Disruptive technologies and firm upgrading strategies in the Canadian automotive supply chain

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Research Questions

- Which recent disruptive technological trends pose the greatest risks and opportunities to Canadian parts producers?
- How does new product development occur and what barriers do firms face in their innovation activities?
- What role for public policy?

Canadian Automotive Sector

- Highly integrated into GLR (over 70% of all parts exports in 2016)
- At 1999 peak, contributed 22% of manufacturing shipments, $83.5 billion in exports and 150,000 jobs
- Continued importance:
  - 10 OEM facilities and 600+ supplier plants (various tiers; stampings, plastic parts, TDM important)
  - 100,000+ jobs

Recent Challenges

(1) Southward shift in NA assembly capacity

- Post-1999: ~40% decline in vehicle assembly and parts production

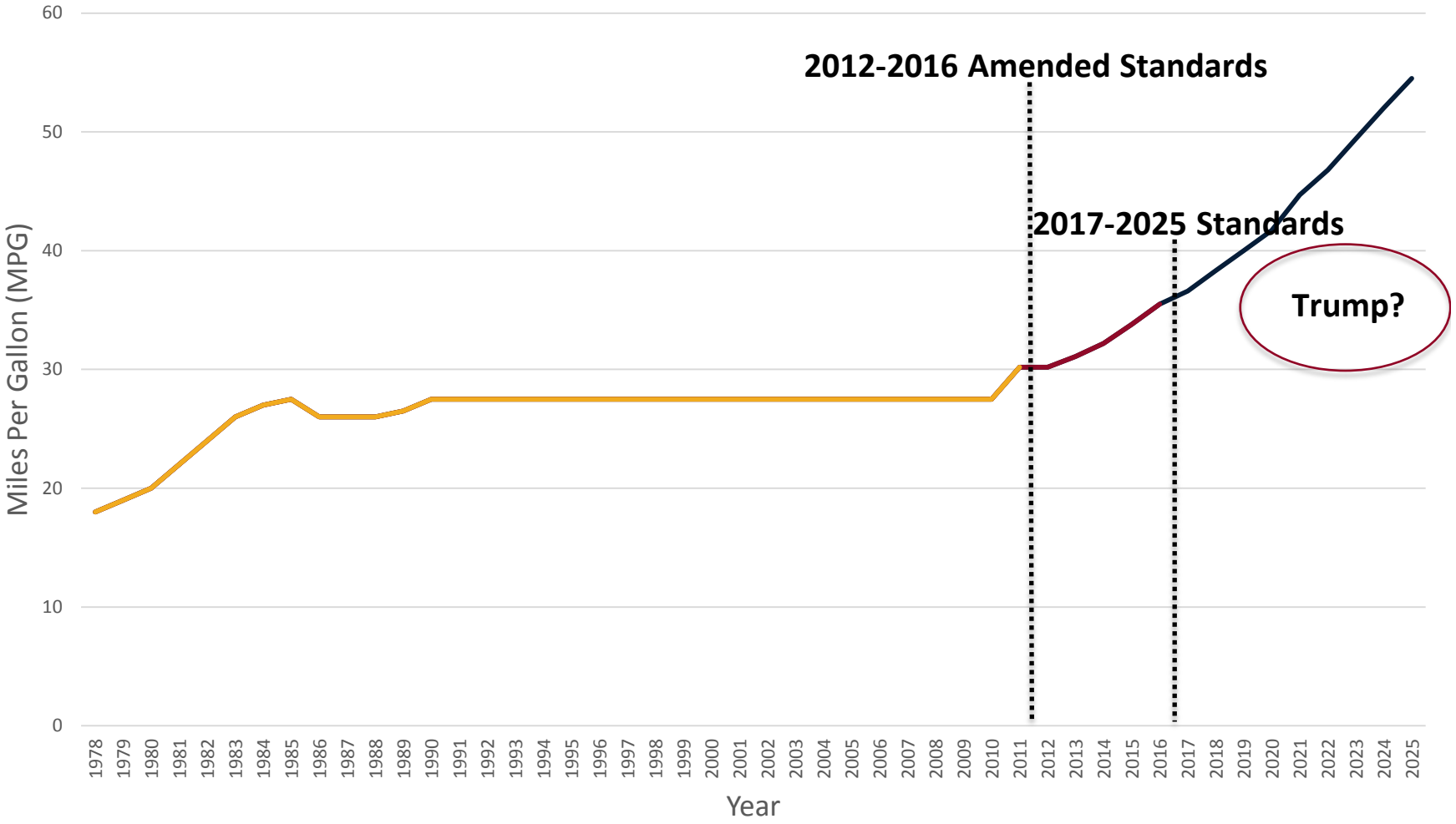
(2) Recently negotiated and pending FTAs (e.g., CKFTA, CETA, NAFTA?)

- unfavorable terms esp. in content requirements

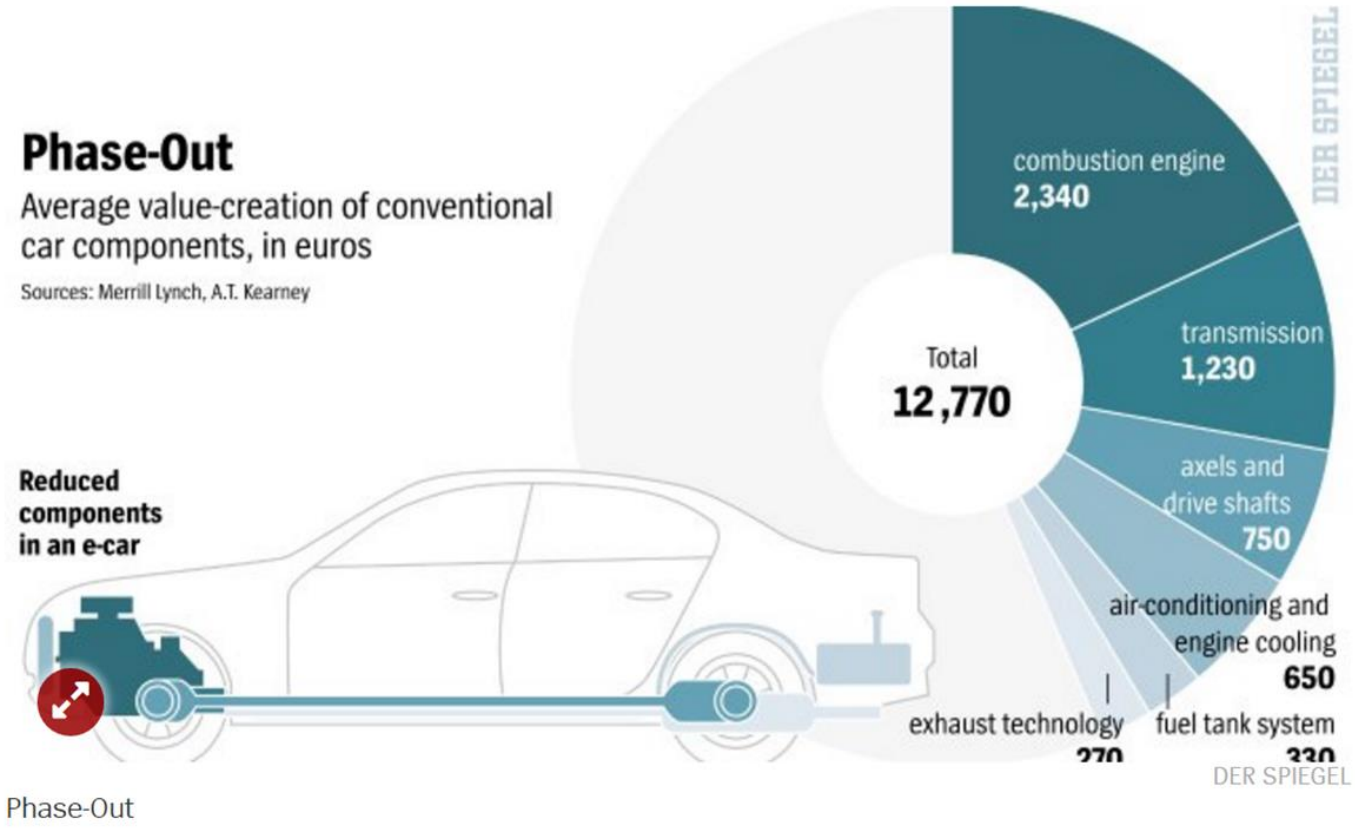
(3) Recent disruptive technological change in the industry

- **new lighter weight materials**
- **vehicle electrification and alternative propulsion systems**
- **connected car technologies**

Drivers: CAFE, Safety, Connectivity



Disruptive transition?



Source: Der Spiegel (2016)

Firm Strategies

- ***Survey of Competitiveness and Innovation in the Canadian Automotive Parts Industry***
  - Plant level survey identifying key factors influencing innovation
    - Impact of state policies and programs, competitive and cost conditions, recent technological changes
  - N=115 (~20% of Canadian automotive supplier plants)
    - Good representation by tier; sub-industry; plant size; and country of ownership
- **35 interviews with automotive executives and government officials**

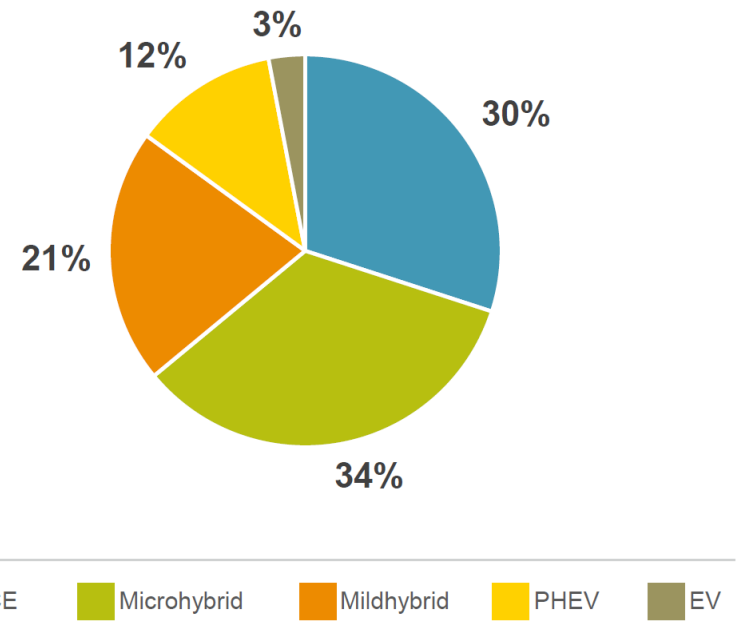
Truly disruptive? Perceived impact of recent technological trends

Technology	- Impact	No Impact	+ Impact
(1) Vehicle lightweighting	17%	33%	**50%**
(2) Efficient ICE Engines	7%	**64%**	29%
(3) New Propulsion Systems	21%	**57%**	22%
(4) Vehicle Electrification	16%	**67%**	16%
(5) Connected and Autonomous Car	5%	**79%**	16%

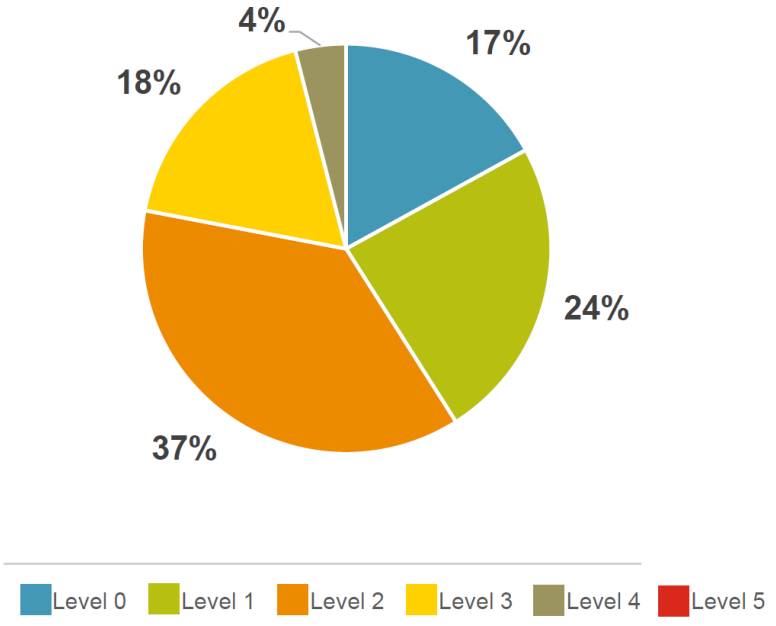
Electric Powertrains and ADAS: in progress?

Projected market share in 2025:

Electric Powertrains



ADAS



Source: Internal Magna projections for market penetration of electric powertrains and ADAS by 2025

What type of innovation?

Innovation activity	% High importance
Acquisition of machinery and/or equipment linked to new product or processes	**26.8**
Tooling up and production start-up	17.9
Training linked to the introduction of new products	17.9
Industrial Engineering and design	**11.6**

Advanced Auto Manufacturing: Two Worlds

- Auto manufacturing – advanced process utilizing robotics, computer systems, complex sequencing and logistics
  - investment influenced by competitiveness factors: relative cost of labour, energy, logistics and other inputs; trade agreements; government financial incentives; etc.

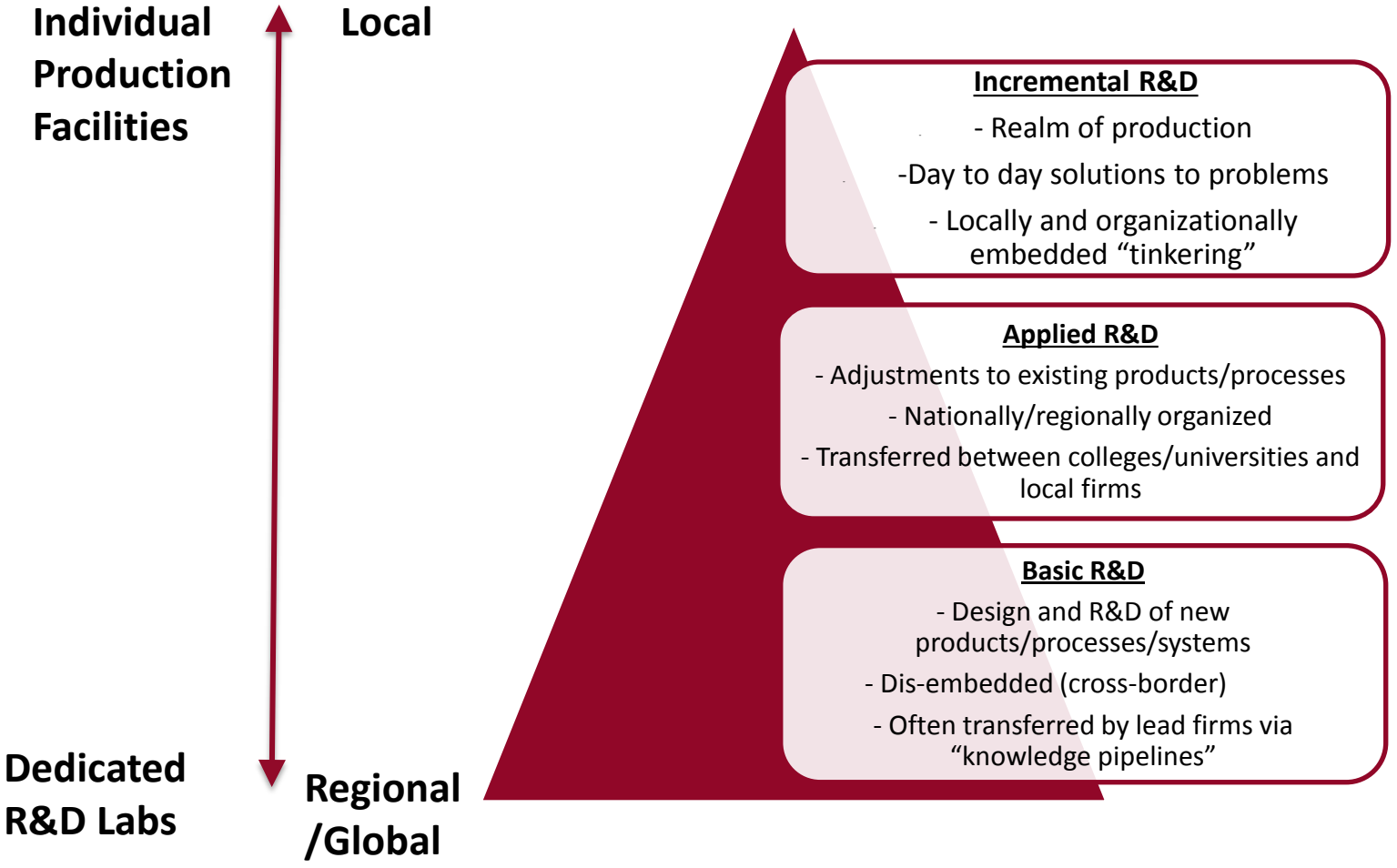
- Auto product engineering and design – process of inventing, testing, integrating and optimizing new products and services
  - dependent on regional 'innovation ecosystem': engineering talent, research networks, IP policies, and state support for basic research
  - Michigan centre of gravity

Bridging the gap?

- Chain-led innovation (pipelines):
  - Top 3 sources of information for the R&D: **Customers**, production staff, parent company
  - Bottom 3: consultancy firms, provincial/federal research labs, **universities**

- Challenges cluster concept - firms important sources of new knowledge

R&D in the Canadian auto supply chain



Barriers limiting R&D

Top 5 barriers:

1. High cost of developing new products/processes (67%)
2. Pressure to meet current customers' demands (65%)
3. Lack of skilled personnel (58%)
4. Lack of financing (26%)
5. Ineligibility to qualify for government programs (25%)

Conclusion: Public Policy Dilemmas

- New market realities and pressing need to upgrade existing supplier base
- BUT what type of policy for what type of industry - manufacturing policy, innovation policy, or both?
- Need innovation support throughout the supply chain (ASCIP, ASIP, SWODF, SR&ED essential)

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