

***Managing the 2020 auto
supply chain :
developments to watch***

Susan Helper
Case Western Reserve University

May 2010

Agenda

- Putting supply chain in a broader frame
 - 1. Broad impact of supply chain factors
 - Key contributor to crisis at GM and Chrysler
 - 2. Supply chain capability has broad determinants
 - A. Supply chains are shared *across* OEMs
 - This sharing poses governance issues for firms—and nations
 - B. Supply chain performance also depends on complementary policies *within* OEMs

1. Suppliers and the US auto crisis

- Cause of US auto crisis often held to be union labor costs
 - But these costs, including “legacy costs” of health care and pensions, made up < 10% of total costs

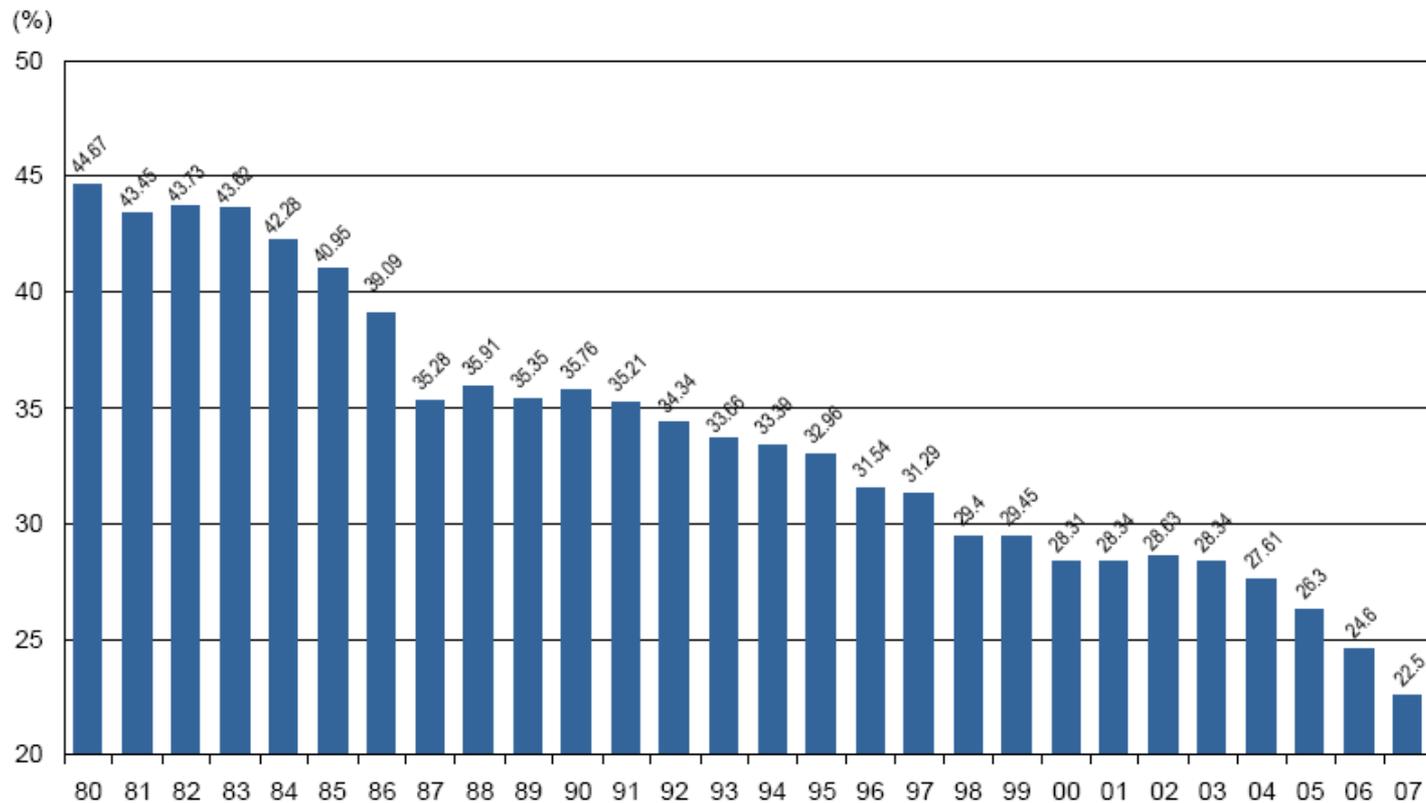
Detroit 3 Transaction Prices for Like-Like Vehicles Lag Behind Japanese OEMs by \$2,500-\$3,500

Category	GM	Ford	Chrysler	Toyota
Compact Car	\$15,025	\$15,031	\$16,721	\$18,418
Compact SUV	\$21,688	\$22,028	\$21,833	-
Compact Truck	\$19,516	\$17,338	\$21,960	\$23,147
Large Car	\$21,518	\$23,047	\$25,342	\$31,753
Large SUV	\$37,087	\$35,425	\$30,084	\$44,971
Large Truck	\$28,442	\$28,555	\$30,137	\$29,222
Luxury Car	\$37,650	\$32,346	-	\$41,728
Luxury Sport Car	\$63,879	\$64,394	-	\$45,974
Luxury SUV	\$45,525	\$45,820	-	\$46,032
Midsize Car	\$19,127	\$18,707	\$20,754	\$23,169
Midsize SUV	\$23,707	\$27,394	\$25,790	\$29,285
Minivan	\$23,940	-	\$25,070	\$26,930
Van	\$23,242	\$22,639	\$38,259	-

Source: Edmunds – January-May 2008

Low price didn't stop market share loss

U.S. Light Vehicle Market Share: GM



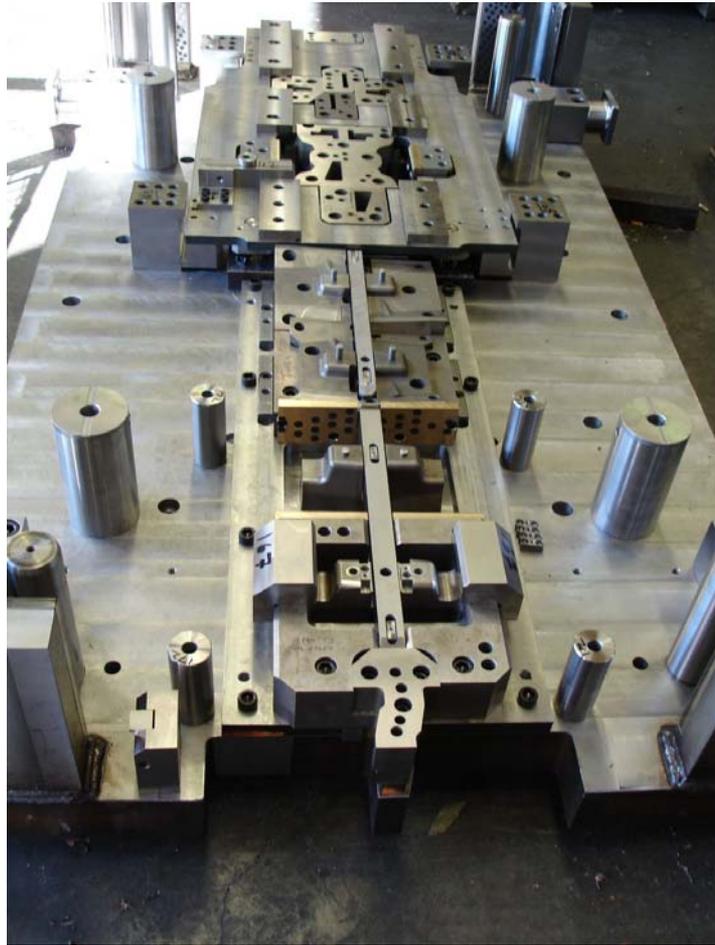
The “Detroit Three” have a *price* problem more than a cost problem

- Suppliers play a key role in this problem—and in its solution
 - Capability problem
 - Massive outsourcing of the last 20 years created a shared supply chain, upon which automakers depend for design, production—
 - But each automaker wants to free-ride on others’ investment
 - Result: Underinvestment in design, quality, delivery, innovation capabilities
 - many supplier bankruptcies (even before general crisis)
 - Collaboration problem
 - US automakers incentivize purchasing agents to minimize piece prices
 - but this often results in increased system costs, reduced performance (eg, poor ride quality)
 - » due to poor management of interactions across parts, frequent engineering changes

2A. Shared supply chains can be productive if governed well

- Examples:
 - Germany: Baden-Wurttemberg
 - Italy: Emilia-Romagna
 - US agriculture
- These industries all have structures to overcome free-rider problems

Case study: automotive dies



Die-making

- Forms that bend metal into the shape of parts such as doors, roofs
- Lots of interaction among car design, engineering, auto manufacturing, die design
 - Flanges, attachment points, springback

US die-making: outsourcing

- Outsourced to small shops, who underbid each other on initial price
 - Make money on engineering changes, when OEM bargaining power is low→
 - Supplier may not want to find problems early
 - Shop cannot predict how many bids it will win→
 - Bid on diverse projects—don't develop expertise on any one type of die
 - Will be late in boom times
 - Die-makers shared across OEMs→ no customer wants to pay for upgrading

US die-making: offshoring

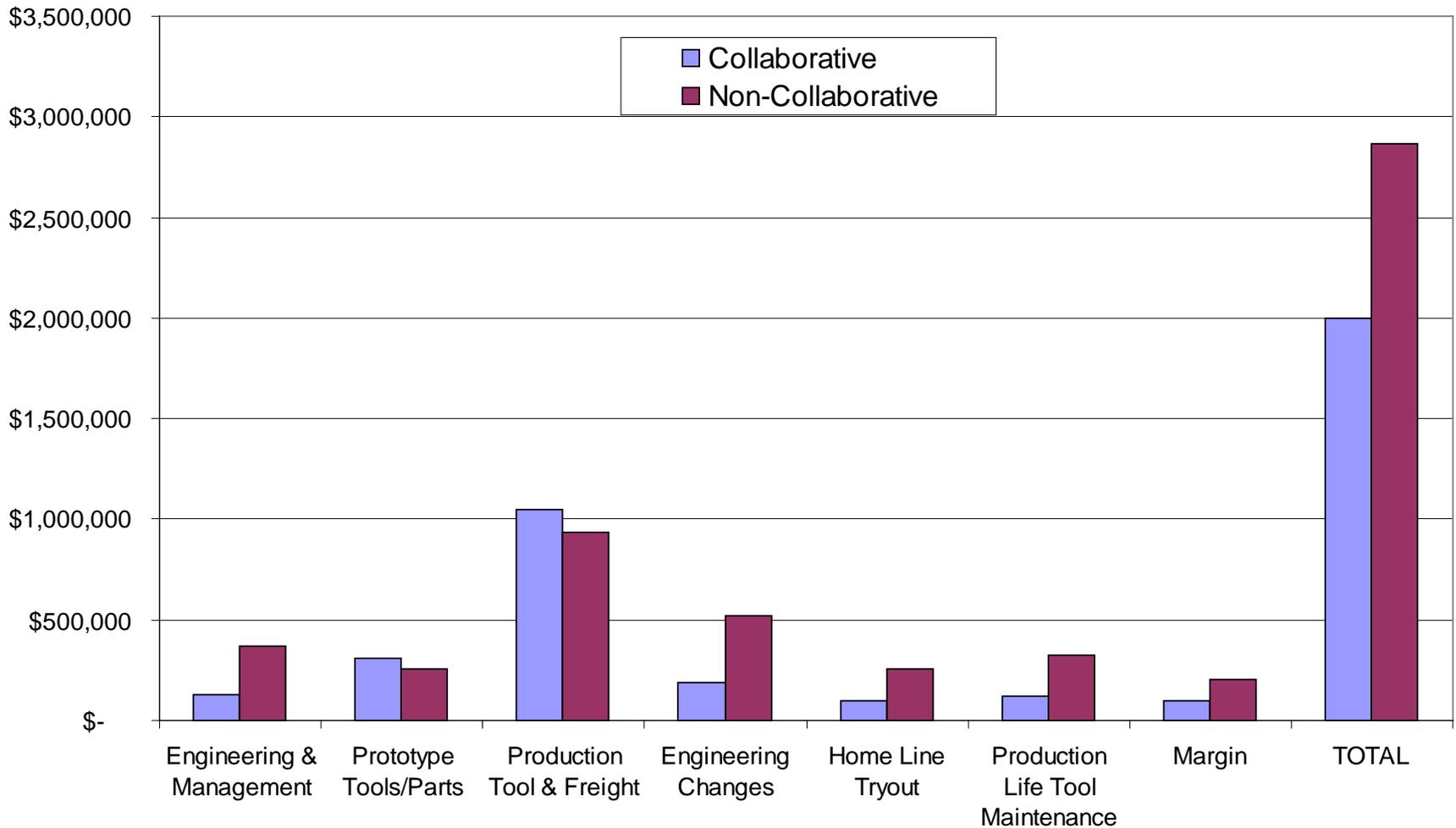
- Chinese subsidies for die-making in last 10yrs
 - entrepreneurs get free factory and equipment if they meet employment goals
 - Piece prices 15-30% lower than US
 - Have developed standard ways of working to overcome distance
 - Webcams, detailed time sheets to show progress
- US die-making lost 1/3 of employees, 2000-5
 - Skilled as well as unskilled mfg being lost

Die-making: Japanese approach

- Honda, Toyota in US:
 - Establish target cost based on deviations from previous design
 - Ask shop that made previous design if they can meet the target price
 - Discuss changes to design
 - System cost is less, quality is higher
 - No dies imported from low-wage countries

Collaborative Tooling Example

Door Inner – 30% Savings



Source: Forthcoming CAR research

An industry council for die-making?

- US mfg stuck in middle between high skills of Europe, low wages of China, Mexico
- Rationale: Shared supply chains can be highly productive, *if* they are governed collectively
- Industry council:
 - Industry participants agree on training, standards for investments in computer-aided design, roadmap for tooling new, green powertrains, etc.
 - Government provides grants on competitive basis (to overcome free-rider problems), but does not “pick winners”

How could industry councils help?

- Elicit the detailed information necessary to design good policies (overcome bounded rationality)
 - identify blockages that retard innovation.
 - Lack of collaboration
 - identify training needs
 - Codification of processes, handling lightweight (“green”) materials
 - manage the design of training for field agents of the Manufacturing Extension Program (MEP) who assist firms in their sector.
- Bring together different interests (overcome opportunism)
 - create social networks that allow firms to learn from each other.
 - make coordinated investments, both subsidized and not.
 - compete for competitive grant programs
 - Government sets terms to incentivize competing on innovation, not low wages
- Thus, avoiding government failure (Rodrik), creating “learning by monitoring” (Sabel)

2B. Supply chain performance depends on complementary policies *within* OEMs

- A cautionary tale from Chrysler in the 1990s
 - Chrysler trusted suppliers
 - Sole source across all of Chrysler
 - Little ability to verify that they got best performance
 - Could not benchmark suppliers of similar part for different car models
 - Could not check, improve designs because Chrysler had laid off engineers
 - Result
 - Chrysler was able to speed up product development, but could not obtain competitive supply prices

The “opium of supplier revenues” is hard to resist

- Did Toyota push suppliers too far on cost?
 - Sticking accelerator pedals
 - made by new supplier (CTS had no Toyota business before 2005)
- From May, 2008 Chunchi newspaper series:
 - A Toyota buyer arrives with stop watch in hand: "Why did you lie?"
 - While the supplier had submitted 40 seconds as the process time on the "Toyota watch" was 30 seconds.
 - "But..." The time he had submitted was based on building in some slack so processes could help each other out when they were behind and still guarantee top quality.
 - *I am a mid-level engineer working for Toyota. The top management... have started a new talent development policy to train new employees to become fully capable engineers in three years. Three years is barely enough to get accustomed to the company and get to know the work flow. People are up in arms about this absurd policy.*

Changes needed

- Adopt collaborative purchasing practices
 - Measure system cost
 - Adopt ‘value analysis’
 - Rigorous joint analysis of each process step improves systemic properties
- Remedy market failures of shared supply chains
 - Externalities
 - Recruit and train workers
 - Complementarities
 - To engage in continuous improvement and/or rapidly introduce new products, firms need to make near-simultaneous investments in marketing, information technology, training, and equipment
 - Hard for small firms to plan, implement, and finance this without help
 - Lean production

Is change occurring?

- “Working relations index” scores of Detroit 3 improving
 - Note: overall average has fallen (slightly) since 2007
- But so far, transaction price gap not shrinking
 - 2010 price, including incentives, comparably equipped:
 - Chevy Cobalt 15,700
 - Ford Focus 16,000
 - Honda Civic 22,300
 - Toyota Corolla 18,500

» *Source: edmunds.com; automotive.com*

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Conclusions

- Massive outsourcing in US manufacturing has created shared supply chains
- These supply chains need explicit governance if we are to overcome free-rider problems that block investments in supplier upgrading
 - If not, US mfg will remain stuck in middle between high skills of Europe, low wages of China, Mexico
- Industry councils could play an important role in this new governance structure
- All OEMs need to be vigilant to avoid changes in purchasing (and also changes in engineering, budgeting as well) that hurt supply chain capabilities