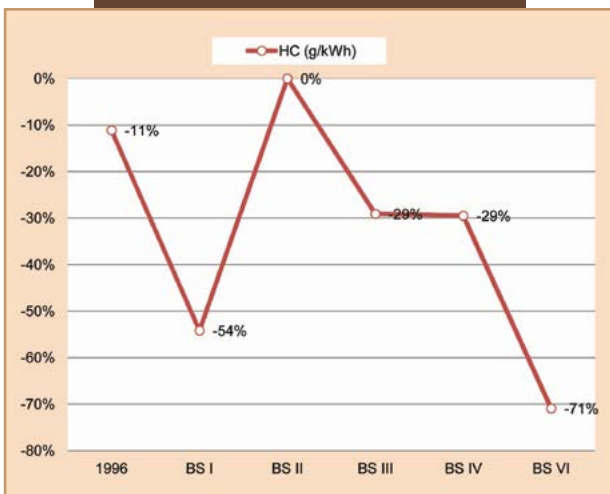
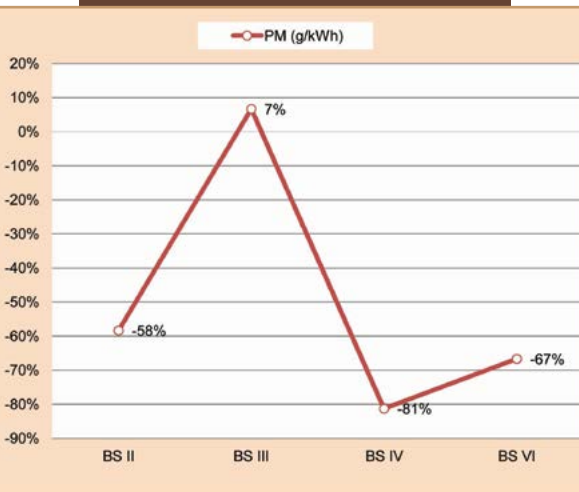
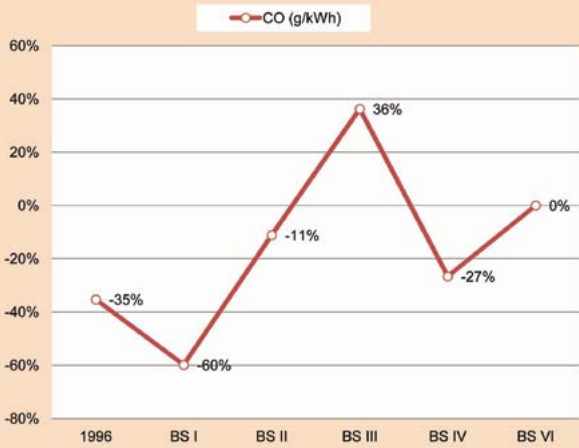
PV industry sales growth might not be impacted after BS-6, but the UV segment might see slower growth for a while



MHCVs: BURNING THE MIDNIGHT OIL

WHAT'S CHANGING IN MHCVs POST BS6?

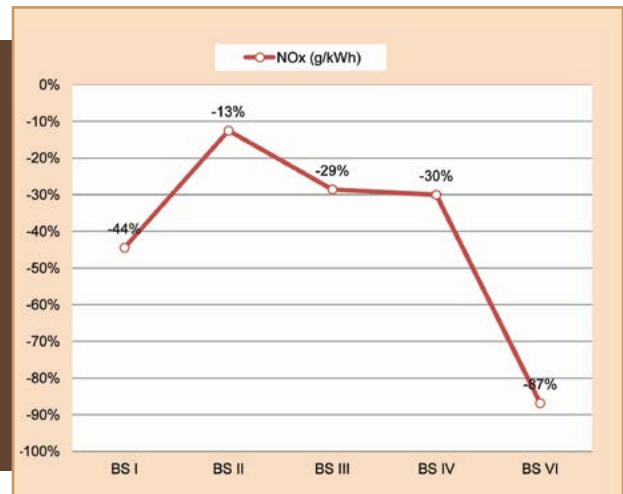
MHCVs would need to contain significant levels of NOx, HC, and PM



MHCVs – on a tight rope

Rahul, an employee in the R&D department of a leading MHCV manufacturer, said: “The MHCV segment is under tremendous pressure when it comes to adhering with BS-6 norms. All the OEMs are on their toes not only because of emission limits but also because they want to ensure low costs. Currently, it looks like we will have to take at least a 15% price hike as 130HP and above trucks would need to use both EGR and SCR, with changes in the driveline and gearbox.” However, the good thing is that fuel efficiency would improve by 10-15% under BS-6, he added, providing these details:

- There is significant tightening in the emission norms of heavy-duty vehicles: NOx limit has to be reduced by c.87% and particle matter by c.67%.
- OEMs Tata motors, Mahindra, Bharat Benz will add EGR technology to their



existing SCR technology. Ashok Leyland will add SCR technology along with its iEGR technology. This major change will be complemented by several other changes in the driveline, gearbox, fuel injection systems, and other technological advancements.

- Globally most MHCV OEMs use a combination of both EGR and SCR, as controlling NOx with standalone technology is almost impossible and also creates engine instability.

Most of the global OEMs use EGR+SCR to comply with Euro 6 norms

Manufacturer	Euro 4	Euro 6
Cummins	SCR	EGR + SCR
Daimler	SCR	EGR + SCR
DAF	SCR	EGR + SCR
Iveco	SCR	SCR
MAN	EGR	EGR + SCR
Scania	EGR / SCR	SCR
Volvo	SCR	EGR + SCR

“Engine modification is a BIG cost to the company, if you need to change anything, now is the time.”

- Rahul, R&D department of an MHCV player

Engine and intake system reforms a major overhaul; electrical to replace mechanical systems

Rahul, the MHCV R&D person says that under BS-6, truck engines will go through a major overhaul across segments, with more usage of centrally controlled functions using ECU. Engine and intake reforms would mainly mean reduction in friction level in engines and more controlled combustion,

which in turn would improve efficiency and minimize emission. Turbo chargers would be upgraded to electronic (currently pneumatic) this would boost power, minimize heat loss, and PM emission. Further, all the accessories/child parts such as water pump, fuel pump, oil pump, and air compressor would be electrified (they were earlier belt or gear driven). All these changes, along with some changes in the gearbox and driveline, would not only help control emission but also improve fuel efficiency by as much as 8 -12%.

Exhaust system changes – SCR to shake hands with EGR

Here are some of the things that will change:

- (1) OEMs would have to use both SCR and EGR technologies. It is very difficult to achieve BS-6 level NOx by only using one of these technologies
- (2) Fuel injection systems would be upgraded to ECU controlled from pneumatic
- (3) Size and ratio of ad-blue tanks would increase
- (4) Exhaust will need to be covered with special insulation
- (5) DPF would need special PGM coating, LCVs can control NOx by using LNT (lean NOx trap)
- (6) Catalyst quantity in the SCR is increased.

OEMs are worried about both things – smooth implementation of technology as well as cost implications. Currently, it appears as if the shift to BS-6 will lead to a 15% hike in prices in the +130HP categories, but this will be along with a 8-12% improvement in fuel efficiency.

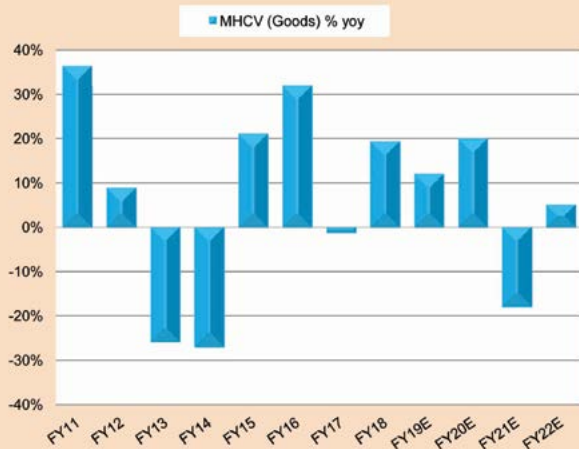
MHCVs: Segment-wise reforms and fuel savings expected

	Description	Fuel Saving
Engine friction reduction	Engine efficiency is affected by friction losses	0.5-1.5%
Combustion Optimisation	Controlled combustion to maximise fuel efficiency and minimize emission	2-3%
Turbocharger improvements	Electronic turbocharger will minimise heat loss and boost power in an optimal way to minimize particulate matter emission	1.0-3.5%
Accessories	Water pump, fuel pump, oil pump, and air compressor are belt or gear driven. Electrification of these accessories will decrease load on the engine	0.5-2.0%
Advance engine controls	ECU controlled fuel injection, time optimisation of other functions such as coolant pumping, exhaust, and turbocharger control will improve efficiency	1-3%
After-treatment systems	It plays a vital role in combustion optimisation by creating back pressure to run the turbocharger	2-3%

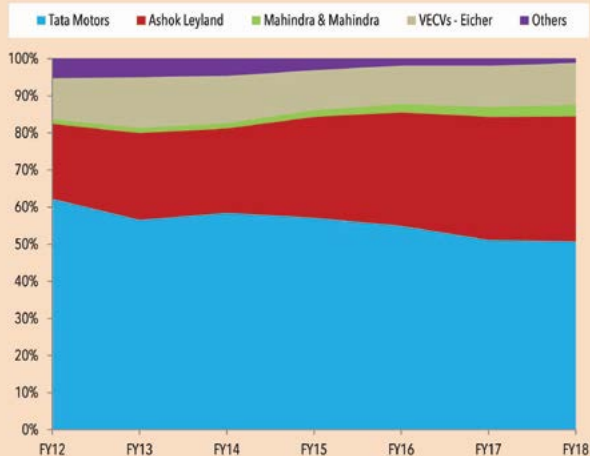
Summary of reforms needed in all categories of automobiles to adhere to BS-6 norms

	Intake System	After Treatment system
Common to all	Improvements in engine combustion and calibration for PM control	
Two-wheelers		All vehicles will have a three-way catalyst
Passenger vehicles - petrol	Carburettors to be replaced by electronic fuel injection system Turbocharger to be introduced in many vehicles	Catalyst coating to be increased in the muffler
Passenger vehicles - diesel (up to 1.4 litres)	Conventional turbocharger to be replaced by electronic turbocharger	Catalyst coating to be increased in the muffler
Passenger vehicles - diesel (above 1.4 litres)		SCR system for NOx control
Light commercial vehicles	NOx control: EGR cooled with higher EGR rate	PM control: DOC + DPF NOx: LNT
	NOx control: EGR cooled with higher EGR rate	NOx control: SCR system (closed loop)
MHCV	Electronic turbocharger controlled by ECU rather than air pressure Electronic fuel pump in place of mechanical pump	PM control: DOC + DPF coated with PGM Increased palladium group metal catalysts at hot end by c.100%

MHCV demand should dry up after BS-6 led by pre-buying, a sharp 15% price hike in a sensitive market, and fleet operators awaiting product and new engine platform feedback before making a buying decision



Ashok might lose its edge to competitors, as it will adopt SCR for the first time



Implications for the MHCV sector

The MHCV sector should see a very strong pre-buying in the run up to the BS-6 shift in FY20, after which demand should dry up led by pre-buying, a sharp 15% price hike in a sensitive market, and fleet operators awaiting product and new engine platform feedback before making a buying decision (which generally takes up to 6-12 months). Ashok might be at a losing end vis-à-vis competitors, as it would adopt SCR for the first time. The price impact on Ashok would be much higher due to its shift from iEGR to SCR. Besides, fleet operators have already used SCR-based platforms of competitors who adopted SCR during the shift to BS4.



pfjhpix / Alamy Stock Photo

Are electric vehicles viable in India?

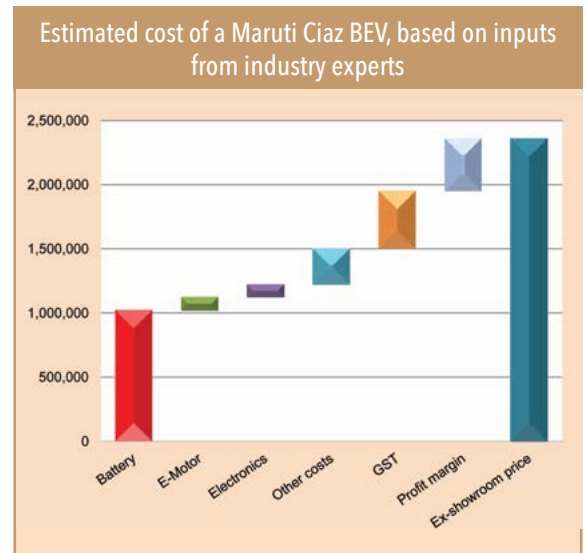
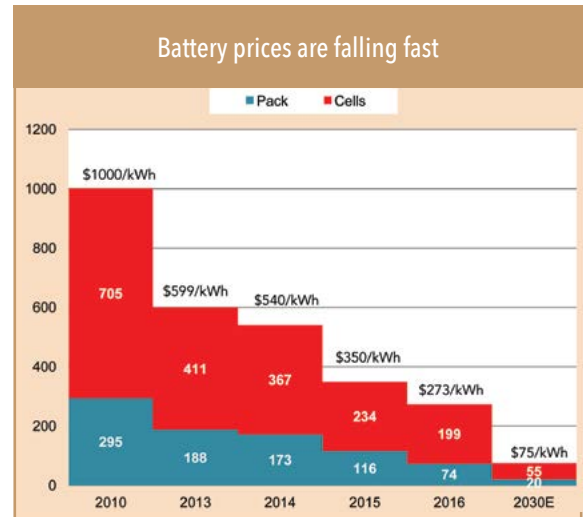
For now, they are only going to add to the BS-6 fright. There are many opinions out there about how and when electric-vehicles will become truly mainstream the world over. Various OEMs have diverse estimates and plans for the next decade. Adoption estimates for 2030 range from as low as 15% to as high as 50%. Most of these forecasts hinge on affordability and a fall in battery prices (which have been consistently falling). But how viable are electric vehicles in the Indian context?

India: A less than electrifying outlook for now

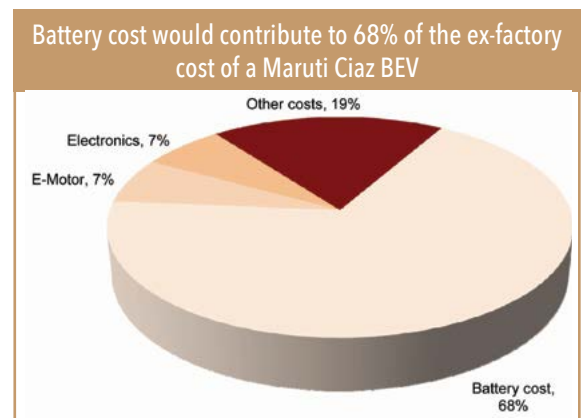
A lot has been written about the adoption of electric vehicles in Europe and North America. But what about the future of electric vehicles in India? GV spoke with various domestic OEMs, component manufacturers, and experts to get a handle on how things stand. Disappointingly, but perhaps unsurprisingly, most players seemed to be on the back-foot; they kept citing the lack of charging infrastructure and high battery prices as big constraints for EV adoption in India. "At current battery prices, converting a vehicle, let's say a regular Maruti Swift into a BEV is not feasible, as its price would be over Rs 1.5mn. Unless the government rolls out big subsidies it would be a failure," says Suresh, who works in the R&D team of an OEM. Nevertheless, he is optimistic about the future. "Battery prices are falling fast, and if this trend continues, it might be feasible to build an affordable electric vehicle for the domestic market soon," he adds.

"Another major constraint to EV adoption in a country like India is infrastructure," says Mr. Singh, a consultant. No charging network, heavy traffic, and cramped cities are hurdles in India's electric vehicles story. He contends that while PV OEMs are not ready, 2W OEMs are. "Most 2W OEMs are in the final testing phase and we might see many electric 2Ws being launched this festive season." Generally, OEMs seem unwilling to invest large amounts in either product development or charging infrastructure. They see a 'very slow' adoption of EVs in India – mainly due to the high costs of converting an ICE vehicle to a BEV.

Industry experts had more insight into how much a leading C segment sedan (BEV) would cost ex-showroom. For market leader Maruti Ciaz (ex-showroom price starting at Rs 800,000), for example, the cost of the Li-ion battery alone could be as high as Rs 1mn. The ex-showroom price of a full battery operated Maruti Ciaz could be as high as Rs 24mn (assuming no tax rebates).



*assuming a 50KWH battery with range of 300+Kms, GST @28%



GV's Norway electric vehicle sojourn

With disappointing feedback from India, a visit to Norway, the Mecca of electric vehicles, seemed inevitable. GV undertook this visit – and it provided invaluable insights into how EV infrastructure has evolved and what led to a sharp pickup in EV sales (50%+ new vehicles sold in Norway are electric). PhillipCapital Analyst Nitesh Sharma decided to go the full nine yards. He decided to 'live with an EV' and test if it was feasible to drive a Tesla X for 1,500 kilometres (coast-to-coast) of this breathtakingly beautiful country. Nitesh talked to Tesla sales managers and customers to understand if living an EV life is comfortable, and more importantly – feasible. The idea was to collect takeaways for Indian OEMs and to answer the question – is it possible and viable for India to become a major EV market?

The friend from Oslo

Nitesh's trip began after landing at Oslo Airport, Gardermoen, on a very cold snowy day in February. He met his old friend Johnny and Johnny's wife Siri, who had agreed to loan their Tesla model X for three days. The beautiful snow-clad Tesla was already charging in their parking bay – all set for the three-day trip. Johnny helped Nitesh with the route options from Oslo to Bergen, and marked the places he could charge the vehicle en-route. He also helped Nitesh familiarise himself with the car's features, charging cycles, and told him a bit about why he eventually bought a Tesla instead of the Skoda that he was initially set on.

Johnny on why he prefers a Tesla X



"One big reason for going for the Tesla X was that my EMI increased by just NOK 700 per month (US\$ 85) vs. the EMI I would have shelled out for a Skoda. Tesla is available at a subsidised finance rate of 3% vs. 7% for other vehicles. Cost savings can be massive. The main reason it is extremely easy to own an electric car

is that the cost of owning a Tesla is miniscule vs. a fossil car. I spend only NOK 200/month (USD 24) on charging vs. NOK 2000 (USD240) that I would have spent on fossil fuel. Within electric vehicles, no other competitor offers a complete family car. Nissan Leaf, Jaguar Ipace, and other hybrids have very less space and low boot space. With three kids and two dogs, the Model X offered ample space with the best possible battery range for me.

We Norwegians care a lot about the environment, and EVs have no carbon pollution – because in Norway, electricity is generated through hydro and wind energy. Plus, Tesla has done a great job by placing a lot of 'super chargers' across the country where charging is free – you will see these on your ride from Oslo to Bergen. Another major incentive is free public parking and tolls (both of these are very expensive with public parking generally costing c. NOK 50/hour or USD 6; the toll for the Oslo-Bergen journey was more than NOK 600 or USD 75)."



The Tesla Model X being fully charged at home



350km range after a near full charge

N I T E S H ' S T R A V E L O G U E

After a tiring flight from India to Norway, Nitesh got a good night's sleep and began his journey the next morning.

Day 1: The trip begins in Oslo

My journey began from Oslo downtown at 9 AM, where I first shopped for essentials and took the opportunity to visit the great Viking Ship Museum, which highlights the rich cultural history of Norway's Vikings.



After this, I got on to the E16 Highway and started for Bergen. I was thoroughly impressed, not just by the car, but also its key, which is a replica of the Model X! What a futuristic touch! After a two-hour 150km journey, I stopped at the Tesla Supercharger in Gulsvik, located alongside a restaurant. It had the capacity to charge about 25 Tesla cars. Here, while I downed a coffee and a burger, the Tesla charged up almost fully, and for free.

Yes, this is the key!





The vehicle lost nearly half its charge after a 150km run in harsh winter conditions



The vehicle charged while I had some food

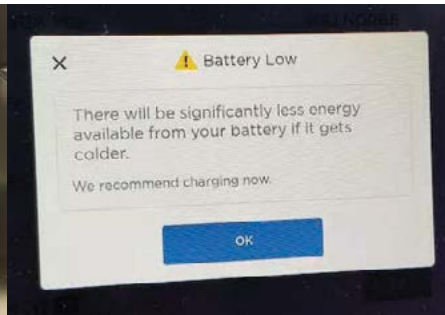
Why not ski?

After the pleasant break at Gulsvik, my next stop was Voss, which was almost 250 km away. I took the scenic route via Geilo Hill Station. The scores of skiing and dog sledging centres along the way proved too much of a temptation and I couldn't resist trying cross-country skiing. To my delight, I realised that I could select an option to keep the car's heating system active while I was away! And I could not resist exercising this option – who wouldn't want a warm and toasty car after a session in the freezing cold? After my tiring skiing session (and almost breaking my leg in the process) I used another feature of the car, which proved very useful in difficult weather conditions. This feature makes the door open fully as you approach the car, and as soon as you are seated and press the brake pedal, the door shuts automatically; the car then turns itself on. It's a very thoughtful feature, and particularly useful to a person unused to -10 degrees Celsius with a limp in his left leg!

The next leg (pun intended) of the journey was in difficult terrain full of snow and black ice, and I was truly impressed by how well the Tesla handled the road. Traction control seemed bullet proof on ice and snow, and ABS and all active sensors of the car certainly added to the ease of driving.

While driving conditions were not the best, the Model X took it all in its stride





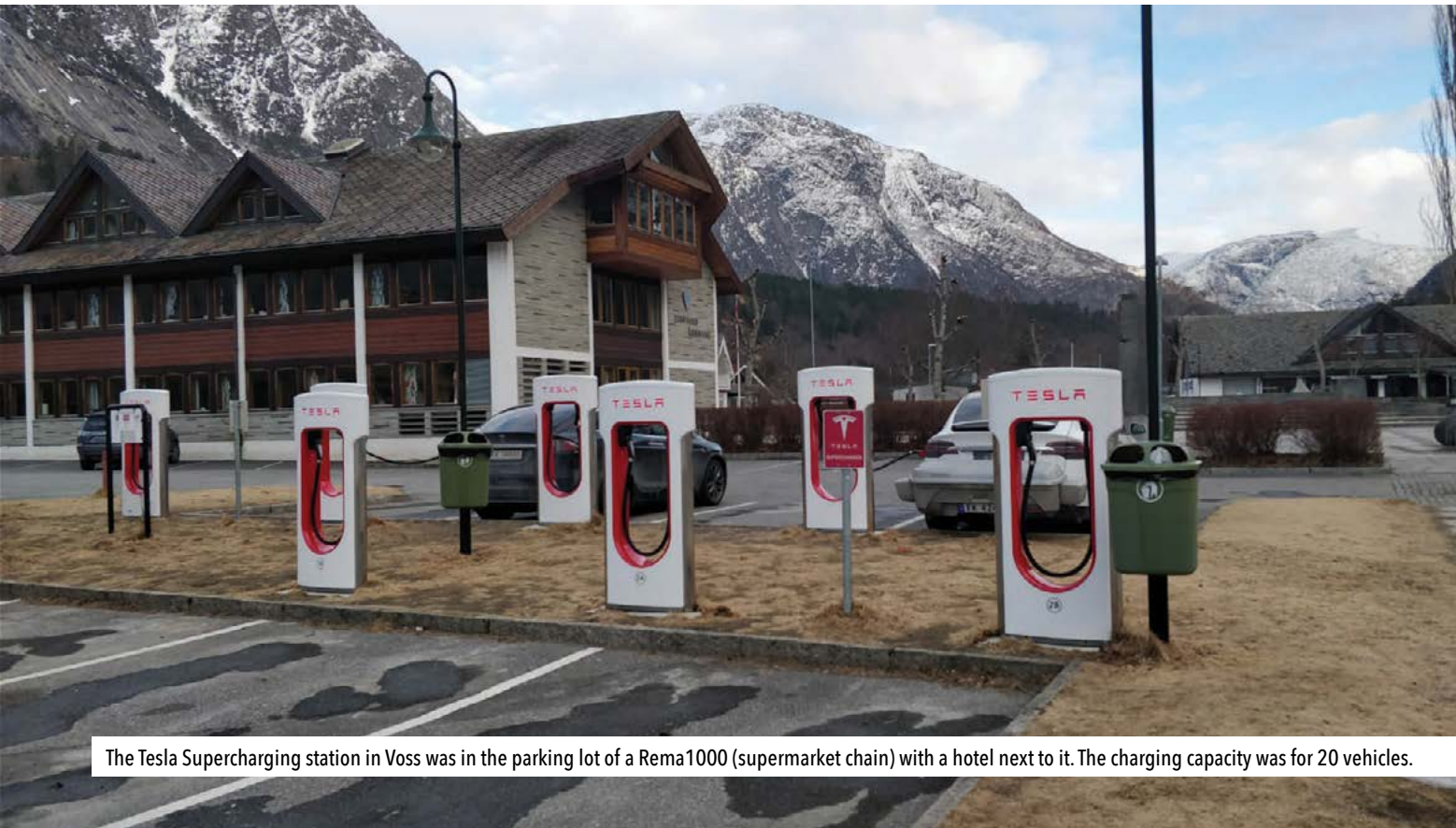
Battery drains, barely makes it

But then disaster struck! Well almost. My 45-minute 'keep the car warm while I ski' stunt proved a bit treacherous – the battery drained during my 45-minute ski session. The car started running out of power faster than I had anticipated and I barely made it to my next charging stop at Voss, or so I thought at least then. About 50km before my destination, the car started issuing low-battery warnings, but fortunately, I made it to the Voss super charging station by a hairsbreadth. This was the only moment in my journey when the constraints of driving a non-

fossil fuel car struck me, to be honest. But to my surprise, when I investigated, the car had managed to reach the Voss Tesla Supercharger with a 25km capacity to spare. Some rest and food for me, and charging for the Tesla, and in 30 minutes both of us were at about 80%+ capacity.



300+ km charge in just 30 minutes



The Tesla Supercharging station in Voss was in the parking lot of a Rema1000 (supermarket chain) with a hotel next to it. The charging capacity was for 20 vehicles.



The tesla supercharger in Bergen was located inside the gas station with about 10 charging portals



The gas station also hosted a private charging company called Hurtiglader

The final leg

After recharging at Voss, I began the last leg of my trip to Bergen (another 100km), where I called it a day and turned back for Oslo the next morning.

One interesting thing I noted in Bergen was that the Tesla Supercharger in Bergen was inside a gas station, which also hosted a charging port for a private company called 'Hurtiglader'. Employees of the supermarket at the gas station (gas stations are usually fully automated as labour is very expensive in Norway) told me that Hurtiglader charges NOK 2.5/minute which implies NOK75 (US\$ 9 or INR 630) for a 70-80% charge. They also said that Tesla offers free-for-life super charging if one is referred and generally everyone buys a Tesla via a referral. If you are not referred, Tesla charges NOK1.4/KWH.

Ha Det

(Goodbye in Norwegian)

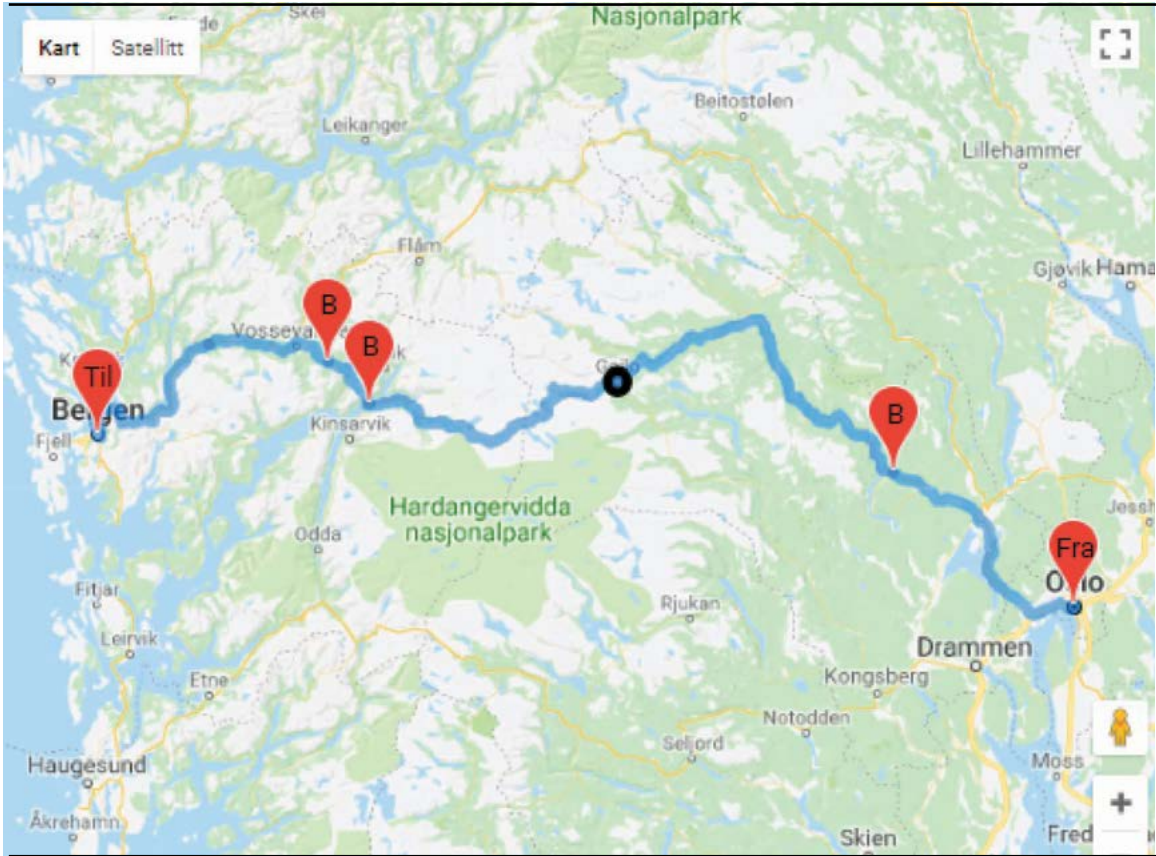
The Tesla Model X, with a dozen ultra-sensors, cameras, rock-solid drive, ludicrous mode, automatic door opening and ignition, semi-autonomous driving, huge screen and many other features left me truly impressed, mesmerized even. I also figured out the following – an EV was practical enough for daily life (provided certain conditions are fulfilled), why EVs are popular in Norway, and what India and Indian OEMs can do to get ahead in the EV race, cause EVs are here to stay and will proliferate all over the world.

On this note I took off from Oslo Airport. I want to thank my friend Johnny and his wife Siri for all their help and support during my trip.



Over my three-day journey with the Tesla of over 1500kms I was left with so many experiences, especially useful insights from consumers and Tesla employees. I was also left with great memories of a beautiful country.

Why is EVs/Tesla successful in Norway



Zero tolls for EVs when tolls are sizable Only after actually driving through Norway does one realise the sizeable tolls that one has to pay. The return trip from Oslo to Bergen had three tolls worth a total of NOK 600 (USD 75 or INR 5,000), but the Tesla vehicle was exempt.

Tolls ✖

Distance	Tolls
463,5 km	kr 267,00

- ✓ Rv. 7 Brekkebygda 70 kr
- ✓ Rv.13 Hardangerbrua 150 kr
- ✓ Rv 13 Svelgane 47 kr

ORDER TAG

Outward tolls

Tolls ✖

Distance	Tolls
463,5 km	kr 330,00

- ✓ E16 Bolstad 47 kr
- ✓ Rv.13 Hardangerbrua 150 kr
- ✓ Rv. 7 Brekkebygda 70 kr
- ✓ E18 Hovedløp 18 kr
- ✓ E18 Maritim 45 kr

ORDER TAG

Return toll

Tolls ✖

Distance	Tolls
463,5 km	kr 0,00

- ✓ Rv. 7 Brekkebygda 0 kr
- ✓ Rv.13 Hardangerbrua 0 kr
- ✓ Rv 13 Svelgane 0 kr

ORDER TAG

Toll for an electric vehicle

Free parking

Even parking is very expensive in most cities in Norway with hourly parking charges upwards of c.NOK 50 per hour (or more than USD 6).

Fuel-cost saving

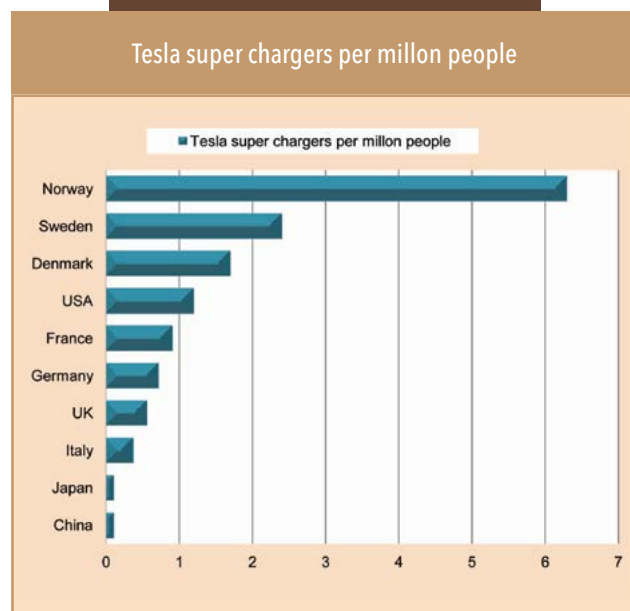
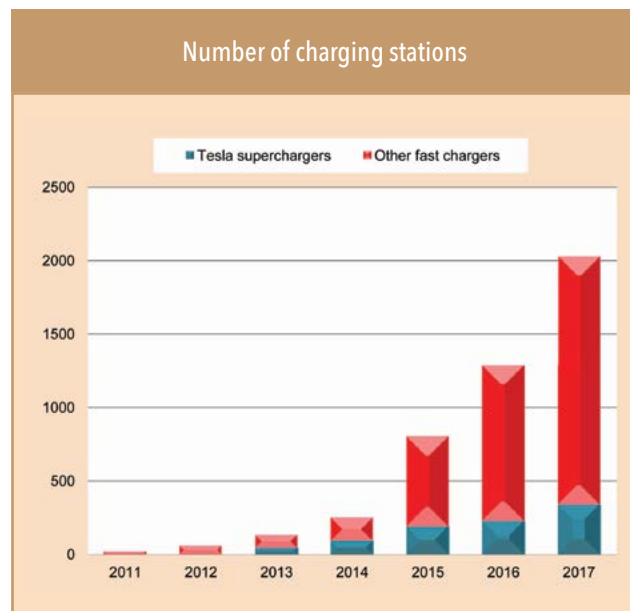
Tesla offers free supercharging. The fuel cost for a 1,500 km trip in a diesel luxury SUV would have been about NOK 1,800 (USD 220 or INR 15,000 – diesel in Norway costs USD 2 or Rs 140).

Very vast network of Tesla superchargers

Tesla currently hosts around 400 active superchargers spread across Norway, which are absolutely free – this makes it easy to travel to any part of the country without worrying about access to charging.

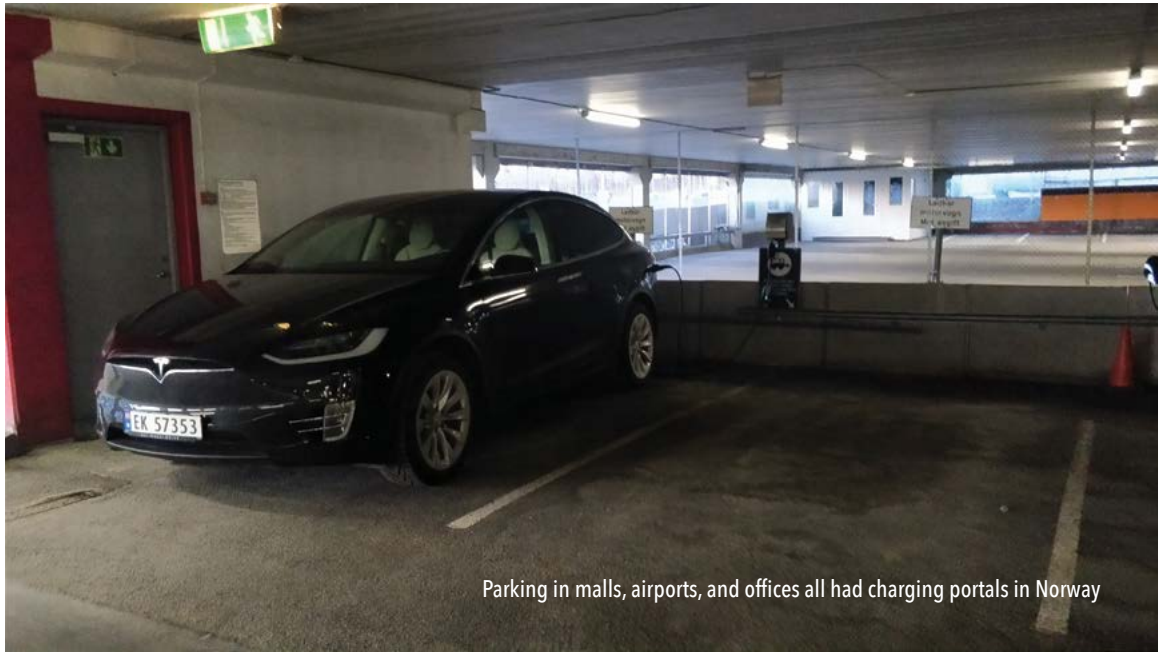
Low population and high per-capita income

The reason EVs picked up so rapidly in Norway is its low population density, but more importantly, its high per-capita income at US\$ 70,000+/annum. Moreover, there is free healthcare, education, and retirement benefits, which lead to high disposable income for discretionary spends. The country is full of natural beauty and the governments' concern and the general public's awareness about preservation and conservation means that almost everybody is willing to invest in EVs.



Model X vs. Jaguar I-Pace – Tesla wins

Nitesh noted in his travelogue that the Tesla Model X with a dozen ultra-sensors, cameras, rock solid drive, ludicrous mode, automatic door opening and ignition, semi-autonomous driving, huge screen and many other features enthralled him. The Jaguar I-Pace lacks most or all of these almost sci-fi features that the Model X has, plus the I-Pace is smaller with a seating capacity of five. In conclusion, while I-Pace is about 12% cheaper than the Model X, it wouldn't be fair to compare it with the much larger and futuristic Model X. A more appropriate comparison would be the I-Pace and the Model S (which also has a larger wheelbase). Additionally, Norwegian consumers are reluctant to buy a Jaguar EV because Tesla's charging infrastructure in the country (offering free charging) is very vast.



Parking in malls, airports, and offices all had charging portals in Norway

Tips for Indian OEMs

EVs is still a long way off for India, given the country's lower discretionary income and high cost of producing a mass-market BEV (as highlighted earlier, the ex-factory cost of a BEV Ciaz would be nearly Rs 2.5mn). However, electric vehicle adoption could take off in India if battery prices fall faster than anticipated.

Meanwhile, what can Indian OEMs do to be ahead of the curve in case of a BEV revolution in India?

Focus more on infrastructure

Indian OEMs should focus more on creating charging infrastructure and an ecosystem. Tesla took five years to create such a network of charging stations in Norway, and it is currently so much more ahead than competition that its moat is not easy to breach. OEMs should not only focus on rolling out good affordable electric vehicles, but take steps towards start adding charging infrastructure in mall parking, airports, and hotels. In Norway, for example, there is optimum utilization of parking places.

If OEM's can offer free charging (like Tesla does) it could considerably reduce total ownership cost and induce rapid adoption. An off-the-cuff idea is that Maruti, M&M, Hero, Bajaj, and TVS have vast dealer networks, which they can use for installing charging stations. This would also provide a strong moat for Indian players, one that would be difficult for foreign OEMs to break, even if they are currently ahead in the global EV race.

Government incentives won't be a big deal in India

While the Norwegian government uses oil money to subsidize conservation efforts (including EVs), other measures such as free toll and parking prove huge incentives there. In India, they may not be as meaningful as their cost is not extremely high (at least for now). Given the Indian government's past resistance to offer any major subsidy for electric vehicles, OEMs would have to depend on battery technology and falling battery cell prices for making affordable BEVs.

Comparative Global Valuation Summary

APPENDIX

Company	CMP	MCAP			SALES			EBITDA			OPM (%)			EPS			EPS GROWTH (%)			P/E			
		\$ Mn	FY18	FY19E	FY20E	FY18	FY19E	FY20E	FY18	FY19E	FY20E	FY18	FY19E	FY20E	FY18	FY19E	FY20E	FY18	FY19E	FY20E	FY18	FY19E	FY20E
Auto-OEMs																							
Bajaj Auto	2,761	11,220	250,284	287,001	319,994	49,456	52,061	57,990	19.8%	18.1%	18.1%	144	154	172	2%	7%	11%	19.1	17.9	16.1			
Hero Motocorp	3,210	9,004	318,590	359,654	400,882	52,419	56,434	63,066	16.5%	15.7%	15.7%	186	190	213	3%	2%	12%	17.3	16.9	15.1			
M&M	947	16,530	478,922	563,847	636,985	62,998	78,696	89,510	13.2%	14.0%	14.1%	35	42	48	3%	21%	14%	27.0	22.3	19.5			
Maruti Suzuki	8,973	38,067	794,362	925,845	1,063,127	123,442	143,097	167,560	15.5%	15.5%	15.8%	273	320	382	10%	17%	19%	32.9	28.0	23.5			
Tata Motors	266	11,813	2,913,765	3,258,446	3,593,330	348,681	381,294	452,265	12.0%	11.7%	12.6%	25	24	34	13%	-2%	40%	10.7	11.0	7.9			
TVS Motors	567	3,783	149,221	177,378	204,113	11,923	14,386	18,034	8.0%	8.1%	8.8%	15	17	22	36%	15%	30%	38.7	33.6	25.8			
Ashok Leyland	131	5,394	256,478	294,631	340,846	26,835	31,082	37,323	10.5%	10.5%	10.9%	5	6	8	-6%	20%	23%	25.3	21.0	17.1			
Escorts Ltd	812	1,398	49,014	59,291	66,556	5,461	7,214	8,447	11.1%	12.2%	12.7%	37	51	60	134%	36%	18%	21.7	16.0	13.5			
Eicher Motors	28,881	11,060	89,274	108,421	128,845	28,283	34,884	41,952	31.7%	32.2%	32.6%	801	991	1,198	28%	24%	21%	36.0	29.1	24.1			
European Autos																							
BMW	83	62,382	98,993	103,230	106,842	14,589	15,079	15,716	14.7%	14.6%	14.7%	11	12	12	-3%	4%	3%	7.3	7.1	6.9			
Volkswagen	137	79,810	240,149	249,884	256,461	34,388	38,166	40,261	14.3%	15.3%	15.7%	25	28	30	4%	14%	6%	5.5	4.8	4.5			
Daimler	55	68,218	167,808	173,072	178,192	18,922	19,904	20,489	11.3%	11.5%	11.5%	9	9	9	-8%	5%	2%	6.4	6.1	6.0			
Peugeot	24	24,734	76,550	78,927	80,473	8,041	8,357	8,440	10.5%	10.6%	10.5%	3	4	4	47%	13%	2%	7.0	6.2	6.1			
Renault	73	25,046	60,224	62,179	63,701	6,927	7,283	7,698	11.5%	11.7%	12.1%	15	16	17	-2%	5%	3%	4.8	4.6	4.4			
Korean Autos																							
Hyundai	126,500	24,225	97,120,137	100,408,679	103,938,744	7,675,416	8,543,502	8,950,213	7.9%	8.5%	8.6%	13,346	16,745	18,954	-16%	25%	13%	9.5	7.6	6.7			
Kia Motors	31,600	11,481	53,703,355	55,647,498	58,466,483	3,411,884	3,853,743	4,262,667	6.4%	6.9%	7.3%	4,208	5,238	5,931	29%	24%	13%	7.5	6.0	5.3			
SAIC Motors	29	49,712	949,117	970,328	1,003,878	48,024	53,673	56,534	5.1%	5.5%	5.6%	3	4	4	9%	8%	7%	8.9	8.2	7.7			
Japanese Autos																							
Honda	3,218	52,317	15,288,013	15,735,237	16,199,907	1,380,353	1,378,129	1,451,179	9.0%	8.8%	9.0%	568	402	431	79%	-29%	7%	5.7	8.0	7.5			
Mazda	1,259	7,139	3,486,960	3,569,051	3,692,266	237,835	199,715	226,891	6.8%	5.6%	6.1%	179	139	163	11%	-23%	18%	7.0	9.1	7.7			
Nissan	1,041	39,415	11,791,170	11,783,516	12,066,868	936,240	919,637	997,456	7.9%	7.8%	8.3%	184	137	151	23%	-26%	10%	5.7	7.6	6.9			
Suzuki	7,226	31,846	3,701,565	3,972,291	4,189,860	515,446	564,485	618,088	13.9%	14.2%	14.8%	473	545	584	35%	15%	7%	15.3	13.2	12.4			
Toyota	6,773	198,351	29,053,546	29,641,057	30,345,355	3,192,118	3,500,300	3,691,375	11.0%	11.8%	12.2%	829	796	855	40%	-4%	7%	8.2	8.5	7.9			
Yamaha	2,762	8,674	1,722,741	1,800,131	1,891,211	206,481	221,128	233,503	12.0%	12.3%	12.3%	310	339	365	9%	9%	8%	8.9	8.2	7.6			
US Autos																							
Ford	9	37,785	146,943	146,955	149,532	11,423	11,529	12,433	7.8%	7.8%	8.3%	1	1	2	-24%	3%	12%	7.0	6.8	6.1			
General Motors	36	50,863	145,335	146,759	148,890	16,550	17,323	16,726	11.4%	11.8%	11.2%	6	6	6	-6%	0%	-4%	6.0	6.0	6.3			

Source: Bloomberg Consensus Estimates

Comparative Global Valuation Summary

Company	CMP	MCAP		SALES		EBITDA		OPM (%)		EPS		EPS GROWTH (%)		P/E			
		\$ Mn	FY18	FY19E	FY20E	FY18	FY19E	FY20E	FY18	FY19E	FY20E	FY18	FY19E	FY20E	FY18	FY19E	FY20E
Auto-Comps																	
Mahindra CIE	286	1,521	76,833	84,152	91,791	10,644	12,117	13,406	13.9%	14.4%	14.6%	13	16	18	21.7	18.0	15.9
Motherson Sumi S	291	8,599	566,199	658,634	760,464	53,141	66,060	81,432	9.4%	10.0%	10.7%	8.8	11.7	15.4	32.9	24.8	18.9
Balkrishna Ind	1,196	3,246	45,211	57,205	66,746	13,252	16,891	20,299	29.3%	29.5%	30.4%	39	50	61	30.3	23.9	19.4
Exide Industries	277	3,305	128,988	144,409	159,545	15,059	17,051	19,207	11.7%	11.8%	12.0%	11.5	11.5	13.1	24.1	24.1	21.1
Bhaarat Forge	671	4,387	79,608	96,056	108,478	17,476	21,017	24,516	22.0%	21.9%	22.6%	19	24.2	29.5	34.6	27.7	22.8
Apollo Tyres	246	1,972	148,229	175,729	200,918	16,564	22,799	27,680	11.2%	13.0%	13.8%	13	18.9	23.9	18.6	13.0	10.3
MRF	72,100	4,294	148,860	167,342	189,431	23,599	29,413	35,086	15.9%	17.6%	18.5%	2,936	3,778	4,719	25	19	15
Bosch	21,147	9,064	116,973	132,821	153,083	21,328	24,478	29,257	18.2%	18.4%	19.1%	468	547	660	45	39	32
Minda IND	431	1,589	43,136	56,910	66,298	5,151	7,074	8,397	11.9%	12.4%	12.7%	9	13	15	46	34	28
RK Foigings	628	288	14,081	17,127	19,905	2,761	3,498	4,109	19.6%	20.4%	20.6%	28	41	52	22	15	12
Gabriel	141	284	17,792	21,202	23,963	1,664	1,997	2,309	9.4%	9.4%	9.6%	7	8	9	21	18	16
JK Tyres	126	403	82,284	96,698	107,687	6,795	12,287	14,376	8.3%	12.7%	13.3%	(0)	15	21	(422)	8	6
Ceat	1,349	766	62,930	70,660	81,576	6,176	7,869	9,904	9.8%	11.1%	12.1%	65	94	112	21	14	12
WABCO India	7,099	1,891	24,468	30,098	35,042	3,913	4,593	5,550	16.0%	15.3%	15.8%	140	171	208	51	42	34
Suprajit Eng	239	470	14,473	16,633	19,124	2,330	2,776	3,254	16.1%	16.7%	17.0%	9	12	14	26	20	17
Global tyre players																	
Bridgestone	7,453	3,714,339	3,824,402	3,824,402	3,824,402	640,961	670,994	695,312	17.3%	17.5%	17.6%	401	420	444	10	10	10
Michelin	21,023	21,832	23,200	23,992	23,992	4,211	4,638	4,895	19.3%	20.0%	20.4%	10	11	12	10	9	9
Goodyear	5,378	15,731	16,136	16,286	16,286	2,083	2,184	2,474	13.2%	13.5%	15.2%	3	4	4	8	6	6

Source: Bloomberg Consensus Estimates

Comparative Global Valuation Summary

Company	MCAP		SALES		EBITDA		OPM (%)		EPS		EPS GROWTH (%)		P/E						
	\$ Mn	FY18	FY19E	FY20E	FY18	FY19E	FY20E	FY18	FY19E	FY20E	FY18	FY19E	FY20E	FY18	FY19E	FY20E			
Other global component players																			
French Players																			
Faurecia	8,279	18,010	19,178	20,230	2,085	2,263	2,447	11.6%	11.8%	12.1%	5	6	6	17%	12%	9%	10	9	9
Compagnie Plastic Omnium	5,807	7,617	8,943	9,507	1,002	1,139	1,271	13.1%	12.7%	13.4%	3	3	4	-1%	13%	11%	11	10	10
Valeo	10,722	19,759	21,642	23,484	2,576	2,890	3,211	13.0%	13.4%	13.7%	4	5	5	2%	16%	14%	10	8	8
German Players																			
ContinentalAG	36,650	45,153	47,713	50,164	6,374	7,058	7,746	14.1%	14.8%	15.4%	15	16	18	-3%	12%	12%	11	10	10
Leoni AG	1,417	5,147	5,401	5,815	382	417	468	7.4%	7.7%	8.0%	4	5	6	8%	11%	17%	8	8	8
EifringKlingerAG	776	1,697	1,782	1,876	221	241	264	13.0%	13.5%	14.1%	1	1	1	-6%	16%	15%	10	9	9
Other Europe																			
CIEAuto	3,843	3,223	3,566	3,770	557	607	656	17.3%	17.0%	17.4%	2	2	2	26%	1%	11%	12	12	12
SKFAB	8,715	84,885	87,807	90,248	12,773	13,221	13,561	15.0%	15.1%	15.0%	15	15	16	14%	4%	4%	12	11	11
NA Players																			
Wabco Hondings	6,512	3,943	4,139	4,286	667	702	748	16.9%	17.0%	17.5%	8	8	9	96%	9%	8%	16	15	15
Magna International Inc.	19,557	41,504	43,296	44,028	4,419	4,603	4,884	10.6%	10.6%	11.1%	7	7	8	15%	9%	12%	8	7	7
Autoliv	7,763	9,060	10,248	10,950	1,371	1,550	1,710	15.1%	15.1%	15.6%	8	9	10	-17%	16%	13%	11	10	10
BorgWarner	9,142	10,733	11,293	11,938	1,804	1,905	2,004	16.8%	16.9%	16.8%	4	5	5	18%	7%	9%	10	9	9
Federal-Mogul		7,950	8,240	8,530	830	875	925	10.4%	10.6%	10.8%	1	1	2	58%	21%	14%			
Lear Corp.	10,626	22,080	23,112	24,074	2,313	2,405	2,540	10.5%	10.4%	10.6%	19	21	23	16%	10%	8%	8	8	8
Gentex Corp.	6,287	1,887	2,003	2,202	646	678	770	34.2%	33.9%	35.0%	2	2	2	29%	8%	12%	14	13	13
Johnson Controls Inc.	34,934	31,269	32,479	33,494	4,867	5,188	5,612	15.6%	16.0%	16.8%	3	3	3	-2%	9%	12%	13	12	12
Visteon Corp.	3,242	3,131	3,248	3,706	358	382	467	11.4%	11.8%	12.6%	6	7	10	6%	14%	37%	17	15	15
Delphi Automotive PLC	3,128	5,045	5,200	5,412	815	859	922	16.2%	16.5%	17.0%	5	5	6	-6%	7%	11%	7	7	7
Japanese Players																			
Denso	37,598	5,063,438	5,439,269	5,667,943	670,548	697,991	755,365	13.2%	12.8%	13.3%	401	437	479	-5%	9%	10%	13	12	12
Aisin Seiki	13,103	3,877,861	4,064,168	4,300,252	474,048	502,740	554,185	12.2%	12.4%	12.9%	533	574	635	5%	8%	11%	9	9	9

Source: Bloomberg Consensus Estimates

Emission Standards for Two Wheeled Vehicles, g/km

Implementation Date (type approvals)	Stage	Class †/ Engine Category	CO	HC	NOx	HC+NOx		PM
						If Evap. test ≤2g/test	If Evap. test ≤6g/test	
1991			12-30	8-10		-		-
1996			4.5	-		3.6		-
2000	India Stage I		2	-		2		-
2005.04	Bharat II		1.5	-		1.5		-
2010.04	Bharat III		1	-		1		-
2016.04*	BS IV	Class 1 & Subclass 2-1	1.403	-	0.39	0.79	0.59	-
		Subclass 2-1	1.97	-	0.34	0.67	0.47	-
		Subclass 3-1 & 3-2	1.97	-	0.2	0.4	0.2	-
2020.04*	BS VI [†]	All Categories	1	0.10a	0.068	-		0.0045 [‡]

†Two-wheeler vehicle categories based on engine displacement (D) and maximum design speed (Vmax) are: Class 1- 50cc<D<150cc and Vmax≤50km/h, or D<150cc and 50<Vmax<100km/h Subclass 2-1-D<150cc and 100≤Vmax<115km/h, or D≥150cc and Vx<115 km/h Subclass 2-2-115≤Vmax<130km/h Subclass 3-1-130<Vmax<140km/h Subclass 3-2-Vmax≥140km/h

* BS IV applies to new type approvals in Apr 2016 and to all vehicle sales and registrations in Apr 2017. BS VI applies to new type approvals of two-wheeled vehicles, sales and registrations on 1 Apr 2020. † Proposed limits | ‡ For direct injection engines only | a - NMHC = 0.068g/km | b - for CNG/LPG fuelled engines, HC+NOx=0.94g/km

RM - Reference Mass; CO- Carbon Mono-oxide; THC - Total Hydrocarbon; NMHC - Non Methane Hydro Carbon; NOx - Oxide of Nitrogen; PM - Mass of Particulate matter; PN - Number of Particles

Emission Standards for Heavy-Duty Vehicles and Engines

Year	Reference	Test	CO	HC	CH4	NOx	PM	PN
1992	-	ECE R49	17.3-32.6	2.7-3.7	-	-	-	-
1996	-	ECE R49	11.2	2.4	-	14.4	-	-
2000	Bharat Stage I	ECE R49	4.5	1.1	-	8	0.36*	-
2005 [†]	Bharat Stage IIa	ECE R49	4	1.1	-	7	0.15	-
2005	Bharat Stage IIIb	ESC	2.1	0.66	-	5	0.10/0.13d	-
		ETC	5.45	0.78	-	5	0.16/0.221d	-
2010	Bharat Stage IVc	ESC	1.5	0.46	-	3.5	0.02	-
		ETC	4	0.55	-	3.5	0.03	-
2020	Bharat Stage VIe	WHSC(CI)	1.5	0.13	-	0.4	0.01	8x1011
		WHTC(CI)	4	0.16	-	0.46	0.01	6x1011

Notes:

* 0.612 for engines below 85 kW

[†] Test cycle changes from ECE R49 to ESC & ETC

a - From 24 Oct 2001 in Delhi; 31 Oct 2001 in Mumbai, Kolkata and Chennai; 1 Apr 2003 in Bangalore, Hyderabad, Ahmedabad, Pune, Surat, Kanpur and Agra; and 1 Apr 2005 in the rest of the country.

b - From 1 Apr 2005 in Delhi, Mumbai, Kolkata, Chennai, Bangalore, Hyderabad, Ahmedabad, Pune, Surat, Kanpur, Solapur, Lucknow, and Agra; and 1 Apr 2010 in the rest of the country.

c - From 1 Apr 2010 in Delhi, Mumbai, Kolkata, Chennai, Bangalore, Hyderabad, Ahmedabad, Pune, Surat, Kanpur, Solapur, Lucknow, and Agra. As of April 2016, applicable in 10 states, different districts & cities in the states of Rajasthan, Maharashtra, Gujarat and Uttar Pradesh and in 4 Union Territories. Nationwide implementation in April 2017.

d - For engines with swept vol. <0.75 liter per cylinder and rated power speed >3000 rpm | e - Proposed limits | f - NMHC for PI engines | RM - Reference Mass; CO- Carbon Mono-oxide; THC - Total Hydrocarbon; NMHC - Non Methane Hydro Carbon; NOx - Oxide of Nitrogen; PM - Mass of Particulate matter; PN - Number of Particles

Emission Standards for Bharat Stage VI (BS-6) passenger vehicles - Petrol

	RM ('000 kg)	CO (mg/km)	THC (mg/km)	NMHC (mg/km)	Nox (mg/km)	HC +NOx (mg/km)	PM (mg/km)	PN (x10 ⁶) (nos/km)
1991	-	27100	2900	-	-	-	-	-
1996	-	12400	-	-	-	4360	-	-
1998	-	12400	-	-	-	4360	-	-
BS I	All PCs	27200	-	-	-	970	-	-
BS II		2200	-	-	-	500	-	-
BS III	< 2.5	2300	200	-	150	-	-	-
BS IV		1000	100	-	80	-	-	-
	All	1000	100	68	60	-	4.5	6
	RM < 1.3	1000	100	90	60	-	4.5	6
BS VI	1.3<RM< 1.76	1810	130	108	75	-	4.5	6
	1.76<RM	2270	160	108	82	-	4.5	6
	All	2270	160	68	82	-	4.5	6

(1) Until three years after date of implementation for new type approvals and new vehicles, particle number emission limit of 6.0 X 10¹² /km shall apply to BS VI gasoline direct injection vehicles upon choice of the manufacturer. RM - Reference Mass; CO- Carbon Mono-oxide; THC - Total Hydrocarbon; NMHC - Non Methane Hydro Carbon; NOx - Oxide of Nitrogen; PM - Mass of Particulate matter; PN - Number of Particles

The Emission Standards for Bharat Stage VI (BS-6) passenger vehicles - Diesel

	RM ('000 kg)	CO (mg/km)	NOX (mg/km)	HC +NOx (mg/km)	PM (mg/km)	PN (x10 ⁶) (mg/km)
1991	-	27100	-	6900		
1996	-	9000	-	4000		
1998	-	12400	-	4360	-	-
BS I		2720	-	970	140	-
BS II		1000	-	700	80	-
BS III	< 2.5	640	500	560	50	-
BS IV		500	250	300	25	-
	All	500	80	170	4.5	6
	RM < 1.3	500	80	170	4.5	6
BS VI	1.3<RM< 1.76	630	105	195	4.5	6
	1.76<RM	740	125	215	4.5	6
	All	740	125	215	4.5	6

(1) For positive ignition, particulate mass and number of particles limit shall apply only to vehicles with direct injection engines.

(2) Until three years after date of implementation for new type approvals and new vehicles, particle number emission limit of 6.0 X 10¹² /km shall apply to BS VI gasoline direct injection vehicles upon choice of the manufacturer. RM - Reference Mass; CO- Carbon Mono-oxide; THC - Total Hydrocarbon; NMHC - Non Methane Hydro Carbon; NOx - Oxide of Nitrogen; PM - Mass of Particulate matter; PN - Number of Particles

DRIVING DIGITAL LEADERSHIP IN THE GLOBAL PRODUCT SEGMENT



Intellect Design Arena (INDA) is an IT products company, with a suite of banking products in its portfolio. It is one of the few Indian IT companies that has managed to create a niche for itself in the IT products space, against the majority of Indian IT companies present in this area. INDA is also a leading player in the banking and financial space, and offers latest cutting-edge solutions in Digital, Cloud, and Blockchain technologies.

Q: What are the opportunities for the Indian IT players in the BFSI products space, and how do you view Indian IT product companies' competitive positioning compared to their global peers?

The BFSI products space offers exciting opportunities powered by three developments. The first is the intense competition that in turn is influencing the digital push to deliver better customer experience and to be more efficient. The second is an increasingly complex and tight regulatory environment that increases compliance requirements, and disintermediation that seems to challenge the fundamentals of the industry. The third is that the industry trend now favours 'buy' more than 'build', tilting the scale in favour of product companies. Intellect offers a full suite of products for this sector, built on a unified architecture, integrating latest technologies including AI/ML, thus positioning itself uniquely ahead of competition, which is confined to either specific BFSI verticals, or specific geographies, or has acquired pieces of products that do not present a unified architecture.

Q: How has the BFSI space evolved from the customer experience point of view?

Customer experience has been the differentiator for banks and therefore for BFSI product companies. Themes such as 'mobile-first design' and 'same experience across all touch-points' have dominated developments in this space. Our holistic 'Digital 360' approach ensures that this part of 'Digital Out' that addresses customer experience delivers 'real-time contextual experiences' to customers.

Q: What are the key challenges that the IT sector has recently faced due to political and regulatory changes such as US elections and Brexit? Do you feel that the macro headwinds are now behind us and that the industry should only grow from here?

These developments typically bring in uncertainty, which increases the risk aversion of the sector. A conservative sector to start with, these kinds of developments lead to deferral of decisions, or delays in the approval of projects, or reduction in budgets. Two quarters in 2016-17 were impacted by these developments. While we always operate in a backdrop of geo-political uncertainty, our primary demand drivers assure us of a growth phase.

Q: How do you see sustainability of growth for the Indian players in view of the significant changes on the technologies front and entry of fin-tech firms?

From Intellect's perspective, we have integrated the latest in technology such as artificial intelligence, machine learning, and natural language processing in our products and platforms. We are offering many products in the subscription model, taking advantage of cloud technologies. Being a robust, end-to-end industrialized technology player addressing the needs of global leaders in BFSI, we do not see a threat from fin-tech start-ups – most of which address specific slivers of demand or tackle the B2C space.

Q: How different are you from your global and Indian peers, per se?

From India, TCS, Infosys, and Oracle Financial Services compete with us. Globally, Temenos, Finastra, FIS, Bottomline, and ACI compete with us. We are unique in providing the full product suite for BFSI through our 14 products that address all verticals of banks and insurance majors. Some of our global competition has augmented its product portfolio through acquisitions, which results in inconsistent technologies coming together and leads to tardy and expensive integration. In contrast, Intellect has developed all products in-house with the same unified architecture. This enables us to deliver quickly to meet market expectations in areas such as true digital architecture, emerging innovations in AI/ ML, and in getting the products cloud ready.

With a truly unified architecture, we are best positioned to provide digital solutions. Digital is all about giving the power of intelligent decision making to end-customers – in real time. Such a capability can be delivered best only if you have a unified architecture that allows transactions to flow through seamlessly. It is only because of such an architecture that we are able to deliver capabilities such as contextual banking.

We also differ in our sales strategy. There is a natural cap to the amount one product that can be sold in a particular country. Our competitors address this by spreading themselves across the world. Our chosen strategy is domination of chosen markets. We invest strongly in hiring local sales force and building deep relationships with customers. Our strategy is to sell 14 products to one customer rather than sell one product to 14 customers.

Intellect's business is well balanced between growth markets and advanced markets with 55% of the business from advanced markets. The net result of this strategy has been that we have successfully commanded premium pricing versus our global competition in markets where they have been leaders before.

Q: Intellectual reported strong growth in FY18 after a below-par performance in the previous year. What were the key reasons for the quick turnaround? FY16-17 was impacted by external challenges, despite which we delivered 13% growth. Therefore, I don't think it was below par. I believe we have now crossed the hump of market acceptance. We are also ready with a complete suite of 14 products across banking and insurance verticals. In FY17-18, we won a significant deal with each of the market leaders in some of the APAC countries and in India in the iGTB business. We also won a deal in the US, apart from expanding our relationship in Canada. In the iGCB business, the launch of IDC 18.1 Intellect Digital Core in October 2017 saw us win six deals in quick succession, including a breakthrough entry into Europe. In all, we won 12 transformational deals during the year.

Q: New deal-flow has improved considerably in the last

few quarters. You have signed the largest-ever deal in the company's history this month. What are the key drivers of the improved deal-flow? Is it because of more deals coming to the market or has the win-ratio improved recently?

Our deal qualification process has become much more rigorous. We choose the deals that we bid for and are able to strike a much better success rate because of focused efforts. In addition, the recent wins with market leaders and successful 'go-lives' of earlier wins have provided us much better references. In this sector, the typical buying pattern is to 'follow the leader'. Therefore, our wins with leaders generate further opportunities.

Q: Tell us about the GeM program. How has it been growing for the company, and how it can transform the way the government departments are working?

We won the prestigious Government eMarketplace deal in FY17-18 (along with our consortium partners) in the face of stiff global competition. The portal went live earlier this year. We earn revenue as fixed basis points of the total GMV transacted through the portal. GeM's GMV has crossed Rs 100bn recently. It is anticipated that the current transaction rate will scale up significantly with increased thrust on adoption of this portal by more states, government departments, and PSUs. In its fullest potential, the GMV is expected to scale up 10-15x from current levels.

Q: Please brief us about your fund-raising plan?

Intellect invests consistently in technology and sales and marketing. Our investments in R&D are around Rs 2bn per year. We have also been investing in branding, market expansion, and augmenting our sales / pre-sales teams. We had raised approximately Rs 2bn last year through a rights issue to fund growth in addition to meeting increasing working capital needs and retiring debt progressively.

After significant investments, we are able to see the potential for growing beyond 20% yoy. Pursuing such a higher growth trajectory requires more growth capital. Also, as we pitch for large deals, we find the need for a stronger balance sheet. Therefore, we have opted to raise more equity rather than additional debt to fund these requirements. Based on deliberations with the board, the promoter has offered to bring in more funds – up to Rs 1bn – to re-affirm his commitment to the business. We have also secured approval for an enabling resolution to raise funds to the tune of an additional Rs 4bn. We will decide on the timing and mode of raising this additional capital when the requirement arises. Each of our products are in different phases of value realization. Some are delivering in the current financial year, while others would deliver over the next 2-3 years. We would access the market when a specific need for additional funds comes up.

Indian Economy – Trend Indicators

Monthly Economic Indicators

Growth Rates (%)	Jun-17	Jul-17	Aug-17	Sep-17	Oct-17	Nov-17	Dec-17	Jan-18	Feb-18	Mar-18	Apr-18	May-18	Jun-18	Jul-18
IIP	-0.2	0.9	4.5	3.8	1.8	8.5	7.1	7.4	7.1	4.6	4.8	3.2	7.0	-
PMI	50.9	47.9	51.2	51.2	50.3	52.6	54.7	52.4	52.1	51.0	51.6	51.2	53.1	52.3
Core sector	0.8	2.4	4.4	4.7	5.0	6.9	3.8	6.1	5.4	4.5	4.6	4.3	6.7	6.6
WPI	0.9	1.9	3.2	2.6	3.6	3.9	3.6	3.0	2.7	2.7	3.6	4.8	5.8	5.1
CPI	1.5	2.4	3.3	3.3	3.6	4.9	5.2	5.1	4.4	4.3	4.6	4.9	5.0	4.2
Money Supply	7.4	7.1	7.0	6.0	6.5	7.3	10.2	10.8	10.5	9.9	10.6	10.4	10.1	10.1
Deposit	10.5	9.8	9.7	8.1	8.7	5.4	3.2	4.3	5.3	6.1	8.1	7.5	7.4	7.7
Credit	5.6	5.8	5.9	6.5	6.8	8.7	9.8	10.4	10.4	10.5	12.1	12.4	12.4	12.2
Exports	4.4	3.9	10.3	25.7	-1.1	30.9	12.4	9.1	4.5	-0.4	5.2	20.2	17.6	14.3
Imports	19.0	15.4	21.0	18.1	7.6	21.2	21.1	26.1	10.4	7.9	4.6	14.9	21.3	28.8
Trade deficit ^(USD Bn)	-13.0	-11.4	-11.6	-1.0	25.9	6.3	41.1	64.6	25.8	31.2	3.6	5.6	28.1	57.4
Net FDI ^(USD Bn)	1.6	4.0	8.6	1.1	1.6	-1.3	4.3	1.9	4.0	1.8	4.8	3.9	1.2	-
FII ^(USD Bn)	4.6	3.3	0.6	-1.5	3.1	2.7	-0.4	3.5	-2.4	1.2	-3.0	-4.1	-2.0	-
ECB ^(USD Bn)	1.6	1.9	1.6	3.5	4.4	3.0	1.3	0.5	3.1	5.1	3.9	1.3	2.7	-
Dollar-Rupee	64.6	64.2	63.9	65.3	64.7	64.5	63.9	63.6	64.4	65.0	65.7	67.6	67.8	68.7
FOREX Reserves ^(USD Bn)	386.5	392.9	394.6	399.7	398.8	400.7	409.4	417.8	420.6	424.4	420.4	412.8	406.1	404.2
NRI Deposits ^(USD Bn)	118.1	119.2	118.6	118.0	119.2	120.9	123.3	124.4	124.3	126.2	124.6	123.5	123.4	-

Quarterly Economic Indicators

Balance of Payment ^(USD Bn)	Q4FY16	Q1FY17	Q2FY17	Q3FY17	Q4FY17	Q1FY18	Q2FY18	Q3FY18	Q4FY18
Exports	65.8	66.6	67.4	68.8	77.4	73.1	76.1	77.5	82.2
Imports	90.6	90.5	93.1	102.0	107.1	115.1	108.5	121.6	123.8
Trade deficit	-24.8	-23.8	-25.6	-33.3	-29.7	-41.9	-32.5	-44.0	-41.6
Net Invisibles	24.4	23.5	22.2	25.3	26.3	27.0	25.5	30.3	28.6
CAD	-0.3	-0.3	-3.4	-8.0	-3.5	-15.0	-7.0	-13.7	-13.1
CAD (% of GDP)	0.1	0.1	0.6	1.4	0.6	2.5	1.1	2.0	
Capital Account	3.5	7.1	12.8	6.1	10.4	26.9	16.9	22.5	25.0
BoP	3.3	7.0	8.5	-1.2	7.3	11.4	9.5	9.4	13.2

GDP and its Components ^(YoY, %)	Q1FY17	Q2FY17	Q3FY17	Q4FY17	Q1FY18	Q2FY18	Q3FY18	Q4FY18	Q1FY19
Agriculture & allied activities	2.5	4.1	6.9	5.2	2.3	2.7	4.1	4.5	5.3
Industry	9.0	6.5	7.2	5.5	1.5	7.0	6.8	8.0	10.8
Mining & Quarrying	-0.9	-1.3	1.9	6.4	-0.7	7.1	-0.1	2.7	0.1
Manufacturing	10.7	7.7	8.2	5.3	1.2	6.9	8.1	9.1	13.5
Electricity, Gas & Water Supply	10.3	5.1	7.4	6.1	7.0	7.7	6.1	7.7	7.3
Services	8.2	7.4	6.4	5.7	7.8	6.6	7.6	8.2	7.5
Construction	3.1	4.3	3.4	-3.7	2.0	2.8	6.8	11.5	8.7
Trade, Hotel, Transport and Communications	8.9	7.7	8.3	6.5	11.1	9.3	9.0	6.8	6.7
Finance, Insurance, Real Estate & Business Services	9.4	7.0	3.3	2.2	6.4	6.4	6.7	5.0	6.5
Community, Social & Personal Services	8.6	9.5	10.3	17.0	9.5	5.6	7.2	13.3	9.9
GDP at FC	7.6	6.8	6.7	5.6	5.6	6.2	6.7	7.6	8.0

Annual Economic Indicators and Forecasts

Indicators	Units	FY10	FY11	FY12	FY13	FY14	FY15	FY16	FY17	FY18E	FY19E
Real GDP/GVA growth	%	8.6	8.9	6.7	6	5.6	7.1	7.9	6.6	6.5-6.7	7-7.5
Agriculture	%	0.8	8.6	5	1.5	4.2	-0.2	0.7	4.9	2	3
Industry	%	10.2	8.3	6.7	5	4.5	6.5	10.2	7	4.9	5.8
Services	%	10	9.2	7.1	6.1	8.2	9.4	9.1	6.9	8.6	8.8
Real GDP	₹ Bn	45161	49185	52475	85992	90844	97190	104905	111854	119349	127942
Real GDP	US\$ Bn	953	1079	1096	1694	1581	1589	1603	1667	1843	1984
Nominal GDP	₹ Bn	64778	77841	87360	99466	112366	124451	136820	151837	167173	186230
Nominal GDP	US\$ Bn	1367	1707	1824	1828	1859	2035	2090	2264	2582	2887
WPI (Average)	%	3.8	9.6	8.7	7.4	6	2	-2.5	3.7	3	3.5-4
CPI (Average)		12.4	10.4	8.3	10.2	9.5	6.4	4.9	4.5	3.4	3.7-4.2
Money Supply	%	19.2	16.2	15.8	13.6	13.5	12	10.3	7.3	9.5	10
CRR	%	5.75	6	4.75	4	4	4	4	4	4	4
Repo rate	%	5	6.75	8.5	7.5	8	7.5	6.75	6.25	6	6
Reverse repo rate	%	3.5	5.75	7.5	6.5	7	6.5	5.75	5.75	5.75	5.75
Bank Deposit growth	%	17.2	15.9	13.5	14.2	14.6	12.1	9.7	11.2	8	11
Bank Credit growth	%	16.9	21.5	17	14.1	13.5	12.5	10.7	4.7	9	10
Centre Fiscal Deficit	₹ Bn	4140	3736	5160	5209	5245	5107	5328	5343	5684	5959
Centre Fiscal Deficit	% of GDP	6.4	4.8	5.7	5.2	4.6	4.1	3.9	3.5	3.4	3.2
State Fiscal Deficit	% of GDP	2.9	2.1	1.9	2	2.2	2.6	3.6	3	3.5	3.2
Consolidated Fiscal Deficit	% of GDP	9.3	6.9	7.6	6.9	7.1	6.6	7.5	6.5	6.9	6.4
Exports	US\$ Bn	182.4	251.1	309.8	306.6	318.6	316.7	266.4	280.1	299.7	305.7
YoY Growth	%	-3.5	37.6	23.4	-1	3.9	-0.6	-15.9	5.2	7	2
Imports	US\$ Bn	300.6	381.1	499.5	502.2	466.2	460.9	396.4	392.6	459.3	470.8
YoY Growth	%	-2.5	26.7	31.1	0.5	-7.2	-1.1	-14	-1	17	2.5
Trade Balance	US\$ Bn	-118.2	-129.9	-189.8	-195.6	-147.6	-144.2	-130.1	-112.4	-159.6	-165.1
Net Invisibles	US\$ Bn	80	84.6	111.6	107.5	115.2	116.2	107.9	97.1	108.3	116.2
Current Account Deficit	US\$ Bn	-38.2	-45.3	-78.2	-88.2	-32.4	-27.9	-22.2	-15.3	-51.2	-48.8
CAD (% of GDP)	%	-2.8	-2.6	-4.2	-4.7	-1.7	-1.4	-1.1	-0.7	-2	1.5-2
Capital Account Balance	US\$ Bn	51.6	62	67.8	89.3	48.8	90	41.1	36.5	64.9	82
Dollar-Rupee (Average)		47.4	45.6	47.9	54.4	60.5	61.2	65.5	67	64.8	64.5

Source: RBI, CSO, CGA, Ministry of Agriculture, Ministry of commerce, Bloomberg, PhillipCapital India Research

PhillipCapital India Coverage Universe: Valuation Summary

Name of company	Sector	CMP ₹	Mkt Cap ₹ bn	Net Sales (₹ mn)		EBIDTA (₹ mn)		PAT (₹ mn)		EPS (₹)		EPS Growth (%)		P/E (x)		P/B (x)		EV/EBITDA (x)		ROE (%)			
				FY19E	FY20E	FY19E	FY20E	FY19E	FY20E	FY19E	FY20E	FY19E	FY20E	FY19E	FY20E	FY19E	FY20E	FY19E	FY20E	FY19E	FY20E	FY19E	FY20E
Mahindra & Mahindra	Automobiles	937	1,143,551	533,834	593,201	78,763	90,488	44,512	51,325	37	43	12.1	15.3	25.0	21.7	3.4	3.1	14.7	12.6	13.8	14.3	12.0	12.7
Escorts	Automobiles	773	110,380	56,139	61,666	7,068	8,211	4,738	5,505	40	46	34.8	16.2	19.5	16.8	3.1	2.6	15.3	12.6	15.8	15.6	16.0	16.0
Tata Motors	Automobiles	276	821,456	3,209,554	3,406,201	446,077	510,369	128,517	155,011	40	48	76.0	20.6	6.9	5.7	1.2	1.0	3.4	3.1	17.6	18.2	6.4	6.9
Bharat Forge	Automobiles	667	300,490	99,672	111,613	21,503	25,195	11,758	14,337	25	31	38.4	21.9	26.4	21.7	6.6	5.5	14.8	12.5	24.8	25.2	19.7	21.0
Bajaj Auto	Automobiles	2,869	778,947	275,544	316,127	50,406	55,990	43,070	47,805	149	165	5.0	11.0	19.3	17.4	3.8	3.4	15.4	13.8	19.9	19.3	20.1	19.7
Hero MotoCorp	Automobiles	3,278	651,059	363,552	400,628	59,168	66,269	42,970	48,523	215	243	17.0	12.9	15.2	13.5	4.6	3.8	10.8	9.5	30.1	28.1	30.8	29.2
Apollo Tyres	Automobiles	241	164,150	167,332	188,163	22,878	26,394	10,770	12,875	19	23	48.8	19.5	12.8	10.7	1.3	1.2	8.7	7.5	10.0	10.8	7.2	7.9
Mahindra CIE	Automobiles	299	96,113	71,450	77,839	10,249	11,191	5,667	6,425	15	17	27.8	13.4	20.0	17.6	2.9	2.7	10.0	9.0	14.6	15.1	14.4	16.4
Ceat	Automobiles	1,392	56,754	71,118	81,223	8,795	10,568	4,590	5,500	113	135	71.7	19.8	12.3	10.3	1.9	1.7	8.4	7.6	15.5	16.1	13.1	11.9
Ramkrishna Forgings	Automobiles	624	21,739	17,885	22,007	3,861	4,798	1,616	2,155	50	66	70.8	33.3	12.6	9.4	2.2	1.8	7.6	6.3	17.7	19.2	17.7	18.3
Manuti Suzuki	Automobiles	8,639	2,774,923	872,874	989,508	142,443	166,077	97,516	116,625	323	386	26.3	19.6	26.8	22.4	5.2	4.4	19.4	16.6	19.5	19.5	19.7	19.9
Ashok Leyland	Automobiles	130	347,519	270,455	300,133	30,305	35,182	17,488	20,585	6	7	11.0	17.7	21.7	18.4	4.2	3.5	11.6	9.8	19.2	18.7	20.0	19.6
BHEL	Capital Goods	78	272,234	320,397	375,051	26,476	33,708	15,452	19,936	4	5	229.8	29.0	18.5	14.3	0.8	0.8	5.9	4.5	4.6	5.7	4.0	4.9
Larsen & Toubro	Capital Goods	1,337	1,805,224	1,366,844	1,575,515	156,587	178,971	83,897	95,283	60	68	15.4	13.4	22.4	19.7	3.0	2.7	18.4	16.4	13.6	13.8	6.2	6.4
VA Tech Wabag	Capital Goods	385	19,970	37,995	40,736	3,651	3,948	1,684	1,893	31	35	22.4	12.4	12.5	11.1	1.7	1.5	6.1	5.2	13.4	13.5	10.8	10.7
CG Power & Industrial	Capital Goods	55	39,360	68,571	74,372	5,760	7,050	1,713	2,612	3	4	246.6	52.5	20.2	13.3	1.3	1.2	9.1	7.2	6.5	9.2	6.7	8.4
GE T&D	Capital Goods	276	72,000	45,500	44,435	4,091	4,340	2,354	2,685	9	10	-3.3	14.1	30.1	26.4	5.2	4.5	16.1	14.5	17.3	17.1	21.6	20.9
Voltas	Capital Goods	583	190,259	76,095	89,244	8,386	9,458	6,506	7,299	20	22	17.4	12.2	29.7	26.4	4.4	3.9	22.6	19.8	14.8	14.8	15.2	15.2
Bharat Electronics	Capital Goods	91	289,224	117,953	132,428	22,886	26,395	14,888	16,983	6	7	-0.3	14.1	14.9	13.0	2.6	2.3	11.7	9.7	17.2	17.6	15.6	16.0
Engineers India	Capital Goods	126	85,656	23,229	30,741	4,241	5,043	3,788	4,371	6	7	11.1	15.4	21.0	18.2	3.4	3.2	13.5	11.2	16.2	17.4	18.9	20.6
KFC International	Capital Goods	291	84,325	115,514	131,058	11,762	13,457	5,504	6,391	21	25	19.5	16.1	13.6	11.7	3.0	2.5	8.7	7.5	22.3	21.3	15.8	15.4
Cummins India	Capital Goods	744	194,317	55,929	63,845	8,270	9,768	7,510	8,601	27	31	6.0	14.5	27.5	24.0	4.9	4.5	23.0	19.4	17.7	18.8	16.7	18.3
Siemens	Capital Goods	977	361,462	132,609	132,839	13,178	13,980	8,809	9,882	25	28	27.8	12.2	39.5	35.2	4.2	3.4	23.8	20.8	10.6	9.6	9.6	33.5
ABB India	Capital Goods	1,374	255,562	109,288	118,032	9,657	10,737	5,441	6,148	26	29	31.3	13.0	53.5	47.3	7.2	6.4	25.4	22.4	13.5	13.6	12.5	12.5
Thermax	Capital Goods	980	137,048	56,591	69,026	5,346	6,712	3,395	4,282	28	36	46.2	26.1	34.4	27.3	3.9	3.5	25.2	20.0	11.4	12.9	10.8	12.2
Cochin Shipyard	Capital Goods	424	322,350	27,535	27,805	5,594	4,797	4,619	3,873	34	28	14.2	-16.2	12.5	14.9	1.6	1.5	52.2	62.3	13.1	10.3	12.3	9.7
Hindustan Aeronautics	Capital Goods	930	170,908	182,158	202,808	25,081	27,685	15,225	19,079	46	57	-26.5	25.3	20.4	16.3	2.4	2.3	1.0	0.4	12.0	13.9	7.8	9.2
Bharat Dynamics	Capital Goods	352	69,015	45,351	36,743	8,201	5,895	5,878	4,664	32	25	1.3	-20.7	11.0	13.8	2.8	2.5	6.8	8.6	25.2	17.7	21.0	15.1

PhillipCapital India Coverage Universe: Valuation Summary

Name of company	Sector	CMP ₹	Mkt Cap ₹ bn	Net Sales (₹ mn)		EBIDTA (₹ mn)		PAT (₹ mn)		EPS (₹)		EPS Growth (%)		P/E (x)		P/B (x)		EV/EBITDA (x)		ROE (%)			
				FY19E	FY20E	FY19E	FY20E	FY19E	FY20E	FY19E	FY20E	FY19E	FY20E	FY19E	FY20E	FY19E	FY20E	FY19E	FY20E	FY19E	FY20E	FY19E	FY20E
India Cement	Cement	120	36,418	63,870	70,785	9,546	10,870	2,754	3,873	9	13	128.3	40.7	13.4	9.5	0.7	6.7	5.7	5.3	7.1	5.2	6.3	
JK Lakshmi Cement	Cement	325	38,431	39,746	44,053	7,012	8,883	2,787	4,435	24	38	125.0	59.2	13.7	8.6	2.2	1.9	7.2	5.3	16.3	21.8	12.9	18.0
JK Cement	Cement	802	53,494	51,242	53,397	9,477	9,823	3,728	3,430	53	49	24.5	-8.0	15.0	16.3	2.5	2.3	8.4	9.2	16.9	14.2	10.2	8.8
Mangalam Cement	Cement	244	6,564	11,174	11,777	1,903	2,177	858	1,108	32	42	60.6	29.1	7.6	5.9	1.0	0.9	3.6	2.6	13.6	15.7	13.5	18.0
Dalmia Bharat	Cement	2,582	238,806	95,211	104,238	26,088	27,552	7,842	8,299	88	93	40.6	5.8	29.3	27.7	3.7	3.2	10.4	9.4	12.5	11.7	8.8	9.0
Ambuja Cement	Cement	220	449,252	267,822	283,283	42,805	49,261	17,375	20,725	9	10	41.4	19.3	25.1	21.0	2.1	2.0	9.2	8.0	8.3	9.4	8.4	9.7
Ultratech Cement	Cement	4,155	1,147,511	429,709	514,020	85,972	97,234	37,491	46,647	137	162	39.5	18.4	30.4	25.7	3.8	3.5	14.9	12.8	12.5	13.6	8.8	10.2
HeidelbergCement	Cement	165	36,167	21,394	22,447	3,944	4,153	1,727	1,821	8	8	27.4	5.4	21.6	20.5	2.9	2.6	9.6	8.5	13.5	12.5	10.4	10.3
ACC	Cement	1,529	286,563	147,483	158,128	19,659	24,035	12,118	14,545	64	77	30.8	20.0	23.7	19.8	2.9	2.8	13.1	10.8	12.4	14.1	10.6	12.9
Shree Cement	Cement	17,265	605,898	123,447	150,073	32,315	38,994	16,267	18,852	467	541	23.1	15.9	37.0	31.9	6.6	5.7	18.6	15.4	17.8	17.8	17.0	16.3
IOCI Bank	Banks	333	1,960,226	256	306	223	262	87	135	14	21	28.1	54.7	24.6	15.9	1.9	1.8	-	-	8.1	11.7	1.0	1.4
State Bank of India	Banks	285	2,667,113	847,529	981,379	581,646	687,823	60,582	272,585	7	30	-192.5	336.0	42.0	9.6	1.3	1.1	4.6	3.9	3.1	12.7	0.2	0.8
Bank of Baroda	Banks	147	395,240	182,743	222,890	133,603	169,687	24,663	82,427	8	28	-191.2	234.2	17.5	5.2	0.9	0.8	3.0	2.3	5.6	16.1	0.3	1.0
Punjab National Bank	Banks	83	243,483	167,584	211,645	96,986	118,933	-11,529	27,533	-3	8	-92.3	-338.8	-24.2	10.1	0.6	0.6	2.5	2.0	-2.9	6.5	-0.2	0.3
LIC Housing Finance	Banks	484	275,064	43,853	50,505	38,982	44,896	24,322	27,780	48	55	22.2	14.2	10.1	8.8	1.6	1.4	7	6	17	17	1	1
Recco Home Finance	Banks	537	38,015	4,836	5,536	4,258	4,861	2,309	2,704	37	43	10.2	17.1	14.6	12.5	2.2	1.9	8.9	7.8	16.1	16.2	2.1	2.1
Canara Bank	Banks	265	213,008	138,482	169,710	96,973	117,022	-11,060	-3,069	-12	-3	-38.4	-72.3	-22.5	-81.0	0.6	0.7	2.2	1.8	-3.0	-0.8	-0.2	-0.0
HDFC Limited	Banks	1,884	3,339,166	139,175	166,650	167,926	175,903	93,571	111,692	64	65	-11.8	1.9	29.4	28.9	4.4	4.0	19.9	19.0	13.9	14.5	2.2	2.2
AXIS Bank	Banks	652	1,475,054	215,460	258,215	179,754	214,124	31,744	89,583	12	34	-21.3	180.8	53.9	19.2	3	2.3	8.2	6.9	4.9	12.7	0.5	1.1
Indian Bank	Banks	320	175,330	74,915	89,708	55,626	67,746	14,108	29,820	27	57	2.5	111.4	11.9	5.6	0.9	0.8	3.2	2.6	8.2	15.0	0.5	1.0
HDFC Bank	Banks	2,041	5,525,502	467,627	567,826	381,497	463,872	209,779	252,696	78	93	15.1	20.5	26.3	21.9	3.8	3.3	14.5	11.9	16.6	16.2	1.9	1.9
Indusind Bank	Banks	1,829	1,210,490	93,670	117,349	82,604	102,087	45,412	56,456	76	94	25.9	24.3	24.2	19.4	4.0	3.4	14.7	11.9	17.6	18.7	1.9	1.9
DCB Bank	Banks	168	49,936	11,776	14,972	6,338	8,648	3,034	4,165	10	12	23.7	25.9	17.0	13.5	1.6	1.4	7.9	5.8	10.2	11.5	0.9	1.0
Union Bank	Banks	82	103,302	111,745	127,994	79,733	88,277	6,185	18,080	4	13	-114.3	192.3	18.9	6.5	0.4	0.3	1.3	1.2	2.3	5.9	0.1	0.3
Oriental Bank of Com	Banks	76	51,760	49,160	58,214	41,274	47,762	549	5,791	1	7	-100.8	955.1	121.5	11.5	0.5	0.4	1.3	1.1	0.4	3.9	0.0	0.2
Dewan Housing Fin	Banks	632	196,445	29,323	35,026	26,857	32,240	16,216	19,441	52	62	38.2	19.9	12.2	10.2	2	2	7.3	6.1	16.6	17.2	1.4	1.4
Kotak Mahindra Bank	Banks	1,223	2,496,270	113,560	138,462	89,907	112,158	51,173	65,461	36	42	10.1	16.9	34.0	29.1	4.1	3.6	27.8	22.3	12.8	14.3	1.8	1.9
Britannia	FMCG	6,094	767,418	112,914	128,515	18,574	21,678	12,279	14,302	102	119	22.3	16.5	59.6	51.2	17.7	14.7	41.2	34.9	29.7	28.7	31.1	30.2

PhillipCapital India Coverage Universe: Valuation Summary

Name of company	Sector	CMP ₹	Mkt Cap ₹ bn	Net Sales (₹ mn)		EBIDTA (₹ mn)		PAT (₹ mn)		EPS (₹)		EPS Growth (%)		P/E (x)		P/B (x)		EV/EBITDA (x)		ROE (%)			
				FY19E	FY20E	FY19E	FY20E	FY19E	FY20E	FY19E	FY20E	FY19E	FY20E	FY19E	FY20E	FY19E	FY20E	FY19E	FY20E	FY19E	FY20E	FY19E	FY20E
Jubilant Foodworks	FMCG	1,391	191,355	35,773	41,178	6,278	7,952	3,128	4,147	47	63	51.5	32.6	29.3	22.1	7.3	5.8	29.7	23.0	25.0	26.4	27.1	29.0
ITC	FMCG	307	3,715,975	479,457	529,308	180,693	200,447	124,422	140,168	10	12	12.3	12.7	29.6	26.3	7.4	6.8	20.2	18.2	24.9	26.0	24.4	26.0
Hindustan Unilever	FMCG	1,610	3,809,755	405,022	455,331	97,398	113,271	63,802	74,651	29	34	21.3	17.0	54.7	46.8	38.8	31.0	38.5	33.0	70.9	66.2	78.9	74.0
Colgate	FMCG	1,127	305,045	45,793	49,316	12,294	13,362	7,535	8,194	28	30	10.0	8.7	40.7	37.4	16.5	13.8	24.5	21.5	40.6	37.0	44.6	40.3
Glaxo Smithkline Con	FMCG	7,205	285,957	48,738	53,712	10,177	11,182	7,790	8,422	185	200	11.3	8.1	38.9	36.0	8.0	7.2	24.4	20.7	20.5	20.1	21.5	21.1
Titan Company	FMCG	858	812,280	191,175	232,113	22,205	28,017	15,549	19,637	18	22	23.9	26.3	49.0	38.8	12.1	9.9	35.8	28.2	24.7	25.5	28.3	29.1
Asian Paints	FMCG	1,293	1,354,387	194,035	219,924	38,836	44,524	23,099	26,397	24	28	13.9	14.3	53.7	47.0	12.9	11.5	34.7	30.1	24.0	24.5	23.6	24.3
Godrej Consumer Prod	FMCG	1,298	905,283	111,420	125,025	24,988	28,413	17,820	20,663	26	30	7.1	16.0	49.6	42.8	12.6	10.9	36.6	31.9	25.3	25.5	18.5	19.6
Emami	FMCG	558	257,858	28,394	31,901	7,904	8,905	3,965	4,812	17	21	33.4	21.3	31.9	26.3	6.1	5.4	32.2	28.1	19.0	20.5	18.0	20.6
Agro Tech Foods	FMCG	645	16,033	8,793	9,588	739	882	354	439	15	18	11.7	24.2	44.5	35.8	4.3	3.9	20.9	17.1	9.6	10.9	10.0	11.3
Marico Industries	FMCG	344	453,352	72,136	82,158	13,294	15,474	9,635	11,207	7	9	16.4	16.3	46.1	39.7	18.4	17.6	34.0	29.2	39.9	44.4	32.8	37.1
Dabur India	FMCG	450	771,151	88,863	99,423	19,141	21,804	15,685	17,680	9	10	14.3	12.7	50.5	44.8	14.3	11.9	39.4	34.1	28.3	26.6	23.4	25.0
Bajaj Corp	FMCG	421	61,205	8,896	9,837	2,697	2,963	2,249	2,129	15	14	6.5	-5.3	27.6	29.2	11.5	10.7	22.5	20.4	41.8	36.7	42.7	37.3
Pareg Milk Foods	FMCG	293	26,277	22,287	26,174	2,343	2,878	1,173	1,541	14	18	34.7	31.5	21.0	16.0	2.9	2.5	11.4	9.0	13.8	15.4	15.4	16.8
Nestle	FMCG	995,974	114,213	129,651	26,009	30,279	15,431	18,196	15,431	160	189	32.1	17.9	64.5	54.7	25.8	25.0	36.8	31.4	39.9	45.7	25.2	26.9
Thangamayil	FMCG	379	6,011	16,436	19,664	774	1,022	307	436	22	32	33.8	42.0	16.9	11.9	2.7	2.3	9.7	7.6	15.9	19.0	23.1	27.2
Sadbhav Engineering	Infrastructure	270	49,241	39,958	47,949	4,395	5,274	2,949	2,577	17	15	33.6	-12.6	15.7	18.0	2.2	1.9	14.3	11.9	13.7	10.7	10.7	9.1
KNR Construction	Infrastructure	208	32,764	21,248	26,560	3,400	4,250	1,807	1,940	13	14	-33.6	7.3	16.2	15.1	2.2	1.9	10.3	8.3	14.5	13.6	13.4	12.6
JKumar Infra	Infrastructure	247	15,848	22,558	25,942	3,609	4,151	1,525	1,812	20	24	11.6	18.8	12.3	10.3	1.1	1.0	4.3	3.8	9.7	10.5	9.6	10.2
IRB Infrastructure	Infrastructure	172	68,515	69,723	74,492	34,124	29,487	8,978	5,963	26	17	13.2	-33.6	6.7	10.1	0.9	0.9	5.9	7.3	14.0	8.7	4.9	3.9
Ahluwalia Contracts	Infrastructure	299	21,369	19,759	23,711	2,618	3,142	1,515	1,852	23	28	31.3	22.2	13.2	10.8	2.6	2.1	7.8	6.4	21.8	21.5	22.1	21.8
PNC Infotech	Infrastructure	149	40,392	24,136	31,376	3,379	4,393	1,914	2,025	7	8	-4.8	5.8	19.9	18.8	1.9	1.8	12.9	10.6	10.1	9.8	10.0	9.5
Adani Ports & SEZ	Infrastructure	372	829,209	108,828	124,477	73,538	84,709	43,458	49,064	21	24	5.0	12.9	17.7	15.7	3.2	2.7	13.5	11.5	17.8	17.0	10.6	12.3
NCC	Infrastructure	92	55,139	105,831	132,288	11,112	13,890	4,617	6,238	8	10	27.8	35.1	11.9	8.8	1.2	1.1	6.5	5.4	9.9	12.0	12.0	13.0
ITD Cementation	Infrastructure	134	23,114	32,195	n.a.	3,381	n.a.	1,709	n.a.	10	n.a.	45.9	-	13.5	-	1.9	-	7.4	-	13.9	-	14.3	-
Hindustan Construction	Infrastructure	15	11,881	45,751	54,901	5,490	6,588	1,815	3,475	2	3	134.1	91.4	8.2	4.3	0.5	0.5	5.9	4.2	6.3	11.1	7.1	9.7
Ashoka Buildcon	Infrastructure	136	40,986	32,072	41,694	3,849	5,003	2,401	2,539	9	9	-32.5	5.7	15.9	15.0	1.7	1.5	10.8	9.2	10.4	10.0	12.1	11.6
Tata Consultancy	IT Services	2,081	7,578,473	1,380,675	1,534,447	377,900	428,110	296,835	332,474	78	87	14.8	12.0	26.8	23.9	7.6	6.4	19.8	17.3	28.4	26.9	30.1	28.4

PhillipCapital India Coverage Universe: Valuation Summary

Name of company	Sector	CMP ₹	Mkt Cap ₹ bn	Net Sales (₹ mn)		EBIDTA (₹ mn)		PAT (₹ mn)		EPS (₹)		EPS Growth (%)		P/E (x)		P/B (x)		EV/EBITDA (x)		ROE (%)			
				FY19E	FY20E	FY19E	FY20E	FY19E	FY20E	FY19E	FY20E	FY19E	FY20E	FY19E	FY20E	FY19E	FY20E	FY19E	FY20E	FY19E	FY20E	FY19E	FY20E
Infosys Technologies	IT Services	731	2,976,965	794,035	882,563	211,724	233,124	158,540	175,949	73	81	-1.5	11.0	10.0	9.0	2.2	2.0	12.2	10.8	22.1	22.1	23.0	23.1
Wipro	IT Services	325	1,258,808	570,529	613,718	119,394	129,910	89,507	99,368	19.9	22.1	6.3	11.0	16.3	14.7	2.7	2.3	11.0	9.9	16.2	15.8	15.7	15.4
HCL Technologies	IT Services	1,089	1,342,628	578,985	644,863	133,625	150,326	94,282	105,728	68	76	7.4	12.1	16.1	14.3	3.5	3	10.0	8.8	21.7	20.8	22.5	21.6
Tech Mahindra	IT Services	766	649,152	333,449	363,023	52,763	58,282	34,861	38,930	39	44	-8.8	11.7	19.4	17.4	3.3	2.9	11.8	10.4	16.8	16.9	12.8	13.2
L&T Infotech	IT Services	1,919	295,620	87,621	100,911	15,548	18,280	12,881	15,332	76	90	15.8	19.0	25.4	21.3	7.0	5.7	18.7	15.7	27.5	26.8	28.0	27.6
L&T Technology Services	IT Services	1,724	145,718	43,242	50,157	7,316	8,680	5,803	6,981	57	69	20.9	20.3	30.2	25.1	7.2	5.8	19.8	16.4	23.9	23.0	24.6	23.9
Mindtree	IT Services	1,147	157,221	63,552	72,879	10,306	12,821	6,769	8,613	41	53	18.7	27.2	27.8	21.8	5.9	4.9	14.9	11.7	21.2	22.7	23.2	25.0
Cyent Limited	IT Services	801	77,913	46,320	53,626	6,658	7,689	5,185	6,019	46	54	20.9	16.1	17.4	15.0	3.3	2.9	10.1	8.4	19.2	19.1	19.0	18.8
Persistent Systems	IT Services	885	66,960	34,690	39,088	5,859	6,966	3,948	4,640	49	58	22.2	17.5	17.9	15.3	2.9	2.6	11.0	9.1	16.4	16.9	16.2	16.9
NiIT Technologies	IT Services	1,403	79,382	34,781	39,546	5,793	6,680	3,528	4,112	58	67	25.9	16.6	24.3	20.9	4.3	3.7	12.1	9.9	17.5	17.7	17.6	17.9
Intellect Design Arena	IT Services	256	25,872	13,332	15,963	1,159	1,552	985	917	8	7	110.2	-6.9	32.7	35.1	3.6	3.3	23.8	18.4	-	-	6.1	7.7
Majesco	IT Services	555	14,595	9,893	12,073	514	1,046	315	670	11	24	-1,658	112.8	49.5	23.3	2.7	2.4	27.2	12.9	5.5	10.4	4.7	8.7
Praj Inds.	Logistics	93	14,727	10,343	12,571	808	1,527	529	1,068	3	6	76.5	101.8	31.6	15.6	2.4	2.3	17.4	8.9	7.5	14.5	7.3	14.4
Pennar Inds.	Logistics	45	5,813	19,963	23,089	2,017	2,468	747	948	6	8	30.2	26.8	7.3	5.8	0.8	0.8	4.0	3.3	11.4	13.0	14.8	16.0
Indo Count Industries	Logistics	76	16,818	21,270	23,759	3,117	3,586	1,625	1,817	8	9	29.8	11.8	9.2	8.2	1.4	1.2	6.4	5.7	14.9	14.5	13.8	13.7
Sintex Plastic	Logistics	37	26,855	51,905	57,773	7,572	9,529	2,474	4,109	4	6	0.7	66.0	9.8	5.9	0.7	0.6	6.9	5.2	6.6	10.2	5.5	7.6
KDDL	Logistics	473	5,349	5,709	6,741	527	675	166	228	15	21	-3.7	38.0	30.9	22.4	3.6	3.3	13.2	10.6	11.7	14.6	8.3	10.0
Gateway Distriparks	Logistics	180	19,408	4,344	4,937	950	1,087	944	1,238	9	11	13.5	31.2	20.7	15.8	1.9	1.9	20.3	17.7	9.3	11.9	9.5	12.0
Container Corp Of India	Logistics	659	312,690	65,411	79,036	13,745	17,555	11,061	13,878	23	28	5.4	25.5	29.1	23.2	3.2	3.0	21.1	16.4	11.1	13.0	11.0	13.1
Navkar	Logistics	109	20,282	7,153	8,968	2,657	3,404	1,771	2,348	12	16	75.5	32.6	9.3	7.0	0.8	0.8	8.5	6.2	9.1	10.7	8.4	10.2
Allcargo Logistics	Logistics	117	31,068	64,539	71,210	4,158	5,010	2,059	2,709	8	11	15.5	31.6	14.0	10.6	1.4	1.3	8.0	6.5	9.9	11.9	9.4	11.4
VRL Logistics	Midcap	306	31,259	21,800	25,166	2,950	3,623	1,189	1,493	13	16	19.8	25.6	23.4	18.7	4.3	3.9	11.5	9.6	18.5	20.9	14.0	14.2
VGuard Industries	Midcap	200	89,890	27,394	31,435	2,836	3,434	2,065	2,494	5	8	25.4	71.8	41.2	23.9	9.2	5.3	31.6	26.0	22.3	22.3	23.4	23.5
Bejaj Electricals	Midcap	533	61,934	61,258	75,783	4,512	6,334	2,455	3,560	24	35	42.0	45.0	22.0	15.2	5.2	4.0	15.6	11.2	23.8	26.6	15.4	17.9
Finolex Cables	Midcap	551	93,981	30,870	35,456	4,693	5,432	4,083	4,665	27	30	10.1	14.2	20.6	18.1	3.3	2.9	19.0	16.0	16.1	15.9	17.0	16.8
KEI Industries	Midcap	410	34,060	37,726	43,462	3,760	4,504	3,447	4,132	44	53	18.5	19.9	9.3	7.7	4.2	3.3	10.8	8.8	45.7	42.9	24.3	27.1
Havells India	Midcap	641	400,396	95,608	111,456	12,234	14,601	7,839	9,238	13	15	13.2	17.8	51.1	43.4	9.8	8.7	32.8	27.2	19.2	20.0	18.2	19.5
Muthoot Finance	NBFC	453	165,498	42,767	44,940	28,397	29,343	16,781	16,763	42	42	-2.5	-0.1	10.8	10.8	2.0	1.8	5.8	5.6	20.1	17.5	4.9	4.5

PhillipCapital India Coverage Universe: Valuation Summary

Name of company	Sector	CMP ₹	Mkt Cap ₹ bn	Net Sales (₹ mn)		EBIDTA (₹ mn)		PAT (₹ mn)		EPS (₹)		EPS Growth (%)		P/E (x)		P/B (x)		EV/EBITDA (x)		ROE (%)			
				FY19E	FY20E	FY19E	FY20E	FY19E	FY20E	FY19E	FY20E	FY19E	FY20E	FY19E	FY20E	FY19E	FY20E	FY19E	FY20E	FY19E	FY20E	FY19E	FY20E
Shriram City Union Fin	NBFC	1,954	127,956	38,470	46,559	24,462	29,890	9,467	11,736	144	178	42.4	24.0	13.6	11.0	2.1	1.8	5.2	4.3	16.0	17.4	3.0	3.1
Cholamandalam Inve	NBFC	1,390	223,864	39,036	50,582	23,718	30,785	12,317	16,109	79	98	26.4	24.8	17.6	14.1	3.5	2.5	9.4	7.3	21.7	21.0	2.8	2.8
Shriram Transport Fin	NBFC	1,192	324,681	77,265	90,404	61,257	71,334	24,338	30,540	107	107	64.9	-	11.1	11.1	1.8	1.8	5.3	4.6	17.8	17.8	2.5	2.5
Mah & Mah Finance	NBFC	447	312,311	45,578	55,139	30,817	37,235	13,404	17,081	22	28	57.8	27.4	20.5	16.1	2.6	2.3	10.1	8.4	13.4	15.1	2.2	2.3
Manappuram Finance	NBFC	91	94,785	22,980	25,675	12,675	14,167	7,958	8,875	9	11	13.7	11.5	9.6	8.6	1.7	1.5	7.5	6.7	19.2	18.4	5.1	5.0
Magma Fincorp	NBFC	138	39,720	13,651	15,733	7,506	8,771	3,502	4,249	13	16	33.7	21.3	10.6	8.8	1.4	1.2	5.3	4.5	13.9	14.6	2.4	2.6
Indiabulls Housing Fin	NBFC	1,161	586,139	54,490	68,039	66,120	82,557	46,691	58,741	110	139	30	26	11	8	3	2	8.9	7.1	29.3	30.7	3.1	3.1
Bharat Financial Inc	NBFC	1,123	170,908	16,436	-	9,312	-	5,267	-	37	-	34.1	-	30.0	-	4.7	-	18.4	-	17.0	-	2.3	-
Ipsca Laboratories	Pharma	771	96,710	36,450	42,312	6,707	8,039	4,007	5,009	32	40	67.4	25.0	24.1	19.3	3.1	2.7	14.7	11.9	13.0	14.0	10.9	12.3
Aurobindo Pharma	Pharma	796	364,757	187,182	214,550	39,121	47,201	23,793	29,112	41	50	-2.3	22.4	19.5	15.9	3.3	2.8	10.1	8.0	17.1	17.4	17.3	18.4
Divi's Laboratories	Pharma	1,279	319,730	44,483	50,317	15,480	18,014	10,937	12,893	41	49	28.8	17.9	31.0	26.3	5.1	4.4	20.3	17.4	16.3	16.7	-	-
Cadila Healthcare	Pharma	420	385,951	121,973	135,339	26,899	30,814	17,357	20,154	17	20	-1.9	16.1	24.8	21.3	4.1	3.4	15.5	13.1	15.9	15.5	11.2	11.9
Sun Pharma	Pharma	638	104,866	301,000	339,531	75,220	92,814	48,268	62,734	20	26	2.9	30.0	15.8	24.4	0.0	3.1	1.4	0.4	11.3	12.9	9.3	10.8
Cipla	Pharma	668	516,144	17,290	19,341	4,565	5,319	1,744	2,147	22	27	18.5	23.1	30.8	25.0	3.4	3.0	113.5	97.0	18.7	19.7	-	-
Lupin	Pharma	944	401,241	165,050	179,950	33,203	39,308	15,782	19,523	35	43	16.8	23.7	27.1	21.9	2.9	2.6	13.7	11.3	10.6	11.9	-	-
Glennmark Pharma	Pharma	687	168,595	95,415	104,789	18,898	21,258	9,258	10,740	33	38	19.3	16.0	20.9	18.0	3.0	2.6	10.5	9.2	14.4	14.4	10.1	10.7
Dr Reddy's Labs.	Pharma	2,564	378,109	155,254	173,581	30,275	36,452	15,304	20,367	90	120	51.2	33.1	28.5	21.5	3.1	2.7	13.6	11.0	10.7	12.7	7.0	8.6
Biocin	Pharma	638	350,850	54,227	70,124	12,589	19,028	6,703	11,400	11	19	131.7	70.1	57.1	33.6	6.6	5.6	28.7	18.7	11.0	16.0	11.0	16.0
SRF	Specialty Ch	1,953	100,397	65,390	75,986	11,574	14,437	5,562	7,418	97	129	33.9	33.4	20.2	15.1	2.8	2.4	11.0	8.6	13.8	15.8	9.2	10.7
Meghmani Organics	Specialty Ch	85	23,626	21,313	26,257	4,625	5,987	2,103	2,786	8	11	22.0	32.5	10.3	7.8	2.0	1.6	6.6	4.7	19.3	20.4	15.1	16.4
Camlin Fine Sciences	Specialty Ch	65	10,577	9,860	12,369	927	2,041	215	992	2	8	-170.9	360.9	36.3	7.9	2.0	1.6	16.5	6.9	8.2	24.1	-	-
Aarti Industries	Specialty Ch	1,331	103,426	45,315	52,743	8,701	10,549	4,504	5,673	55	70	35.3	26.0	24.0	19.1	5.3	4.2	14.2	11.9	22.9	22.5	-	-
Vinati Organics	Specialty Ch	1,330	50,980	9,999	13,893	3,210	4,368	2,095	2,863	41	55	45.6	36.6	32.8	24.0	6.6	5.2	17.0	12.4	20.3	21.7	-	-
Atul	Specialty Ch	3,160	86,909	38,231	42,969	6,614	7,777	3,970	4,700	134	158	41.2	18.4	23.6	20.0	3.6	3.1	12.6	10.2	15.1	15.4	-	-
UPL	Agri Inputs	703	326,287	196,228	226,930	37,326	43,516	21,794	27,017	43	53	4.1	24.0	16.5	13.3	3.3	2.7	9.5	8.0	21.7	22.5	17.1	18.2
Coromandel Int	Agri Inputs	400	123,077	124,663	140,007	13,755	17,220	7,506	9,823	26	34	5.7	30.9	15.6	11.9	3.2	2.6	10.7	8.4	20.3	22.0	36.9	39.1
PI Industries	Agri Inputs	779	114,463	26,555	30,547	5,960	7,324	4,316	5,376	31	39	17.4	24.6	24.9	20.0	4.7	4.0	18.9	15.2	18.9	20.0	19.1	20.5
Excel Crop	Agri Inputs	4,236	50,400	15,210	20,298	2,199	3,047	1,357	1,911	123	174	67.2	40.8	34.3	24.4	7.1	5.6	22.7	16.4	20.7	22.9	21.0	23.2

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