Constructing a Ladder for Growth: Policy, Markets, and Industrial Upgrading in China *

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* Work in collaboration with Eric Thun, Oxford University
Motivation

• All kinds of indications of upgrading in Chinese manufacturing
  – Exports (Mandel, 2013; Manova, 2015)
  – Domestic Market
    • Telecom equipment
    • Power
    • Autos
    • Heavy Construction Equipment
• But huge differences across sectors in terms of dynamism, and the success of Chinese “domestic” firms and building of “national champions”
• Differences prompting push for “indigenous” innovation in both industry and services, with possibly more restrictive and smaller role in sectors for MNCs
Autos vs Heavy Construction Equipment

• Similar in numerous respects
  – Mature industries, with relatively well-defined technological paradigms
  – Length of quality ladders similar
  – Success in both sectors in other leading Asian economies
    • Japan
    • Korea
  – China also benefitted from a potentially larger domestic market, with huge lower end in both sectors that provided “natural protection” to help foster development

• But major differences in outcomes and current strength of local (Chinese) firms
A Simple Heuristic: Quality Ladders

• In all product markets, distinct segments related to “quality,” where quality refers to features or attributes of a product (or service) that bear on its ability to satisfy needs of the user.

• The actual size of these market segments, as well as the prices consumers are going to pay for each “quality” level, depends on the interaction between consumer preferences (demand) and capabilities and costs of firms (supply).

• When firms from developing and developed economies compete, differentiation based on quality, i.e. vertical product differentiation, plays a central role.
Argument in Brief

• Differences are a product of policy through their effects on the structure of the quality ladder and competition between firms

• Each segment of a quality ladder plays an important role in the upgrading process
  – Lower end: Incubation for local firms
  – Upper end: Natural domain of MNCs
  – Middle: Contested territory and “Fight for the Middle” dynamic

• Policy has a habit of knocking out critical rungs on the development ladder that matter for the:
  – Incentives for new upgrading through the demand side
  – Availability of know-how, inputs and resources required for upgrading on the supply side
  – Interaction important as upgrading requires both
The Market for Wheel Loaders and Excavators
Variation in Outcomes
Strong Movement Up the Quality Ladder – Construction Equipment

Wheel-loaders in 1999 (inner circle) and 2010 (outer circle)

Excavators in 1999 (inner circle) and 2010 (outer circle)

- Foreign-invested
- Domestic
Strong Movement Up the Quality Ladder – Construction Equipment

- **Wheel-loaders:** Market-driven consolidation, with four-firm concentration ratio rising from 43.5% in 1997 to 62.2% in 2010; by 2014, nearly 70%. Of the top four, three are Chinese.

- **Mid-size Excavators:** CLSA test of 13 leading excavator brands in China, performed over 185 working hours during a two week period in 2013.

<table>
<thead>
<tr>
<th>Test</th>
<th>Champion</th>
<th>No. 2</th>
<th>No. 3</th>
<th>No. 4</th>
<th>No. 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Work-cycle</td>
<td>Caterpillar</td>
<td>Sany</td>
<td>Komatsu</td>
<td>Doosan</td>
<td>Hitachi</td>
</tr>
<tr>
<td>Productivity</td>
<td>Caterpillar</td>
<td>Sany</td>
<td>Komatsu</td>
<td>Doosan</td>
<td>Hitachi</td>
</tr>
<tr>
<td>Fuel-saving</td>
<td>Sany</td>
<td>Caterpillar</td>
<td>Hitachi</td>
<td>Komatsu</td>
<td>Doosan</td>
</tr>
<tr>
<td>Durability Assessment</td>
<td>Caterpillar</td>
<td>Sany</td>
<td>Doosan</td>
<td>Komatsu</td>
<td>Hitachi</td>
</tr>
<tr>
<td>Ease of Operation</td>
<td>Komatsu</td>
<td>Caterpillar</td>
<td>Sany</td>
<td>Hitachi</td>
<td>Doosan</td>
</tr>
<tr>
<td>Overall Rating</td>
<td>Caterpillar</td>
<td>Sany</td>
<td>Komatsu</td>
<td>Doosan</td>
<td>Hitachi</td>
</tr>
</tbody>
</table>

Overall, CLSA found that “technology gaps are non-existent” between top-tier Chinese and international companies...” (CLSA 2013)
Variation in Outcomes
Weak Movement Up Quality Ladder – Autos
Declining Market Share of Domestic OEMs

Note: Domestic brands not including Chinese JV brands.
Source: IHS Global Insight and Bernstein analysis.
Market share by volume (left) and revenue (right)

Note: Cars excluding minivans; GM therefore excludes Wuling.
Source: IHS Global Insight and Bernstein analysis.
Top 5 Models by Segment, 2012

<table>
<thead>
<tr>
<th>Sales Rank</th>
<th>A-segment</th>
<th>B-Segment</th>
<th>C-Segment</th>
<th>D-Segment</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Chery QQ3</td>
<td>Chevrolet Sail</td>
<td>Ford Focus</td>
<td>VW Passat</td>
</tr>
<tr>
<td>2</td>
<td>Changan Benben</td>
<td>VW Polo</td>
<td>Buick Excelle</td>
<td>VW Santana</td>
</tr>
<tr>
<td>3</td>
<td>Suzuki Alto</td>
<td>Kia K2</td>
<td>VW Lavida</td>
<td>VW Magotan</td>
</tr>
<tr>
<td>4</td>
<td>BYD F0</td>
<td>Honda City</td>
<td>VW Jetta</td>
<td>Toyota Camry</td>
</tr>
<tr>
<td>5</td>
<td>Lifan 320</td>
<td>FAW Xiali N5</td>
<td>Chevrolet Cruze</td>
<td>Nissan Teana</td>
</tr>
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“The leading Chinese products now have bodies, safety and suspension hardware that are largely competitive. But they are behind on engine technology and are also let down by assembly standards, material choices, systems integration, refinement, and a lack of final development and testing. They are still a long way from being genuinely ‘world class.’” Bernstein 2012
1. Incubation Space

High volume at low-end of the quality ladder enables INCUBATION EFFECT

Domestic Firms

Foreign Firms

q_1

q_2

Quality

Price

R_q^S

R_q^D

Quality Ladder (ROW)
2. Competition Effect

High volume at low-end of the quality ladder creates INCUBATION EFFECT

High volume in middle segments (and higher) promotes COMPETITION EFFECT

Domestic Firms

Foreign Firms

Price

Quality
Channels of Capability-Building

High volume at low-end of the quality ladder enables INCUBATION EFFECT

High volume in middle segments (and higher) promotes COMPETITION EFFECT

CHALLENGES of CAPABILITY-BUILDING are formed as firms compete for new segments.
Segmentation is Shaped by Policy

• **On the demand-side**, state policy in the form of regulation and market restrictions affect consumer demand and the size of segments (e.g. tariffs, non-tariff barriers, tax policy, subsidies, state procurement policy, etc.)

• **On the supply side**, state policy shapes the resources and opportunities that are available to firms (e.g. preference for state-ownership, limitations on foreign ownership, restrictions on entry and forms of technology transfer, tariffs and non-tariff barriers on intermediates).
## Variation in Policy

<table>
<thead>
<tr>
<th>Supply Side</th>
<th>Demand Side</th>
</tr>
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<tbody>
<tr>
<td>Few restrictions on entry, ownership or M&amp;A activity or forms of technology transfer</td>
<td>Low tariffs, policies on demand are segment neutral</td>
</tr>
<tr>
<td>Few restrictions in any segment</td>
<td>High tariffs increase prices in all segment</td>
</tr>
<tr>
<td>High restrictions on entry and ownership limit private sector growth in low-end; focus on JVs limits licensing deals</td>
<td>Restrictions on motorcycle use in urban areas and highways lowers demand in high-end</td>
</tr>
</tbody>
</table>

### Key:
Shading indicates policies whose impact is not segment neutral.
All Segments: Construction Equipment

<table>
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<th>Excavator</th>
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<td>125 cc Bikes and below</td>
<td>Higher-end segments restricted by high tariffs and restrictions on use in urban areas and highways.</td>
<td>Lower-end segments restricted by high tariffs, restrictions on private sector entry, and restrictions on foreign participation.</td>
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## Missing Low-End: Autos

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<td>125 cc Bikes and below</td>
<td>Higher-end segments restricted by high tariffs and restrictions on use in urban areas and highways.</td>
<td>Cars with engine displacement of 1.6 liters and above.</td>
</tr>
<tr>
<td>Lower-end segments restricted by high tariffs, restrictions on private sector entry, and restrictions on foreign participation.</td>
<td></td>
<td></td>
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</table>
• Supply-side:
  – Restrictions on foreign entry and forms of technology transfer
  – Restriction on domestic entry

• Demand-side
  – High tariffs

• Interactions:
  – No incubation period for domestic firms prior to WTO
Competition Effect: Post-WTO Accession

• Rapid increase in number of JVs
• Rapid increase in number of independent Chinese firms
• Growth in the low-end of the market
• Segmentation begins to resemble construction equipment
But Too Little Too Late

- Independent firms are *new* firms rather than ones that cultivated capabilities during early stage of growth—they must take short-cuts
Constructing a Ladder

- Market segments serve as rungs on the development ladder and missing rungs impede the development process.
- Firms need the incentive to upgrade (on the demand side) and the channel of upgrading (the supply side).
- Interaction between domestic and foreign firms drives upgrading (when you are lucky enough to have a large domestic market...).
- Other cases of success: machine tools, white goods, elevators, power tools, electrical transformers, telecom equipment.....
- Other cases of failure: wind turbines
- Policy shapes the configuration of rungs, and the objective of policy should be to promote diversity and competition.