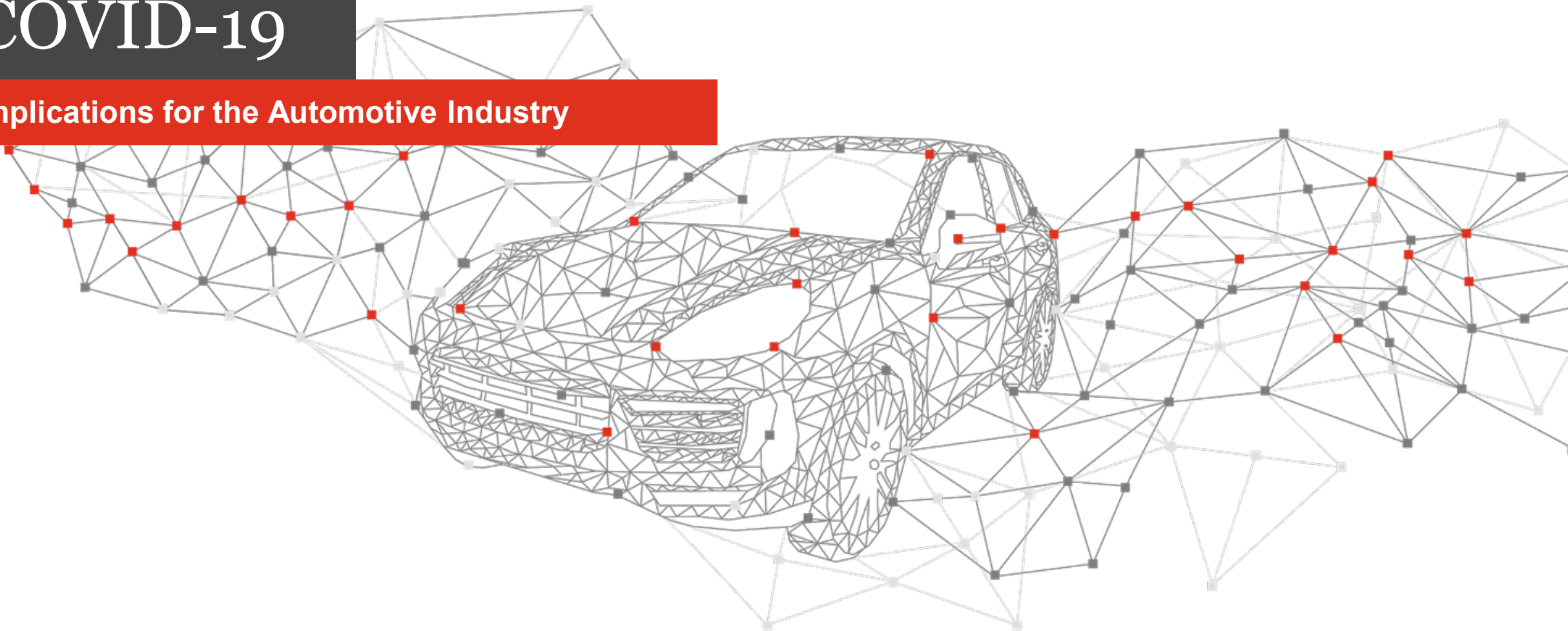


COVID-19

Implications for the Automotive Industry



Agenda

1. Implications of COVID-19 for the automotive industry
2. Overview of scenarios and assumptions
3. Global: Sales
4. Europe: Sales
5. Germany: Sales
6. Europe: Production
7. USA: Sales
8. China: Sales
9. Long-term development
10. Version Control

Structural analysis

The re-start of production in Q2 determines the availability of vehicles, while planned sales incentives attempt to support the return of demand

Short term (Q1)

Shutting down and closing

Market

Stop of sales

Sudden and complete drop in new car sales due to social restrictions and a lack of sales and financing staff

OEMs

Plant closures

Synchronous, complete shutdown to minimize variable costs - Avoiding permanent layoffs and closures as much as possible

Suppliers

Interrupted production

Extensive lack of demand impairs the production of suppliers in all regions and requires dedicated coordination

Finances

Cash flow effects

Lack of sales impairs the inflow of liquidity from April onwards, while structural costs remain largely unchanged

Medium term (Q2)

Restart and recovery

Crisis vs. incentives

Economic crisis and missing confidence suppress new vehicle demand; possible government incentive programs focus on electric and plug-in vehicles

Production re-start

Significant reorganisation of production processes hampers output; gradual ramp-up over 3 months expected due to repeated break-offs

Restoring supply chains

The demolition of the logistics chains will cause supply bottlenecks for another 3 months; suppliers start to actively renegotiate production order and allocation

Effects on profitability

Due to a lack of revenue and cash inflows, profitability is lost at all levels of the automotive value chain with increased risk of company defaults

Long term (Q3+)

Restructuring and implications

Full digitization of sales

Stationary retail has proven most effective and agile in the implementation of digital marketing and sales; digital sales don't necessarily equal direct sales

Integrated mobility services

OEMs continue to develop technology systems that go beyond shared mobility to connect multimodal individual transportation demand

De-globalized supply chains

Build-up of real-time transparency and active management of cluster risks across all supplier levels and regions; increase of local value-add

Consolidation & alignment

Tier-1 suppliers combining into major system integrators, while upstream suppliers expected to integrate vertically

The year 2020 up to May

Production closures continue as demand starts to recover; stock sales provide temporary remedy on still very low volume levels

Country	Sales Decrease*	Decrease vs. YTD May 19	Production Decrease**	Decrease vs. YTD May 19	Comment
China	-2,336,175	-28.3%	-2,683,208	-33.4%	In May, strong recovery of sales to +2% vs. 2019 while production still lags
Japan	-373,899	-19.5%	-864,969	-24.6%	State of emergency and voluntary contact restrictions withdrawn since end of May
South Korea	-6,973	-1.2%	-361,874	-23.3%	Severe shutdowns from mid-February to mid-March, quick return to normal operations
USA	-1,228,026	-22.1%	-1,340,592	-41.3%	Less than 31% sales loss in May, while production remains almost completely closed
Rest of NA	-389,232	-36.8%	-917,055	-44.6%	Sales decline more than 47% in May, production almost completely shut down
Germany	-533,705	-35.0%	-883,667	-43.3%	Lock-down measures released towards end-May, sales -50%, production -66%
UK	-537,542	-51.4%	-246,640	-44.2%	Nearly total loss of sales in May with -89%, production likewise
France	-452,725	-48.5%	-483,578	-62.3%	Slightly less than 100,000 sales (-50%), recovering visibly from April's -88%
Italy	-464,044	-50.7%	-136,628	-53.6%	Start of sales rebound from April low with 99,711 units in May (-50%)
Spain	-352,091	-57.8%	-414,302	-42.3%	Heavy sales losses continue with 34,337 units in May (-73%) due to extended curfew
other EU	-839,773	-42.2%	-1,013,911	-42.3%	Plant closures reduce production by estimated 60% in May after -94% in April
ROW	-2,269,355	-34.6%	-2,514,930	-42.6%	Estimated production loss of 2/3 vs. 2019 in May due to global OEM closures
Total	-9,783,540	-31.6%	-11,861,354	-37.9%	Sales continue to de-couple from production development through stock sales

* partly estimated

** estimated

Of the **four scenarios**, the “Deep Impact” worst case is materializing as actual development; sales incentives become more concrete

Scenario	Impact/ V-Shape	Incentive/ Short V	Deep Impact/ U-Shape	Double Dip/ L-Shape
Assumptions on demand	Collapse of consumer confidence originally assumed over only 4 weeks, overtaken by actual distancing measures of 6-8 weeks, progressive recovery to normal modelled over 3 months	Starting like „Deep Impact“, EU government are assumed to launch synchronized incentive programs focusing on EV/ PHEV and charging infrastructure. China has extended NEV incentives	Collapse of consumer confidence as well as curfews and closures lead to losses over two months from March into May. Permanent reductions of demand also in the second half of the year in line with the financial crisis 2008/ 2009	Like "Impact", with accelerated recovery until September; due to second wave of infection renewed containment measures slowing demand in October – November globally
Assumptions on production	Majority of plants close originally assumed over 4 weeks; scenario is updated with actual development on monthly basis; production resumption assumed linearly over 3 months after actuals	Incentive programs focused at EV/ PHEV are expected to have only limited short-term effects, while general consumption stimulus (VAT reduction, consumer subsidies) is expected to support willingness-to-spend by private consumers	Voluntary and officially ordered plant closures over 2 months reduce global production significantly. Reorganisation of supply chains and production processes delay ramp- up to extend over 3 months	As "Impact", with linear recovery over three months; new but less stringent closures due to second infection wave in October - November
Consolidation to sales incl. short-term stock changes	Restriction in production lead to a global undersupply of approx. 3.6 million units	Restrictions in production lead to a global undersupply of approx. 3.8 million units	Restrictions in production lead to a global undersupply of approx. 5.1 million units	Restrictions in production lead to a global undersupply of approx. 3.9 million units

COVID-19 effects are continuing on the expected “Deep Impact” path, with sales in China and USA showing more resilience than Europe

Key assumptions

- **Demand** is returning proportionately with the lifting of local restrictions at different rates, with economic effects impacting on consumer confidence
- **Production** bottlenecks caused by logistical and financial problems of OEM factories and suppliers determine the production ramp-up

Current situation: Year-to-date global sales show diverging development paths over key regions: while China has entered into full recovery in May, US sales showed strong resilience in April and May. New vehicle registrations in Europe collapsed completely in April, and showed only partial recovery in May. As production still lagging demand, significant sales of in-stock vehicles occur.

Effects:

China: After a strong recovery pre-year levels in April and May, the Chinese market is showing unbroken demand potential. Short- and mid-term government support (e.g. reduction of purchase tax, NEV subsidies) have a lasting positive effect.

Europe: After complete lock-down in several major markets, sales recovered to ca. -60% in May, partially supported by stock vehicle sales. As government incentives are focused on EV/ PHEV, they may not be able to create major market pull.

USA: US sales showed significant resilience in April, but still fell significantly behind 2019 in May. Due to drastic economic impact – and lack of planned incentives – we expect continued weakness through the year.

New York Times, 7 February
Chinese Car Factories Idled

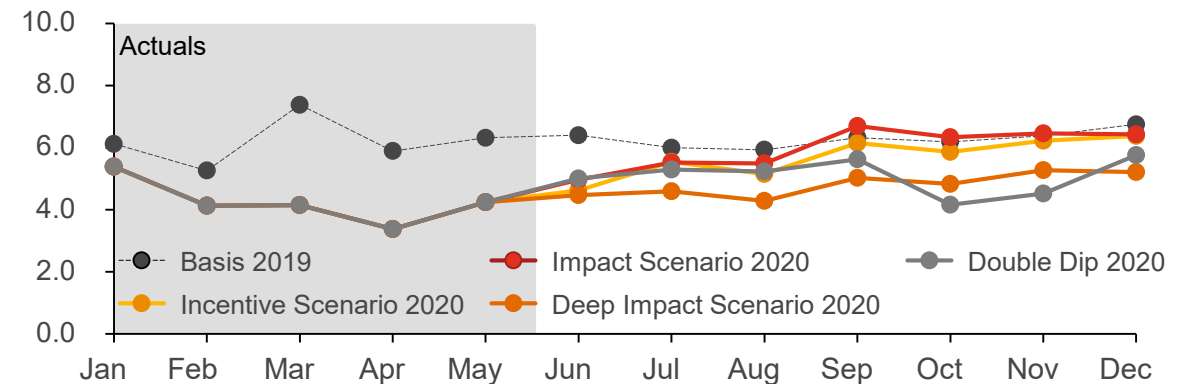
As the coronavirus spreads, assembly lines may take longer than expected to restart, causing a chain reaction around the world.

AbcNews, 19 March 2020
Automakers shut N. A. plants

Concerns about the spreading coronavirus has forced most of North America's auto plants to close temporarily

PC* sales: Scenario assessment for sales 2020

(in millions, global)



Scenario	Sales (in millions)	Effect	Result
2019	75		Basis of comparison
Incentive	61.2	-18.3%	<ul style="list-style-type: none"> • -19.4% in Version 5 • More effective in Europe
Impact	63.2	-15.7%	<ul style="list-style-type: none"> • -13.2% in Version 5 • Recovery delayed due to actuals
Deep Impact	55.0	-26.6%	<ul style="list-style-type: none"> • -29.2% in Version 5 • Positive actuals in China and USA
Double Dip	56.9	-24.1%	<ul style="list-style-type: none"> • -20.9% in Version 5 • More severe second wave effects

*PC: Passenger Cars = Car

Focus on Europe: Sales

COVID-19 measures are showing a scalable impact on demand, with countries following individual paths

Key assumptions

- **Demand** fails completely during lock-down periods, but returns differently according to depth of overall economic impact
- Bottlenecks in **production** due to delivery restraints of local suppliers slow down production ramp-up in Q2 2020

Current situation: European demand was increasingly halted in March 2020, as a direct effect of the measures to contain COVID-19. On the basis of available data, new car registrations in Western Europe in March fell by about 53%, in April 85%, in May 65%, partially supported by subsidized sales of stock vehicles. Incentive programs are expected to focus entirely on EV/ PHEV with little direct effect, but may direct additional interest and showroom traffic to other vehicles as well.

Effects:

UK: Delayed government measures (e.g. school closures) lead to an delayed but devastating decline in sales (April:~- 99%, May:~-89%) followed by an expected slow recovery in the second half year.

France: Due to extended curfews and closures, sales in France dropped 88.8% in April and still over 40% in May. The government is preparing support programs.

Italy and Spain: As severely affected pandemic country, Italy was not only one of the first countries to suffer from Corona effects, but also one of the hardest-hit. Effects in Spain started later, but have extended into May with estimated -71%.

Merkur, 17 March 2020 **Ban on entry into EU countries**

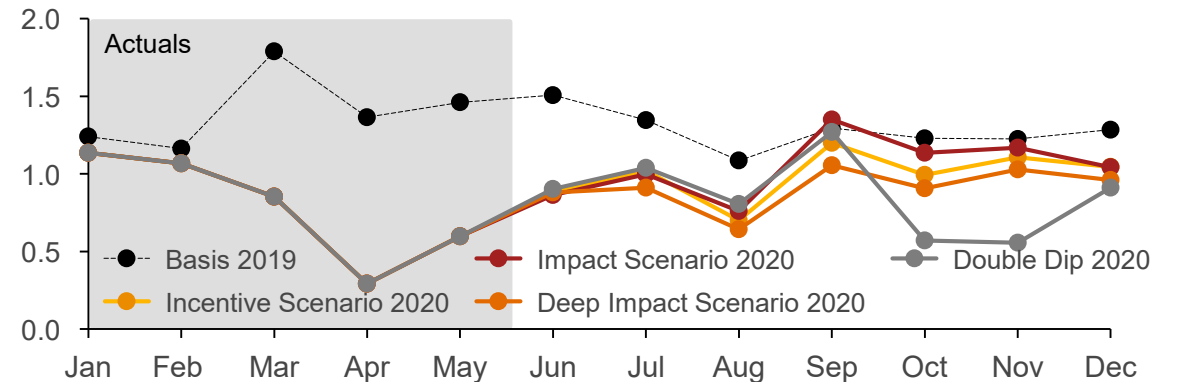
The EU imposes "basically a 30-day entry ban" on non-EU citizens, Chancellor Merkel said.

News, 22 March 2020 **Increased curfew**

Italy has to mourn 800 corona deaths in one day - and immediately tightens the rules. All non-essential businesses must close down ...

PC* sales: Risk assessment for sales 2020

(in millions, Europe incl. UK)



Scenario	Sales (in millions)	Effect	Result
2019	15.9		Basis of comparison
Incentive	10.9	-31.9%	<ul style="list-style-type: none"> • -42% in June vs. 2019 • -19% in H2 vs. 2019
Impact	11.3	-29.5%	<ul style="list-style-type: none"> • -43% in June vs. 2019 • Recovery in the second HY
Deep Impact	10.3	-35.4%	<ul style="list-style-type: none"> • -42% in June vs. 2019 • -26% in H2 vs. 2019
Double Dip	10.0	-37.5%	<ul style="list-style-type: none"> • -40% in June vs. 2019 • -54% in October vs. 2019

*PC: Passenger Cars = Car

Focus on Germany

The coming incentive scheme will have little direct effect, but may induce a long-term revival

Key assumptions

- **Demand fails completely during lock-down periods, but returns at different rates after local restrictions expire**
- Bottlenecks in **production** due to delivery restraints of local suppliers slow down factory ramp-ups in Q2 2020

Current situation: New registrations in Germany slumped by 61% in April, and production by 90%. May figures showed trepid recovery on both ends and show that these have brought the car market to a virtual standstill. The incentive scheme decided by the German government will increase already-generous subsidies on EV and PHEV by another 50%, but production capacity is limited anyways. A reduction of VAT by 3% may induce additional showroom traffic and further sales.

Effects:

Demand: The future development of demand is largely determined by the duration of social measures. No demand occurs during the period when public life is suspended; online sales also have only a minimal effect. Depending on the developments on the labor market, long-term effects will occur.

Production: The synchronous closure of all vehicle plants in Germany from 13-18 March has continued through April, with low-level re-opening of factories. Production recovery is modelled following a linear path over 3 months in-line with the three-shift layout of a typical car factory – albeit we assume the third shift may not be needed.

FNP, 23 March 2020
No contact in Germany

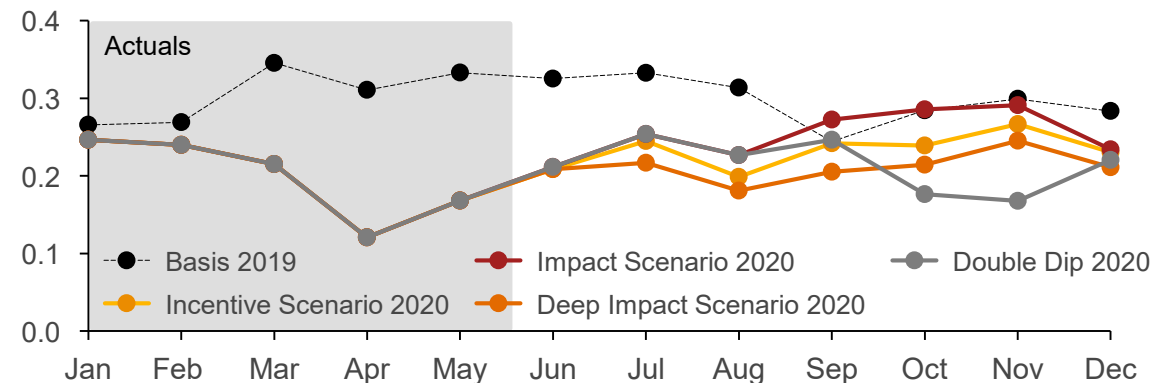
A general curfew will not be introduced in Germany for the time being. But the federal and state governments have decided to ban all contact...

n-tv, 3 April 2020
No deadline for the end of measures in sight yet

The Chancellor said in her video podcast published on Friday that she could not name an end to the measures...

PC* sales: Scenarios for sales 2020

(in millions, Germany)



Scenario	Sales (in millions)	Effect	Result
2019	3.6		Basis of comparison
Incentive	2.6	-27.4%	<ul style="list-style-type: none"> • -36% in June vs. 2019 • -19% in H2 vs. 2019
Impact	2.8	-23.3%	<ul style="list-style-type: none"> • -35% in June vs. 2019 • Recovery in the second HY
Deep Impact	2.5	-31.5%	<ul style="list-style-type: none"> • -36% in June vs. 2019 • -28% in H2 vs. 2019
Double Dip	2.5	-30.9%	<ul style="list-style-type: none"> • -35% in June vs. 2019 • -38% in October vs. 2019

*PC: Passenger Cars = Car

Focus on Europe: Production

Vehicle production significantly affected by the disruption of value chains and work re-organization

Key assumptions

- European **production** largely shut down from mid-March, resumption of production varies according to scenario
- Restrictions in production due to **delivery difficulties of suppliers**, especially from Asia, into the 2nd quarter

Current situation: From 16 March onwards, a synchronized shutdown of vehicle production in Western Europe set in, correspondingly also at Tier 1 suppliers. Suppliers at other levels do not have sufficient market power to enforce closures and are faced with unchanged high costs. Sales of stock vehicles have already started to satisfy budding demand, further decoupling production from demand trends.

Effects:

Short-term: Based on available information, we estimate production to have fallen by about 45% in March compared to 2019, and to literally be at a complete standstill in April at -97% versus 2019. May production is estimated at -70% versus 2019.

Medium-term: Mid-term recovery will depend on ongoing efforts to re-install production processes under post-COVID precautions, which are estimated to reduce output by 30-50% per shift. Based on the typical three-shift layout of vehicle production, we assume at least three months of recovery before target output will be reached to match demand.

News, 17 March 2020
No contact in Germany

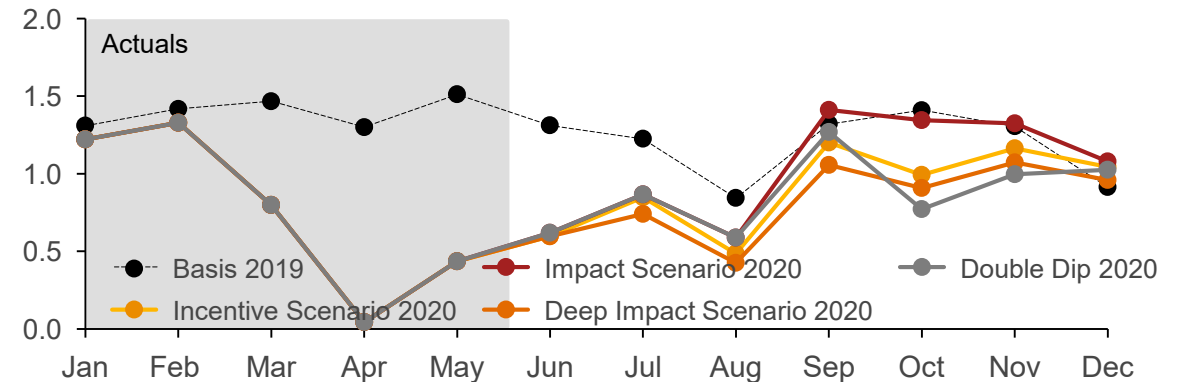
Due to the coronavirus, Volkswagen is closing plants in Spain, Portugal, Italy and Slovakia for 2 weeks, starting on 20.03.20....

Manager Magazin, 16 March 2020
FCA closes 8 plants in Europe

FCA is closing most of its production in Europe due to the impact of the pandemic. This affects 6 plants in Italy alone ...

PC* production: Scenarios for production 2020

(in millions, Europe incl. UK)



Scenario	Production (in millions)	Effect	Result
2019	15.3		Basis of comparison
Incentive	10.2	-33.8%	<ul style="list-style-type: none"> • -55% in June vs. 2019 • -18% in H2 vs. 2019
Impact	11.1	-27.9%	<ul style="list-style-type: none"> • -15.3% in Version 5 • Recover from April low
Deep Impact	9.6	-37.5%	<ul style="list-style-type: none"> • -55% in June vs. 2019 • -26% in H2 vs. 2019
Double Dip	10.0	-35.0%	<ul style="list-style-type: none"> • -21.2% in Version 5 • -45% in October vs. 2019

*PC: Passenger Cars = Car

Focus on USA

Extended containment measures follow the Deep Impact scenario path, with limited incentive effects

Key assumptions

- **Demand** is affected to varying degrees by state-level measures and escalating unemployment
- Bottlenecks in **production** due to failures and closures of suppliers and logistics chains from Mexico and South Asia/ China

Current situation: After initial hesitation, the US government put massive restrictions on public life into effect at the end of March and initially set a deadline of 30 April. The implementation of the measures at state level is varied and inconsistent. An **incentive scheme** following the “cash-for clunkers” example of 2009 would only have a temporary effect but lift the market by about 5% points – but is currently not seen as very probable.

Effects:

Demand: After initial slumps in California and New England (New York, Boston), vehicle retail has shown remarkable resilience in April and May. The sharp rise in unemployment - together with a collapse of stock markets - is further dampening purchasing power.

Production: In the meantime, the expect a restart has not materialized in May but will start only in June (Deep Impact Scenario), so that a catch-up process lasting several years is to be expected, as after 2008/09. In April, vehicle production came to an almost complete standstill. May production is estimated at -80%.

ARD, 1 April 2020 Setback in the US auto market

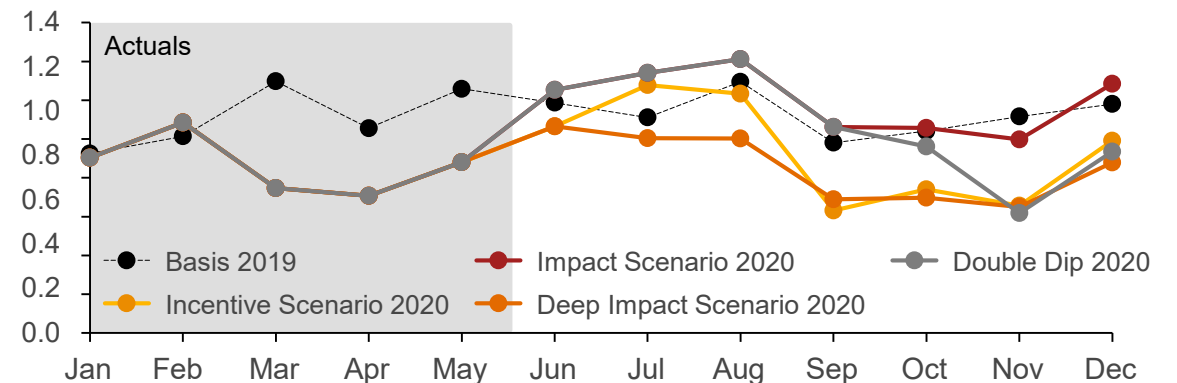
Devastating consequences of the corona pandemic for the business of manufacturers. Mazda and Mitsubishi suffered losses of 42% and 52% respectively in March (US market) ...

NTV, 1 April 2020 US market: VW suffers

March: Sales in the USA slumped by 42% for Volkswagen. The focus is now on the greatest possible stability for customers, employees ...

PC* sales: Scenarios for sales 2020

(in millions, USA)



Scenario	Sales (in millions)	Effect	Result
2019	13.5		Basis of comparison
Incentive	10.9	-18.9%	<ul style="list-style-type: none"> • -10% in June vs. 2019 • -18% in H2 vs. 2019
Impact	12.7	-5.4%	<ul style="list-style-type: none"> • +6% in June vs. 2019 • Recovery in the second HY
Deep Impact	10.3	-23.4%	<ul style="list-style-type: none"> • -10% in June vs. 2019 • -27% in H2 vs. 2019
Double Dip	11.9	-11.6%	<ul style="list-style-type: none"> • +6% in June vs. 2019 • -8% in October vs. 2019

*PC: Passenger Cars = Car

Focus on China

Demand shows surprising resilience while financial incentives may have a visible effect

Key assumptions

- **Demand** is returning rapidly even before the expiry of local restrictions and continues to be politically supported
- Continued measures in **production** reduce capacity utilization, but are to be phased out quickly with strict government control

Current situation: After the almost complete loss of demand in February, car retailers quickly switched to online processes and were able to continue to meet part of the demand. Outside of Hubei/ Wuhan, production has restarted in all plants, both at OEMs and suppliers. Judging from the example of 2009, **incentives** on car taxations and financing can unleash pent-up demand from 2017-18, while installed capacity allows for production of up to 5 million units per month.

Effects:

Demand: The pent-up demand for new and replacement vehicles is already high as a result of the 2018/ 2019 downturn, and will be further supported by the reduction of registration restrictions and the extension of NEV subsidies. However, the reduction of VAT on used cars may have a reverse effect on new vehicle sales.

Production: The release of the supplier and manufacturer plants allows a rapid start of production; however, JV plants of foreign brands still suffer in part from a lack of supply from international suppliers. A return to planned volumes is foreseeable (Scenario Impact/ Recovery), if no second wave of infection occurs (Scenario Double Dip).

Bloomberg, 4 March 2020
China Car Sales Drop 80%

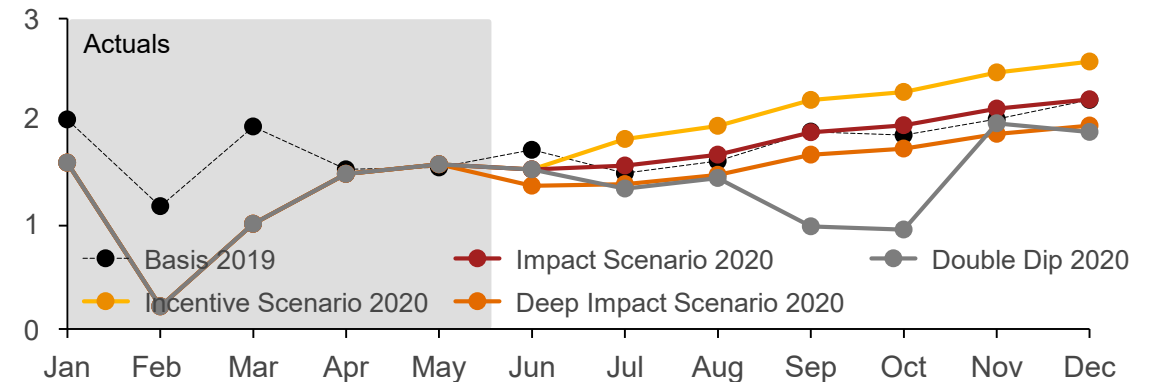
China's car sales had the biggest monthly plunge on record as the coronavirus kept shoppers away...

China Daily, 5 April 2020
China to invigorate car market

A State Council...decided to extend subsidies and tax exemptions for new energy vehicle purchases by another two years ...

PC* sales: Scenarios for sales 2020

(in millions, China)



Scenario	Sales (in millions)	Effect	Result
2019	21.1		Basis of comparison
Incentive	20.8	-1.5%	<ul style="list-style-type: none"> • -3.4% in Version 5 • +20% in H2 vs. 2019
Impact	19.0	-10.4%	<ul style="list-style-type: none"> • -11% in June vs. 2019 • Recovery in the second HY
Deep Impact	17.5	-17.3%	<ul style="list-style-type: none"> • -19.5% in Version 5 • -Takeover of PwC China
Double Dip	16.1	-23.7%	<ul style="list-style-type: none"> • -11% in June vs. 2019 • -49% in October vs. 2019

*PC: Passenger Cars = Car

Long-term Sales Global

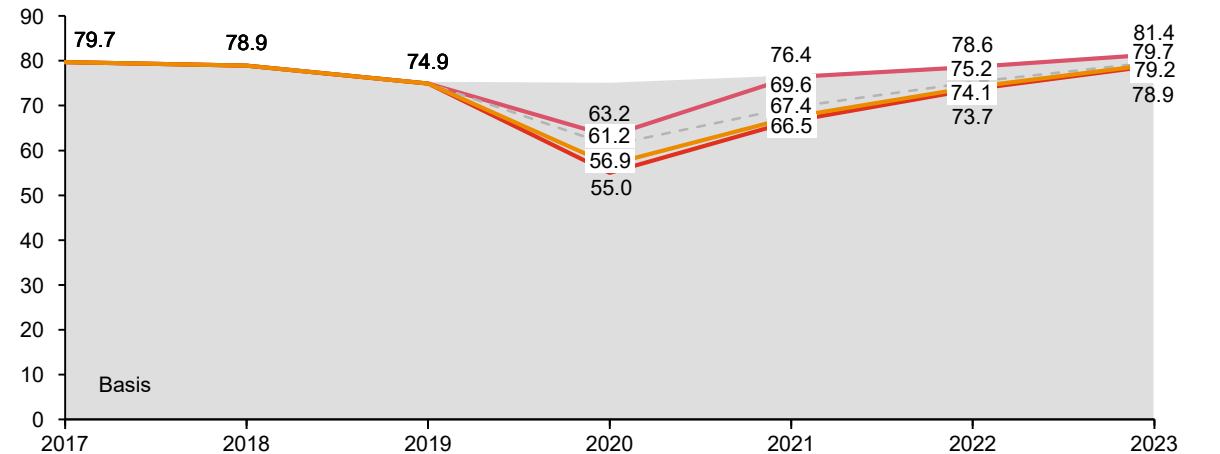
Based on learnings from 2008/09, our analysis expects a quicker recovery in all scenarios

Key assumptions

- 1 Impact**
 - After a decline in production due to **plant shutdowns** that have already been **announced**, production can be **resumed without restriction for the most part**
 - Production** shortfalls in the first and second quarter will not be made up but merely return to expected rates. This assumes no structural damage to supplier and logistics networks
- 2 Incentive**
 - After the setback of Q2, **supply chains** and also demand are **recovering** rapidly - initially in China due to the time lag
 - Synchronized **sales incentives for EV/ PHEV** create limited sales support without significant effect on production, exc. China
- 3 Deep Impact**
 - Extending current announcements, April will be marked by **continuing shutdowns** - production is recovering only slowly due to **damaged supplier networks**
 - Disruptive effects on the economy and suppliers lead to a gradual recovery **over several quarters**
- 4 Double Dip**
 - First wave of infections** can be **quickly contained** due to strict measures (see 'Impact' scenario)
 - After the summer, a **second COVID-19 wave** will follow, which can be **contained more effectively** with more targeted measures
 - Overall effect is structural and extends **into the following years**

PC* sales: Risk assessment until 2023

(in millions, global)



Year-on-Year Change	Impact	Incentive	Deep Impact	Double Dip
2020 vs 2019	-15.7%	-18.3%	-26.6%	-24.1%
2021 vs 2020	+20.9%	+13.7%	+21.0%	+18.6%
2022 vs 2021	+2.9%	+8.1%	+10.8%	+9.9%
2023 vs 2022	+3.6%	+6.0%	+7.1%	+6.8%

Long-term Production Europe

Sales incentives will only have a limited effect on production but help mitigate demand impact

Key assumptions

- 1 Impact**
 - After a decline in production due to **plant shutdowns** that have already been **announced**, production can be **resumed without restriction for the most part**
 - Production shortfalls in the months February to April will not be made up but return to expected rates as demand recovers and new product offer creates sufficient buyer interest

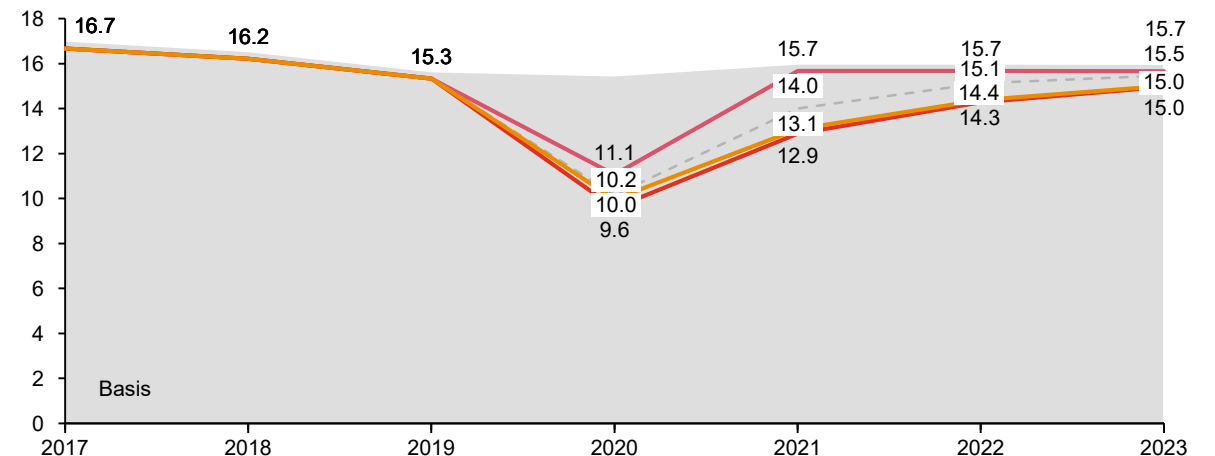
- 2 Incentive**
 - After lifting lock-down measures, European governments quickly agree on coordinated **sales incentives**
 - Immediate effects of incentive schemes on **production volumes** are limited at best, as EV/ PHEV have only limited production capacity reserves to increase production above plan

- 3 Deep Impact**
 - Extending current announcements, April will be marked by **continuing shutdowns** - production is recovering only slowly due to **damaged supplier networks**
 - Disruptive effects on the economy and suppliers lead to a gradual recovery **over several quarters**

- 4 Double Dip**
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 - After the summer, a **second COVID-19 wave** will follow, which can be **contained more effectively** with more targeted measures
 - Overall effect is structural and extends **into the following years**

PC* production: Risk assessment until 2023

(in millions, Europe)



Year-on-Year Change	Impact	Incentive	Deep Impact	Double Dip
2017-2018	-27.9%	-33.8%	-37.5%	-35.0%
2018-2019	+41.7%	+38.0%	+34.5%	+31.3%
2019-2020	+0.0%	+8.0%	+10.8%	+9.9%
2020-2021	-0.2%	+2.3%	+4.7%	+4.3%

COVID-19

Your contacts

Felix Kuhnert



Partner | Global Automotive Leader
PwC Germany (Europe)
Phone: +49 711 25034 3309
felix.kuhnert@pwc.com

Christoph Stürmer



Global Lead Analyst PwC Autofacts®
PwC Germany (Europe)
Phone: +49 69 9585 6269
christoph.stuermer@pwc.com

Version control

Version	Date	Editor	Changes
0.0	20.03.2020	C. Stürmer	Creation of document
1.0	23.03.2020	C. Stürmer	Presentation
2.0	25.03.2020	C. Stürmer	Adaptation of documentation, assumptions and results
2.1	27.03.2020	C. Stürmer	Formatting
3.0	06.04.2020	C. Stürmer	Corrections, contacts and annex; 2019 Global Sales 75 m instead of 74 m due to update Rest-of-NA
3.1	08.04.2020	C. Stürmer	Added Q1 overview slide, reviewed scenarios
4.0	21.04.2020	C. Stürmer	Replacement of "Recovery" with "Incentive" Scenario Correction of Q1 Overview slide to ACEA sales actuals and production reports Adaption of Deep Impact Scenario to actuals: Global Sales -36.8% instead of -29%
4.1	27.04.2020	C. Stürmer	Format adapted to global template
4.2	12.05.2020	E. Lüttel	Inclusion of April actuals; sales volume 1.4 million higher (+0.6 m in USA, +0.5 m in China)
5.0	13.05.2020	E. Lüttel	Update of consolidation model for actuals Jan-Apr (Deep Impact -29.2% instead of -38.6%) Takeover of actualized China scenarios (Incentive scenario: sales -3% instead of +16.6%)
6.0	09.06.2020	C. Stürmer	Research of actual sales and production estimates year-to date May 2020 Exact modelling of DEU/ EU incentive scenario