China’s Quest for Independent Capabilities in the Automotive Sector

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Plan for the Talk

• The quest for indigenous innovation in China: Rapid growth, but who benefits?
• Upgrading strategies of domestic firms
• Future directions
Growth in China

• Between 1978 and 2004, GDP per capita in China grew at 8.2% a year

• Between 1985 and 2005, China’s exports increased from $50 billion to $798 billion
Growth in the Chinese Auto Sector

- **Vehicles**
  - 1995: ~100 Billion RMB
  - 2004: ~500 Billion RMB

- **Vehicle Parts**
  - 1995: ~100 Billion RMB
  - 2004: ~400 Billion RMB
Growth in the Chinese Auto Sector

But who benefits from growth?
"The Word's Most Unequal Trading Relationship"

Processing vs. Normal Exports
(for ATP products exported to U.S.)

Data Source: China Custom Statistics, U.S. Census ATP definition
Ownership of Exporting Firm in China (for ATP products exported to U.S.)

Data Source: China Custom Statistics, U.S. Census ATP definition
Who is capturing the domestic market?

<table>
<thead>
<tr>
<th>Year</th>
<th>Domestic firms share of domestic market</th>
<th>FIEs share of domestic market</th>
<th>Imports share of domestic market</th>
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<tr>
<td>1995</td>
<td>68.3</td>
<td>13.3</td>
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<td>2004</td>
<td>59</td>
<td>21.8</td>
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Source: 1995 and 2004 Enterprise Census Data (aggregated up to the 4-digit CIC level) and UNCOMTRADE 8-digit HS data (aggregated using concordance between the 4-digit CIC and 8-digit HS)
Who is capturing the domestic vehicle market?

Total domestic sales:  
1995: RMB 106.9 billion  
2004: RMB 526.6 billion
Weakness in Chinese Firms Exacerbated by Incremental Reform

• Excessive reliance on foreign firms
• Bias against private-sector Chinese firms
• “Irrational” competition within the domestic marketplace
Rise of the Domestic Firms

Produced in China, in joint ventures with foreign companies

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<tr>
<th>Year</th>
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*Includes cars, S.U.V.'s and minivans, but not pickups.

Source: Automotive Resources Asia

The New York Times
Car Production by Segment

Passenger Car production in China, 2000

Passenger Car Production in China, 2006
Number of New Models Introduced, By Ownership

![Bar chart showing the number of new models introduced from 2000 to 2006 by different vehicle types and ownership categories. The chart compares JVs (Joint Ventures) and Chinese Car Producers.]
Battle at the Bottom

- The technology gap is smaller at the low-end
- The size of the low-end segment facilitates learning-by-doing, supports the development of a supply network, and generates the revenue needed for upgrading
Battle at the Bottom

• The technology gap is smaller at the low-end

• The size of the low-end segment facilitates learning-by-doing, supports the development of a supply network, and generates the revenue needed for upgrading

• The manufacturing demands are within the range of domestic firm’s capabilities and the rate of change is relatively slow
Pressure at the Top

• Global firms seek to take advantage of global economies of scale by standardizing products and processes

• Global designs and follow-sourcing increase costs

• Cost pressure and the size of lower-end segments leads to aggressive localization
Fight for the Middle

• Leveraging existing capabilities
  – SOEs focus on familiar models
  – Private firms focus on niche products
  – All firms draw on state sector resources

• Role of the foreign sector: JVs, outward FDI, human capital

• Uniqueness of foreign-domestic interaction
  – the strong incentives to localize deepens upgrading channels: shift in R&D activities, increased local sourcing
  – from the perspective of suppliers, complementary sets of relationships
Background: Automotive

- Global firms have the ability to spread high costs of design and branding across global markets—scale is critical.
- Global firms have the leverage in the global value chain: assemblers, global Tier 1 suppliers, Tier 2 suppliers.
- Design and innovation capabilities are core competencies.
- Challenge for domestic firm is to upgrade process, produce higher value-added products, and/or expand breadth of capabilities.
- High hurdle in auto sector: technology is sophisticated and product cycle is relatively fast.
Go it Alone?
Export to Aftermarket

- Chinese firm competes on the basis of price
- Upgrading is difficult because there is little tutelage from global firms—relationships are purely market based and there is no lead firm
- Primary benefit is stable and high volume business
Find a Tutor?
Lower Tier of a Global Value Chain

- Global assembler (or JV) shares product design and development burden with global suppliers.
- Cost pressure leads Tier 1 to outsource, but high quality and technical requirements of assembler force it to carefully control and tutor domestic suppliers.
- Domestic supplier has opportunity to improve process skills but has limited opportunity to broaden range of capabilities—global supplier does not want to give up high-value added activities.

Indicates the direction in which design information flows.
The Chinese Auto Market

## Profile of Small Car Buyers

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<th>2001</th>
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<td>% Female</td>
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<td>35</td>
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<td>% First time buyer</td>
<td>83</td>
<td>87</td>
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<td>% University educated or above</td>
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<td>% with monthly income of RMB 8,000 or above</td>
<td>17</td>
<td>26</td>
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Source: Mei 2007
Price of SVW Santana vs. Cumulative Production Volume

OEM Quality Scores

Source: JD Power Initial Quality Scores in the U.S. and China (domestic firms and FIEs) in Li 2007.
## Defect Rates for Suppliers to 1st Tier Suppliers

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<td>Average PPM</td>
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Proliferation of Models

Car models in China, 1995

Car models in China, 2001

Form a Partnership?
Upper Tier of Domestic Value Chain

- **Domestic Assembler**
  - Lead firm is a Chinese assembler which has little vehicle design capability, and is eager to utilize design skills of suppliers (but demands very low price)

- **Domestic Tier 1**
  - Domestic suppliers are given the opportunity to develop new capabilities

- **Tier 2**
  - Difficult to improve quality standards because there is no tutelage and price competition is intense.

Indicates the direction in which design information flows
Sourcing Patterns of Auto OEMs in China
(average percentage by ownership of Tier 1 suppliers)
Leveraging Competencies?

**Global Assembler**

- Global Tier 1
- Domestic Tier 2
- Tier 3

Tier 2 position provides opportunity for process and product upgrading, but Tier 1 restricts functional upgrading.

**Domestic Assembler**

- Tier 1 (Global or Domestic)
- Tier 2
- Tier 3

Tier 1 position provides opportunity for functional upgrading, but competition is intense.

**Aftermarket**

- Distributor
- Domestic Firm
- Suppliers

Large economies of scale and stable market, but margins are small.
Product Upgrading in Braking Systems

Drum Brake

Disc Brake

Anti-Lock Braking System
Functional Upgrading in Braking Systems
Firm Y – Domestic Firm

• Founded in 1976 as a collective enterprise; privatized in 1997

• Product Progression: brake components, drum brake, disc brake, ABS (first domestic firm with ABS capability)

• Markets: Foreign-Invested vs. Domestic
  – Rear Drum Brake: FAW-VW, SVW, Dongfeng Peugeot, Zhengzhou Nissan, Chery, Jiangling
  – Disc Brake: FAW-VW (old models), Zhengzhou Nissan (pick-up trucks), Geely, Chery, Changan, Jiangling, SAIC-GM-Wuling
  – ABS: Beijing Jeep (old model), Zhengzhou Nissan (pick-up trucks), Zhejiang Zhongtai, Chongqing Lifan, Anhui Jianghuai, Beijing Futian
  – Front Suspension: SAIC-GM-Wuling

• Product Development: 1. Foreign firms provides designs; 2. Firm Y designs and develop (and holds IP); Firm Y licenses technology
1. Upgrading Paths for Domestic Firm

- **Joint Ventures**
  - JV will produce same product as wholly-Chinese owned firm but defect rate is 50 PPM compared to 300-500 PPM and cost is 20% higher
  - Firm Y always retains majority share

- **Collaboration with Universities**
  - Collaborative research
  - Post-doctoral research station within the firm

- **Internal Human Capital**
  - Design centre has 180 people (2 PhDs, 3 masters, the remaining college graduates)

- **Government Support**
  - Tax treatment, interest free loans, funding for high-tech projects
2. Pressure on Foreign Firms

• Cost Advantage
  – Less capital-intensive production process
  – Supply network

• Production Planning
  – Domestic firms are more flexible and capable of high variety in small volumes

• Service
3. Increased Opportunity for Domestic Firms

- Tier 1 supply firms increase local content to increase localization

  - Tier 1 changes designs to create opportunity for local firms

  - Tier 1 begins to shift design burden to local suppliers
3. Increased Opportunity for Domestic Firms

- Tier 1 supply firms increase local content to increase localization
- Tier 1 changes designs to create opportunity for local firms
- Tier 1 begins to shift design burden to local suppliers
- Participation in multiple value chains creates new opportunities for domestic firms
Shifting Policy Environment

• Industry consolidation
• Stimulate demand through tax breaks and subsidies
• Promotion of independent Chinese brands
• Development of alternative energy vehicles