The Strategic Behavior of Japanese Carmakers and its Impact on Employment

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For the details, see the discussion paper, Shimizu (2014) “Structural Change of the Market and Strategy of Japanese Carmakers”.
1. Profit Strategy of Carmakers and its Adequacy

1.1 Determinants of the Strategy

The Strategy of the Firm \( i \) \((S_i)\) is determined by:

\[
S_i = \left( s_{pi}, s_{qi}, s_{ri}, s_{li} \right)
\]

Product Strategy: \( s_p = (v_{SV}, v_K, v_M, v_{HV}, v_{EV}) \)

Production Strategy: \( s_q = (q_{DP}, q_{OP}) \)

Regional Strategy: \( s_r = (r_J, r_{NA}, r_{EU}, r_{AS}) \)

Employment Strategy: \( s_l = (l_J, l_{OV}) \)
1.2 Product Strategy: $s_p = (v_{SV}, v_K, v_M, v_{HV}, v_{EV})$

$v_{SV}$: Standard Gasoline Vehicles
$v_K$: Kei Cars/Trucks
$v_M$: Imported Cars
$v_{HV}$: Hybrid Vehicles
$v_{EV}$: Electric Vehicles

\[ v_j = \frac{p_{j2012}}{\sum p_{k2012}} - \frac{p_{j2000}}{\sum p_{k2000}} \]

$P_j = \text{Sales volume of the product } j$

$j, k \in (SV, K, M, HV, EV)$

<table>
<thead>
<tr>
<th></th>
<th>$v_{SV}$</th>
<th>$v_K$</th>
<th>$v_M$</th>
<th>$v_{HV}$</th>
<th>$v_{EV}$</th>
</tr>
</thead>
<tbody>
<tr>
<td>TOYOTA</td>
<td>-31.4%</td>
<td>1.4%</td>
<td>0.4%</td>
<td>29.0%</td>
<td>0.0%</td>
</tr>
<tr>
<td>NISSAN</td>
<td>-28.1%</td>
<td>19.1%</td>
<td>6.7%</td>
<td>0.6%</td>
<td>1.7%</td>
</tr>
<tr>
<td>HONDA</td>
<td>-20.7%</td>
<td>1.4%</td>
<td>-1.3%</td>
<td>20.6%</td>
<td>0.0%</td>
</tr>
<tr>
<td>SUZUKI</td>
<td>5.5%</td>
<td>-5.7%</td>
<td>0.2%</td>
<td>0.0%</td>
<td>0.0%</td>
</tr>
<tr>
<td>MAZDA</td>
<td>-9.3%</td>
<td>9.3%</td>
<td>0.0%</td>
<td>0.0%</td>
<td>0.0%</td>
</tr>
<tr>
<td>MITSU.</td>
<td>-8.9%</td>
<td>-0.1%</td>
<td>6.5%</td>
<td>0.0%</td>
<td>2.5%</td>
</tr>
</tbody>
</table>

Data: Financial Reports of each firm.

Evolution of Product Strategy:
Change of Sales Weight in the Past 12 Years

TOYOTA and HONDA
Shift from the Standard Vehicles (SV) to the HV

NISSAN
Shift from the SV to the Kei and Imported Cars

SUZUKI
Slight shift from the Kei Cars/Vehicles to the SV

MAZDA
Slight shift from the SV to the Kei Cars/Vehicles

MITSUBISHI
Slight Shift from the SV to the Imported Cars
HV and EV

HV market has taken off

**Cumulated Domestic Sales of HV, 2001 - 2013**

Especially remarkable diffusion of the Prius and the Aqua of Toyota, and the Fit HV of Honda.

EV market doesn’t take off yet, even seems failed in.

Nissan has decided to develop and commercialize its HV.
Mitsubishi continues to place its future in EV.

Data: http://hybrid-eco.net (April, 2014)

TOYOTA: Global Sales of HV, 1997-2013

Data: Toyota
1.3 Production Strategy: \( s_q = (q_{DP}, q_{OP}) \)

- \( q_{DP} \): Domestic Production
- \( q_{OP} \): Overseas Production

\( q_j \) is the average annual growth rate of Domestic Production or Overseas Production in the past 13 years.

\[
q_j = \left( \frac{J_{2012}}{J_{2000}} \right)^{\frac{1}{13}} - 1
\]

\( j \in (DP, OP) \)

Data: Financial Reports of carmakers
Evolution of Production Strategy: Globalisation in the Past 12 Years

TOYOTA, SUZUKI, and MAZDA
Keeping and/or Increasing the domestic production, and increasing the overseas production

NISSAN and HONDA
Shift from the domestic production to the overseas production

MITSUBISHI
Decreasing both, the domestic and overseas productions

Evolution of Exports and Overseas Production


Data: Financial Reports of each firm
TOYOTA

Increased both, but overseas production more than exports. Only TOYOTA lost both from 2006 to 2008 (bottom of OP in 2008, that of exports in 2009), and began to substitute exports with overseas production after 2008.

NISSAN, HONDA and SUZUKI

Increased both until 2006, but the shift from exports to overseas production after 2008.

MAZDA

Increased exports more than overseas production.

MITSUBISHI

Reduced both until 2008, and after that, slightly increased both, but overseas production more than exports.

1.4 Regional Strategy:  \( s_r = \left( r_J, r_{NA}, r_{EU}, r_{AS} \right) \)

- \( r_J \): Production in Japan
- \( r_{NA} \): Production in North America
- \( r_{EU} \): Production in Europe
- \( r_{AS} \): Production in Asia

Evolution of a regional production from 2005 to 2012:

\[
\frac{r_j^{2012}}{r_j^{2000}} = \left( \frac{r_j^{2012}}{r_j^{2000}} \right)^{\frac{1}{7}} - 1
\]

Annual Growth Rate from 2005 to 2012 (%)

<table>
<thead>
<tr>
<th></th>
<th>Japan</th>
<th>North America</th>
<th>Europe</th>
<th>Asia</th>
</tr>
</thead>
<tbody>
<tr>
<td>TOYOTA</td>
<td>-1.16</td>
<td>0.48</td>
<td>-8.95</td>
<td>10.24</td>
</tr>
<tr>
<td>NISSAN</td>
<td>-3.54</td>
<td>-2.61</td>
<td>6.96</td>
<td>25.18</td>
</tr>
<tr>
<td>HONDA</td>
<td>-4.88</td>
<td>3.02</td>
<td>-1.52</td>
<td>10.99</td>
</tr>
<tr>
<td>SUZUKI</td>
<td>-1.16</td>
<td>0</td>
<td>0</td>
<td>9.64</td>
</tr>
<tr>
<td>MAZDA</td>
<td>-0.54</td>
<td>-9.27</td>
<td>0</td>
<td>12.39</td>
</tr>
<tr>
<td>MITSUBISHI</td>
<td>-5.18</td>
<td>-8.51</td>
<td>-20.7</td>
<td>1.83</td>
</tr>
</tbody>
</table>

Data: Financial Reports of each firm.
Evolution of Regional Strategy

TOYOTA
Decrease in Japan and Europe, increase in North America and Asia

NISSAN
Decrease in Asia and North America, increase in Europe and Asia (China)

HONDA
Decrease in Japan and Europe, increase in North and Asia (China)

SUZUKI
Decrease in Japan, increase in Asia (India); no presence in North America and Europe

MAZDA
Decrease in Japan and North America, increase in Asia (Thailand and China); no presence in Europe

MITSUBISHI
Decrease in Japan, North America and Europe, increase in Asia (Thailand)

1.5 Employment Strategy:

\[ s_I = (l_J, l_{OV}) \]

\( l_J \): Domestic Employment
\( l_{OV} \): Overseas Employment

The vectors represent the growth rate of employment from 2000 to 2012 of each carmaker. For example, SUZUKI increased its domestic employees by 28% and its overseas employment by 120% from 2000 to 2012.

Data: Financial Reports of each firm.
Employment Strategy

TOYOTA and SUZUKI
Increased domestic employment and overseas employment.

NISSAN and HONDA
Reduced domestic employment, and increased overseas employment

MAZDA
Increased domestic employment, and reduced overseas employment

MITSUBISHI
Reduced both domestic and overseas employments even in a large scale.

1.6. Synthesis:
Adequacy of the Profit Strategy

<table>
<thead>
<tr>
<th></th>
<th>Sp</th>
<th>Sq</th>
<th>Sr</th>
<th>Sl</th>
</tr>
</thead>
<tbody>
<tr>
<td>TOYOTA</td>
<td>HV</td>
<td>SV</td>
<td>OV</td>
<td>NA, As, D, EU</td>
</tr>
<tr>
<td>NISSAN</td>
<td>K, M, EV</td>
<td>SV</td>
<td>OV</td>
<td>D</td>
</tr>
<tr>
<td>HONDA</td>
<td>HV</td>
<td>SV, M</td>
<td>OV</td>
<td>D</td>
</tr>
<tr>
<td>SUZUKI</td>
<td>SV</td>
<td>K</td>
<td>D, OV</td>
<td>India</td>
</tr>
<tr>
<td>MAZDA</td>
<td>K</td>
<td>SV</td>
<td>D, OV</td>
<td>As</td>
</tr>
<tr>
<td>MITSU</td>
<td>M, EV</td>
<td>SV, K</td>
<td>D, OV</td>
<td>As</td>
</tr>
</tbody>
</table>

Note: We take into account only the items varying at a rate larger than 1% in absolute value.
TOYOTA: Successful Balanced & Sustainable Globalization?

In the long run, shift from SV to HV; Increasing overseas production in North America and Asia, by keeping domestic production and employment. Despite of accidents in 2007-11: the contraction of American market, the Toyota bashing in the USA, the Tohoku earthquake and tsunami, and the Thailand floods in 2011, its strategy works well with increasing production and sales of HV. Only problem resides in its European Operations.
NISSAN: Incoherent Globalisation at the cost of domestic employment?

In the long run, shift from SV to K., M., EV; Increasing overseas production and employment in Europe and China by reducing domestic production and employment.

Globalization strategy makes its consolidated result profitable, but its domestic operations became vulnerable to appreciation of the yen: deficits in 2010-11.

This strategy seems far from bringing its expected results: the operating profit rate in European operations expanded remains very low: 0.2% in 2012. Sales of imported cars (March/Micra) and Kei-cars supplied by Suzuki and Mitsubishi don’t ameliorate its position in domestic market.
**HONDA: Successful & Sustainable Globalisation at the cost of domestic employment?**

In the long run, shift from SV to HV; Increasing overseas production and employment in North America and Asia by reducing domestic production and employment.

Except the unconsolidated profit rate in 2008, it remains profitable in the consolidated as well as the unconsolidated results. So, its globalisation strategy looks work well, and its product strategy on domestic market hopeful.

**SUZUKI: Successful Localisation (JAPAN and India)?**

In the long run, shift from K to SV; Increasing overseas (India) and domestic productions and employments; supplying K. to Nissan, Mazda.

Profitable even in 2008, its localisation strategy based on Japan and India is successful.

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**Data: Financial Reports of each firm.**
Other Carmakers

• Mazda in restructuring its strategy
• Mitsubishi ? Disappear? Or alliance with Nissan?
• SUBARU:  
  Suffering from slow sales on domestic market from 2006, it decided in 2009 to specialise in the production of SV by outsourcing the Kei cars to Daihatsu, and enforcing productive cooperation with TOYOTA.
• ISUZU:  
  Its strategy focused on Trucks & Bus production and diesel engines after 2002, though producing SUV in Thailand for Thailand and Indonesian market, looks successful. But its alliance strategy remains confused, especially in relations with Toyota (shareholder of 5.89% of equity) and GM.

2. Employment Issues
2.1 Evolution of Domestic Employment

NISSAN and HONDA

Factors reducing their domestic employment ($g_{empl}$) in 1994-2012

NISSAN:

$$g_{empl,t} = -0.042*** + 0.486*** \pi_t$$

\(\pi\): unconsolidated net profit rate

HONDA:

$$g_{empl,t} = -0.014*** + 0.0864*** g_{Q,t-2}$$

\(g_Q\): Variation of Domestic production

Though the adjusted coefficient of determination of two estimations is not sufficiently high, it would be allowed to conclude as below, taking account of P-value of estimated coefficients: *** = P < 1%.
NISSAN:
The loss of domestic employment seems caused by its relatively poor financial results: positive correlations between the variation of domestic employment and the unconsolidated net profit rates are confirmed.
As a result, the loss of domestic employment has not been provoked by the globalization of production, but its poor domestic operations have led NISSAN to deploy overseas production.

HONDA:
The domestic employment has a tendency to be influenced by the variation of domestic vehicle production with a lag of two years.
As a result, the globalization of its production doesn’t have any confirmed relations with the loss of domestic employment, which is the consequence of its poor domestic car sales and exports.

2.2 Employment of Temporary Workers:
Ratio of Temporary Workers to Regular Employees

<table>
<thead>
<tr>
<th></th>
<th>TOYOTA</th>
<th>NISSAN</th>
<th>HONDA</th>
<th>MITSUBIS</th>
<th>SUZUKI</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Unconsolidated Data</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Average Ratio</td>
<td>15.8%</td>
<td>3.5%</td>
<td>14.2%</td>
<td>14.6%</td>
<td>n.d.</td>
</tr>
<tr>
<td>(Standard Deviation)</td>
<td>(0.0494)</td>
<td>(0.0372)</td>
<td>(0.0214)</td>
<td>(0.0665)</td>
<td>n.d.</td>
</tr>
<tr>
<td><strong>Consolidated Data</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Average Ratio</td>
<td>18.0%</td>
<td>11.4%</td>
<td>11.7%</td>
<td>12.9%</td>
<td>20.5%</td>
</tr>
<tr>
<td>(Standard Deviation)</td>
<td>(0.0353)</td>
<td>(0.0465)</td>
<td>(0.0134)</td>
<td>(0.0375)</td>
<td>(0.0312)</td>
</tr>
</tbody>
</table>

Data: Financial Reports of carmakers

Notes) Non data means the ratio is under 10% of the regular employees. So, the average ration is calculated only for the years where the data are available, except NISSAN who published the data even under 10%.
General tendency of employment of temporary workers (TW):

Unconsolidated Data: Increase until mid-2000s, and then, decrease;
Consolidated Data: Increase until mid-2000s, then decrease, but increase again after 2009.

**TOYOTA:**

Employment of TW was accelerated from 1999 to 2005 (22.6%), after then, reduced and stabilized at the level of 11%. Until 2005, TW had been increased as a means to cope with demand fluctuation, but this strategy has been modified after then.

**NISSAN:**

Employment of TW had been low, at the level of 1% until 2009, but began to increase after, with the regular employees being reduced. A strategic change is observed: substitution between those since 2010.

**HONDA:**

Employment of TW, increased until 2007, reduced during the financial crisis in 2008-2010, began to increase again. TW employed change with economic fluctuations.

**MITSUBISHI:**

Employment of TW was at a relatively high level until 2007, but TW have been considerably reduced after. Any strategic choice has not been observed, if we take in account its miserable financial and productive results, and the number of regular employees and temporary workers.

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2.3 **Wages:**

Wages and Remunerations in 2013

(Thousand of Yen for remunerations and Wages)

<table>
<thead>
<tr>
<th>Remuneration for</th>
<th>Toyota</th>
<th>Nissan</th>
<th>Honda</th>
<th>Suzuki</th>
<th>Mazda</th>
<th>Mitsubishi</th>
<th>Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>CEO</td>
<td>159,000</td>
<td>980,000</td>
<td>(a)</td>
<td>151,000</td>
<td>(a)</td>
<td>(a)</td>
<td>(a)</td>
</tr>
<tr>
<td>COO</td>
<td>184,000</td>
<td>(a)</td>
<td>(a)</td>
<td>(a)</td>
<td>(a)</td>
<td>(a)</td>
<td>The Nikkei, June 28, 2013</td>
</tr>
<tr>
<td>Average Wage</td>
<td>7,511</td>
<td>6,997</td>
<td>7,215</td>
<td>5,816</td>
<td>5,728</td>
<td>6,281</td>
<td>Financial Reports for the fiscal year 2012</td>
</tr>
<tr>
<td>Average Age</td>
<td>38.6</td>
<td>42.6</td>
<td>44.3</td>
<td>37.9</td>
<td>39.7</td>
<td>39.6</td>
<td>SankeiBiz, April 14, 2013</td>
</tr>
<tr>
<td>Average Service Years</td>
<td>15.5</td>
<td>20.5</td>
<td>23.0</td>
<td>15.6</td>
<td>15.8</td>
<td>15.8</td>
<td></td>
</tr>
</tbody>
</table>

Employees

<table>
<thead>
<tr>
<th>Annual Earnings of an employee at</th>
<th>30 years old</th>
<th>40 years old</th>
<th>50 years old</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average Earnings</td>
<td>5,730</td>
<td>7,850</td>
<td>9,750</td>
</tr>
<tr>
<td></td>
<td>4,710</td>
<td>6,450</td>
<td>8,020</td>
</tr>
<tr>
<td></td>
<td>4,890</td>
<td>6,700</td>
<td>8,320</td>
</tr>
<tr>
<td></td>
<td>4,570</td>
<td>6,270</td>
<td>7,790</td>
</tr>
<tr>
<td></td>
<td>4,420</td>
<td>6,060</td>
<td>7,520</td>
</tr>
<tr>
<td></td>
<td>4,570</td>
<td>6,260</td>
<td>7,780</td>
</tr>
</tbody>
</table>

Note: (a) means the remuneration of less than 100 million of yen.

Carlos Ghosn earns 140 times as much as the average wage of his employees, and 122 times as much as the average wage of his employee at 50 years old. Akio Toyota earns 24 times as much as the average wage of his employees, and 19 times as much as the average wage of his employee at 50 years old. However, an employee of NISSAN earns only 82% of the wage of his/her colleague of the same age at TOYOTA, if we believe the estimation, made by SankeiBiz, which did not show the estimation method.
In order to establish the indexes, we calculated the average annual wage of the employee of 40 years old, under simplified hypothesis as the equation, using the average age of employees and average annual wage, published in the Financial Reports of carmakers.

\[
\overline{w}_{40t} = \frac{40}{\text{AverageAge}_t} \overline{w}_t
\]

NISSAN:
80% of Toyota’s wage in average, but increasing at the rate of 1.3% a year to catch up to Honda’s wage level (84%).

HONDA:
86% of Toyota’s wage in average, and fluctuation around the mean.

SUZUKI:
76% of Toyota’s wage in average, and slightly increasing at the rate of 0.3% a year.

MAZDA:
77% of Toyota’s wage in average, but decreasing slightly at the rate of 0.1% a year.

MITSUBISHI:
73% of Toyota’s wage in average, but increasing at the rate of 0.8% a year, higher than MAZDA and SUZUKI in 2011-12 (81% in these years).
Balanced global and sustainable profit strategy assuring domestic employment:
  TOYOTA
  SUZUKI

Global and sustainable profit strategy, but employment not secured:
  HONDA

Incoherent profit strategy reducing employees:
  NISSAN
  MITSUBISHI

Inappropriate profit strategy, but trying to keep employees:
  MAZDA