Supply base – Size and Interdependency

James M. Rubenstein
Department of Geography
Miami University
Oxford Ohio 45056
rubensjm@muohio.edu
Supply Base: Size and Interdependency

Outline:

• Why focus on supply base
• Changes in the supply base 2006-09
• Linkages across supply chains
Parts suppliers data base

• 3,984 plants in North America in 2009
• Based on ELM International Inc. files
• Substantially altered by Thomas Klier and James Rubenstein
• Assistance from Taft Foster, Associate Economist, Federal Reserve Bank of Chicago
Why focus on supply base?

• Suppliers account for
  ➢ 70+% of value added in vehicles
  ➢ 79% of auto industry jobs

• But suppliers are little understood
Most auto industry jobs are in the supply base.

Graph showing the number of jobs in auto parts and assembly from 1990 to 2010. Jobs in parts (3362 + 3363) and assembly (3361) are shown over time.

Source: BLS CES
Suppliers have increasing share of auto industry jobs

Ratio of parts to assembly jobs

Assembly: NAICS 3361
Parts: 3362 + 3363

Source: BLS CES
Key changes in supply base 2006-09

- Change in plant count
- Change in types of parts
- Change in geography
Number of supplier plants
Only a modest decline 2006-09

• 2009: 3,984 plants
• 2006: 4,265 plants -6.6%

[Klier & Rubenstein/ELM Intl]

Compare to higher job loss 2006-09

• Parts: -37.1%  * Assembly: -39.7%

[BLS CES]
Reasons for modest decline in plant count but sharp decline in employment?

- Restructuring in some sectors
- Plants remain open with much lower workforce
Changing types of parts plants

2009 plant count
- Powertrain: 20.3%
- Interior: 16.0%
- Generic: 17.3%
- Body: 15.4%
- Chassis: 15.4%
- Electronic: 15.7%

Closures 2006-09
- Powertrain: 20.4%
- Interior: 19.0%
- Generic: 12.1%
- Body: 17.2%
- Chassis: 17.0%
- Electronic: 14.3%
Changing U.S. distribution
Strengthening of Auto Alley

2009 Plant Count
- Outside Auto Alley: 22.4%
- South: 23.7%
- Midwest: 53.9%

Closures 2006-09
- Outside Auto Alley: 33.7%
- South: 15.4%
- Midwest: 50.9%
Changing Midwest Parts Plants
% U.S. plants in Midwest - 2006 & 2009

- Body
- Generic
- Interior
- Powertrain
- Chassis
- Electronic

2006 vs 2009
Changing NAFTA distribution
More plants in Mexico

<table>
<thead>
<tr>
<th></th>
<th># Plants</th>
<th>2006-09 Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>U.S.</td>
<td>2,881</td>
<td>-9.1%</td>
</tr>
<tr>
<td>Canada</td>
<td>414</td>
<td>-0.5%</td>
</tr>
<tr>
<td>Mexico</td>
<td>689</td>
<td>+2.1%</td>
</tr>
<tr>
<td>Total</td>
<td>3,984</td>
<td>-6.6%</td>
</tr>
</tbody>
</table>
Changing U.S. Parts Plants

% NAFTA plants in U.S.

- Generic
- Chassis
- Body
- Powertrain
- Interior
- Electronic

2006 to 2009
Linkages among suppliers
% of individual factories

- Supply only Detroit 3: 47.3%
- Supply both Detroit 3 & international: 42.2%
- Supply only international carmakers: 10.5%
Linkages among closed suppliers
% of closed factories 2006-09

Supply only Detroit 3
49.7%

Supply bothDetroit 3 & international
41.5%

Supply only international carmakers
8.8%
## Linkages among suppliers

<table>
<thead>
<tr>
<th>Suppliers to:</th>
<th>Also supplying to:</th>
<th>Detroit 3</th>
<th>Asian</th>
<th>Euro</th>
</tr>
</thead>
<tbody>
<tr>
<td>Detroit 3 carmakers</td>
<td></td>
<td>100%</td>
<td>41%</td>
<td>15%</td>
</tr>
<tr>
<td>Asian carmakers</td>
<td></td>
<td>79%</td>
<td>100%</td>
<td>20%</td>
</tr>
<tr>
<td>European carmakers</td>
<td></td>
<td>88%</td>
<td>63%</td>
<td>100%</td>
</tr>
</tbody>
</table>
Each carmaker has a network of suppliers around its assembly plants. Toyota’s supplier network.
Supply networks overlap
Median distance of suppliers
Summary
Key supply base changes 2006-09

- Modest reduction in plant count, much less than employment decline
- Closure rate relatively high for interior parts plants, lower for generic
- Continued strengthening of Auto Alley, especially Southern end
Summary: Key Interdependencies

• Most suppliers to international carmakers also supply Detroit 3
• Networks of suppliers around assembly plants overlap
Supply base – Size and Interdependency

James M. Rubenstein
Department of Geography
Miami University
Oxford Ohio 45056
rubensjm@muohio.edu