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OeNB 89th East Jour Fixe: Segment "Risks, challenges and opportunities for a sector in transition: a bumpy road ahead for CESEE countries?"

AutoFocus Slovakia Report:

"Slovakia Automotive Industry 2.0: The time is now to retool for the e-mobility era" (key findings presentation)

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28 March 2022, Vienna, Austria

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1. PROJECT AIMS

- **The AutoFocus Slovakia Initiative** has been launched in the Fall of 2020
- Project partners:
  - Slovak Electric Vehicle Association
  - Slovak Automotive Industry Association
  - Cambridge Econometrics performed the macro-economic modelling
  - Funded by the European Climate Foundation

- New report **"Slovakia Automotive Industry 2.0: The time is now to retool for the e-mobility era"**

1) The aim is to mobilize to action public actors to implement a long-term national strategy for Slovakia's automotive transformation from ICE to EV production in a way that's commensurate, competitive, sustainable within the region (V4)
2) To encourage a "race to the top" and enabling conditions for attracting **EVs production facilities** investments and domestic **battery production capacity** investments
3) Could also serve as a model for the green industrial transformation in other sectors, benefit from policy spillover and best practices

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2. SLOVAKIA AUTOMOTIVE LANDSCAPE

- Today Slovakia is **the leading car producer per capita globally** (5.5 million people: 202 cars per 1,000 inhabitants), owing to 4 world-class automotive companies opening their factories:
  - VW Slovakia in Bratislava (since 1991)
  - PSA Peugeot Citroën Slovakia in Trnava (since 2003)
  - Kia Motors Slovakia in Žilina (since 2004)
  - Jaguar Land Rover in Nitra (since 2015)
- The **automotive manufacturing tradition** deeply embedded in DNA/the driving force of the economy:
  - Car manufacturing is the Slovak largest industry (13% of GDP)
  - 54% of industrial production (compared to 33% in Hungary, 31% in Czechia)
  - 33% of industrial exports
  - 10% of the employed population (approximately **275,000 jobs**: Tier 1:177th Tier 2: 98th)
- There are **350+ automotive suppliers** accounting for the vast majority (89%) of direct jobs across the industry:
  - Tier 1: large foreign affiliates account for most of the value-added in the sector
  - Tier 2: suppliers are typically Slovak SMEs

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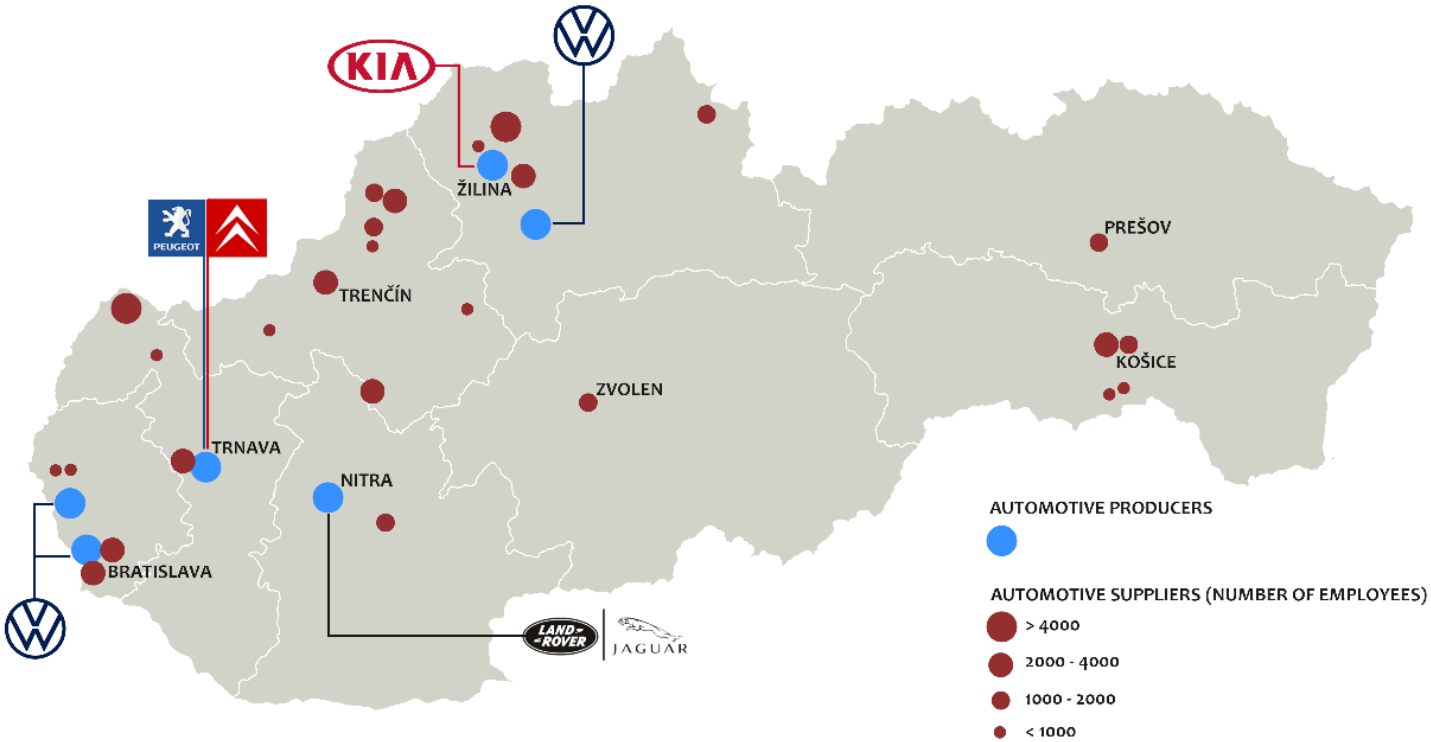
2. SLOVAKIA AUTOMOTIVE LANDSCAPE



Source: SARIO (internal documentation)

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2. SLOVAKIA AUTOMOTIVE LANDSCAPE

- **Slovakia is the least diversified among the V4** in terms of its production portfolio
  - **All 4 factories dedicated to passenger vehicles**, only 1 plant producing engines (KIA)
  - PLN focuses on buses and engines with 2 of its 16 plants producing passenger vehicles
  - CZE produces passenger cars and engines, some focus on buses and heavy-duty vehicles
  - HUN produces passenger cars, engines and buses
- The good news is that **Slovakia is among the top European producers of electric cars** (75,575) behind only DEU and FRA (CATI Chemnitz Automotive Institute, 2020)

- The combination of **narrow production focus/dependency** + **electrification trend** imply large looming risks for the Slovak GDP growth and employment
  - **EVs have 70% less parts that ICE cars**: which means they will be more vulnerable to automation, robotization
  - This transformation will significantly **impact the current workforce**, creating distributional employment/wealth effects

- **Modeled these risks and impacts on GDP and employment** in several scenarios:

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3. ECONOMIC IMPACTS/SCENARIOS

- The global transition from ICE to EVs have accelerated in 2020-2021: **74% of Slovakia's key export markets announced ICE vehicle ban sales by 2035**
- **Impulse to fast-track EV transition on the production-side,** regardless of the local take-up

- We evaluated the economic impacts **of increasing EV demand from such export markets,** using the Cambridge Econometrics E3ME model, and the stakes are high:
- **The assessment builds upon 2 scenarios:**
  - "Business-as-usual scenario": in which the switch to EV production does not take place, losing the majority of its ICE market share
    - **National GDP will be 10% lower than in the "best-case scenario"** by 2035
    - **Total employment will drop by 4.5%** on 2020 levels by 2035

  - "Best-case scenario": SVK adapts its vehicle manufacturing sector to external trends in EVs uptake
    - **National GDP will drop marginally by 0.2%** by 2035
    - **Total employment will drop marginally by 0.3%** on 2020 levels by 2035

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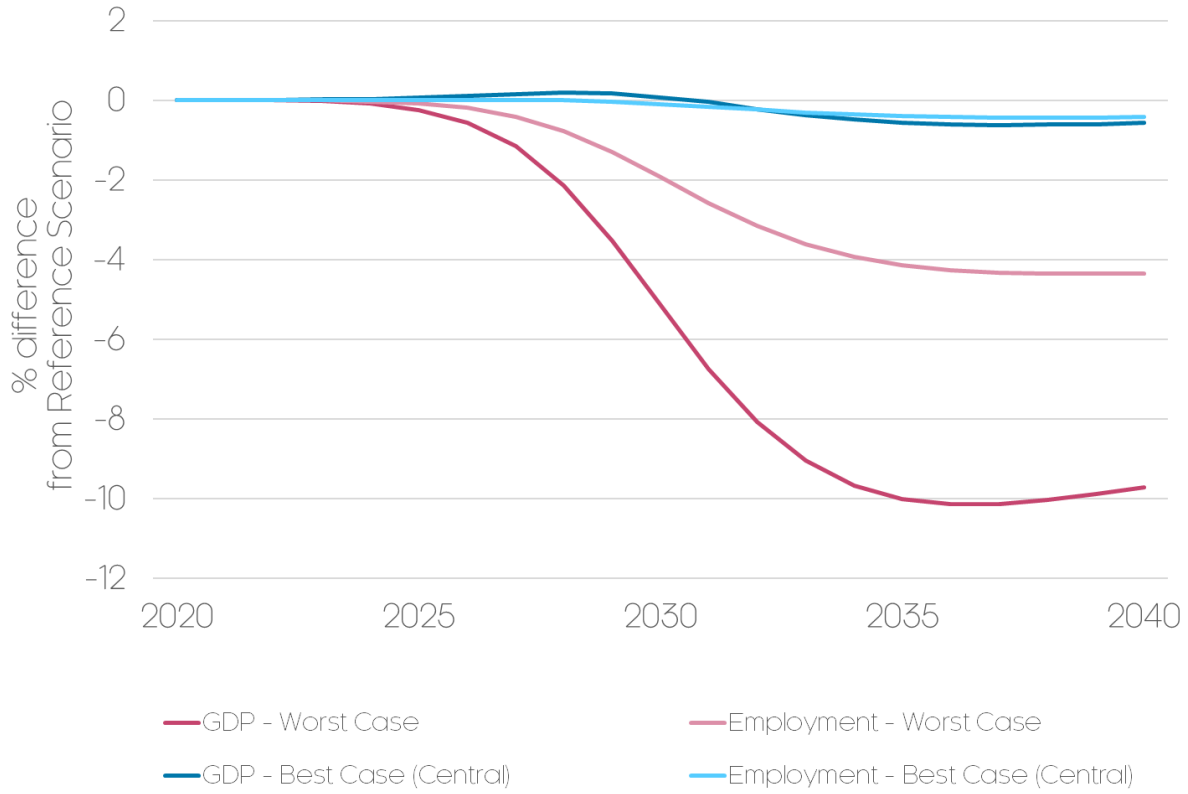
3. ECONOMIC IMPACTS/SCENARIOS ON GDP AND EMPLOYMENT



Source: Cambridge Econometrics.

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3. ECONOMIC IMPACTS/SCENARIOS

- **For a substantial EVs uptake by 2030, investment decisions** need to be made by 2022-2023

- If Slovakia was to follow **the "best-case scenario", substantial investments** need to be made into:
  - **(1) building EV production facilities (/retrofitting ICE): €3.4bn by 2040**

	2025	2030	2035	2040
EV Share of exports	10%	60%	95%	100%
Additional EV share of exports (compared to 2020)	4%	54%	89%	93%
Vehicle production	1,000,000	1,000,000	1,000,000	1,000,000
EVs produced	43,287	536,740	889,079	932,121
EV production investment per annual vehicle production capacity (€m/vehicle)	0.0036	0.0036	0.0036	0.0036
EV Production Cumulative investments (€m)	157	1952	3233	3390

  - **(2) producing batteries domestically to meet EV production requirements: €5.6bn by 2040**

	2025	2030	2035	2040
Additional EV share of exports	4%	54%	89%	93%
Vehicle production	1,000,000	1,000,000	1,000,000	1,000,000
EVs produced	43,287	536,740	889,079	932,121
Battery size (kWh)	70	70	70	70
Total battery requirements (GWH)	3	38	62	65
Cost of investment per GWH capacity (€m per GWH)	85	85	85	86
Cumulative investments (€m)	258	3,194	5,290	5,611

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4. CONCLUSIONS, 10 KEY POLICY "COMMANDMENTS"

- **The net impact of the transition to EV production depends on whether SVK will secure enough domestic battery production capacity** to meet EVs demand from its export markets (3 benefits)
  - Reduce asymmetrical trade dependencies that lead to supply chain disruptions (Covid-19 and Ukraine crises)
  - Offset the losses from the ICE vehicle supply chain dismissal
  - Rely more on innovative processes and capture higher value added
- The required investment in **EVs production facilities** would be **€3.4bn by 2040**
- The required investment in **battery production capacity** stands at **€5.6bn by 2040**
- **The transition is hamstrung on the national leaders' ability** to take ownership/action

1. **Improve general business conditions** especially for green projects by speeding up the administrative process
2. **Clarify and support eligibility of green projects for EU financing** to leverage risk capital
3. **Integrate EU funds** with European Investment Bank (EIB), Slovak Investment Holding (SIH) and commercial loans in consultation with businesses that will use them
4. **Accelerate implementation of the EU green public procurement (GPP)** scheme supporting green RDI
5. **Follow through with ambitious tax reform** delayed by COVID-19
6. **Prepare potential greenfield sites** in terms of ownership, change of use etc.
7. **Foster collaboration between tech universities and industry &** within the wider RDI ecosystem in CEE
8. **Strengthen international university exchanges and collaboration** between CEE research institutes
9. **Use dual education and create new in-demand** majors at universities
10. **Develop a strategy for 'brain drain to brain gain'** in cooperation with universities that removes structural barriers to the Just Transition Fund (JTF)

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BACKGROUND SLIDE: THE UKRAINE WAR

- The current decade has brought **2 unprecedented shocks**, consequential for the automotive
- **The COVID19 pandemic** has presented the industry with adaptation challenges:
  - Accelerated green and digital twin transitions
  - Upended international supply chains: labor shortages/disruptions creating semi-conductor shortages (only last year caused the drop in the automotive industry's output by 8 million vehicles globally)
  - High energy prices caused by limited supplies and disruptions
- Further disruptions/changes are expected in both global EV battery cell and ICE manufacturing due to **the Russian aggression in Ukraine**:
  - **Global vehicle production to drop by 1.5 million this year** (2% less than the 84 million vehicles planned)
  - **Auto-parts & cable harnesses shortage:** UA is a key supplier of wiring harnesses, VW has halted the production of EVs at plants in Zwickau and Dresden due to the lack of wiring systems
  - **Crucial raw materials shortages**: Russia extracts 40% of the world's palladium, used in catalytic converters for ICE vehicles; Russia is also the third-largest worldwide producer of nickel, whose shortage would slow the construction of EV batteries
  - **Concerns over EU energy security:** intensified due to its structural dependence on Russia's fossil fuels: with energy prices reaching record highs and fear of disruptions in gas, oil, and coal supplies
  - **Migration flows:** refugee influx as a drag on over-burdened social systems in the short run, but may significantly help with **supplemented much needed workers/skilled labor/human capital to support the transition to EVs**
    - The influx of workforce from Ukraine, Russia and EU neighborhood countries might have a positive effect on the uptake of highly skilled tasks and related expertise transfer
    - Despite so far only women and children have been able to resettle – with 220,977 of Ukrainians being accepted in SVK since the beginning of the conflict – once the conflict will be over, men will likely reunite with their family amidst challenging reconstruction in Ukraine.
    - LF from Ukraine is dominated by well-educated and highly skilled individuals, also culturally close to the Slovak population and well adaptable to a host society

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BACKGROUND SLIDE: THE E3ME MODEL by Cambridge Econometrics

- Akin to **Computational General Equilibrium (CGE)** model family, except it's **non-equilibrium**
- **In contrast to CGE, it makes more realistic assumptions about the world:** rejects assumptions of perfect competition, decision-making optimization of economic agents, perfect information and fully flexible prices. Assumes fundamental uncertainty in the economy, limited knowledge
- **Sets of equations** describing relationships between variables 3E: **Economy, Energy, Environment**
- **Integrated treatment of the world's economies, energy systems, emissions and material demands.** This enables E3ME to capture two-way linkages and feedbacks between each of these these components
- From these equations **beta coefficients are estimated** based on historical regressions
- **Input / output tables** (e.g. how does 1EUR investment translate into demand in other sector)
- **Building/running scenarios** with various assumptions about the future

- **Assumptions about the future**:
  - **Slovakia export market remain the same as today**: 59% France 13% Germany 24% Other EU 22% United Kingdom 8% China 7% United States 10% Other 16%
  - **Motor vehicle exports remain flat between 2021 and 2030:** Current exports of motor vehicles in Slovakia are €16.4bn (2010 prices)
  - **EV take up in Slovak export markets**: exports reflect the trend of new sales in each destination market which is based on the recent policy announcements of the phase out of ICE vehicles of EU/UK/US/China phasing out ICE by 2035
  - **Shift in the GVC:** The main shift in production value from ICE to EV is mostly from the substitution of the internal combustion engine with electric motor and battery
  - **Import share of ICE engines:** To calculate the domestic production impact of the reduction in ICE powertrain production, we assume that import of ICE engines is equivalent to the current import share of production for the motor vehicle sector as a whole which is around 25%
  - **Labor productivity of electric powertrain versus electrical equipment sector:** Labor productivity of electric powertrain is estimated based on the relative productivity between electrical equipment as a whole and the manufacture of batteries from EU data from Eurostat SBS29. This data suggest battery production is 46% more productive per worker than the wider electrical equipment sector
  - **Labor productivity growth:** Real labor productivity (output per worker employed) for motor vehicles and electrical equipment is assumed to continue to grow based of recent historical productivity growth between 2015 and 2018. Motor vehicle labour productivity grows by 1.8% per annum and electrical equipment grows by 0.3% per annum.
  - **Investments in Batt production facilities**: investments required is calculated based on Slovakia vehicle exports and the corresponding share of batteries (70kWh battery for each vehicle produced is assumed)
  - **Investments in EV production:** We assume transition to EVs is achieved from investment in existing plants to transition from ICE to EV manufacturing plants. Initial estimates based on Volkswagen's conversion of the Zwickau plant investment of €1.2 billion to convert existing ICE vehicle plant producing 330,000 vehicles to full EV production

- **Complex model: for more details see manual https://www.e3me.com/what/e3me/**