

# Status and Causes of Regional Disparity in the Economic Recovery

by Satoshi Shinohara  
Economic Research Group  
shino@nli-research.co.jp

*Regional disparities in the strength of the current economic recovery can be partly explained by differences in industrial structure, especially in the weight of the machinery industry, which has driven economic growth. Also, outlying regions tend to lag behind major metropolitan regions, and depend more heavily on public investment. Thus public investment cutbacks in recent years may also be widening the disparity. Looking ahead, it is increasingly important that regional economies reduce dependence on public investment and shift to an industrial structure that emphasizes private demand.*

## 1. Introduction

According to economic indicators, the current economic recovery that began in January 2002 became Japan's longest postwar expansion in November 2006, when it surpassed the 57-month *Izanagi* boom (November 1965 to July 1970). Nonetheless, the recovery is generally characterized as a lackluster one. Part of the perception can be attributed to regional disparities in the recovery's strength.

This paper examines the extent of regional disparities in the current expansion, and analyzes the possible causes.

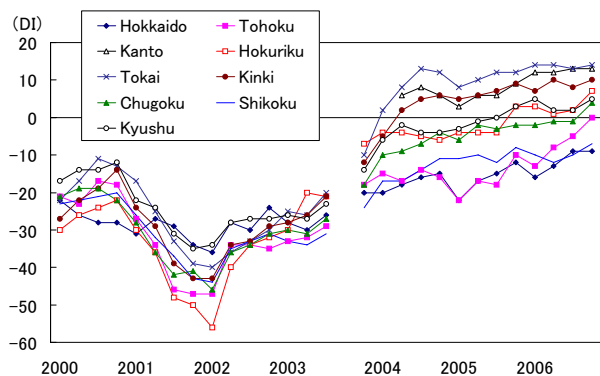
## 2. Regional Disparity

### (1) *Tankan* Business Conditions DI

A key feature of the current recovery has been the disparity of regional economic conditions. In its quarterly *Regional Economic Report* released in January 2007, the Bank of Japan remarked that while production continued to rise in most regions, the "degree and momentum of economic recovery still varied: Kanto-Koshinetsu, Tokai, and Kinki described the economic activity as expanding, while the other regions described it as being on a recovery trend."

Below we examine economic trends using the BOJ *Tankan* diffusion index of business conditions by region (all company sizes and industries). Since the peaks and troughs of the business conditions DI closely coincide with those of the actual business cycle, this indicator is often used as a proxy for general economic trends (Exhibit 1).

**Exhibit 1 Business Sentiment by Region (all industries)**



Notes: December 2003 data is omitted due to data discontinuity associated with the *Tankan* revision. Kanto-Koshinetsu series begins in June 2004. Source: Bank of Japan, *Tankan*.

In the major metropolitan regions of Kanto-Koshinetsu, Tokai and Kinki, the DI turned positive in early 2004, meaning that more companies consider business conditions to be favorable than unfavorable. Meanwhile, the DI in Tohoku finally reached zero in December 2006,

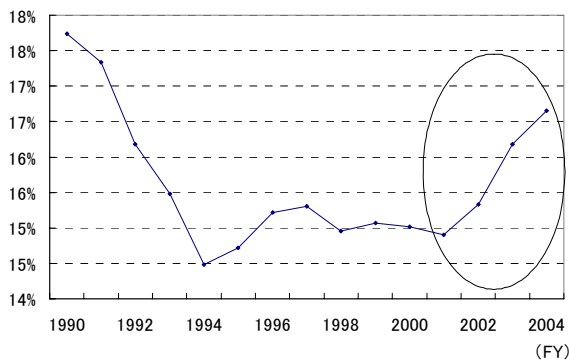
and is still negative in Hokkaido and Shikoku. That is, businesses in these regions have a relatively weak perception of economic recovery.

As the current expansion enters the sixth year, the business conditions DI and its pace of improvement remain quite disparate by region. Moreover, with the DI still negative in some regions, the recovery's strength apparently varies widely by region.<sup>1</sup>

## (2) Income Inequality

Another characteristic of the recovery is the widening income inequality by region. Based on the *Annual Report on Prefectural Accounts* (Cabinet Office), we calculated the coefficient of variation (CV) of per capita income for the 47 prefectures (CV measures how dispersed the data sample is). Since the recovery began in fiscal 2002, the CV has risen, indicating that income inequality has grown (Exhibit 2).

**Exhibit 2 Coefficient of Variation of Per Capita Income (47 pref.)**



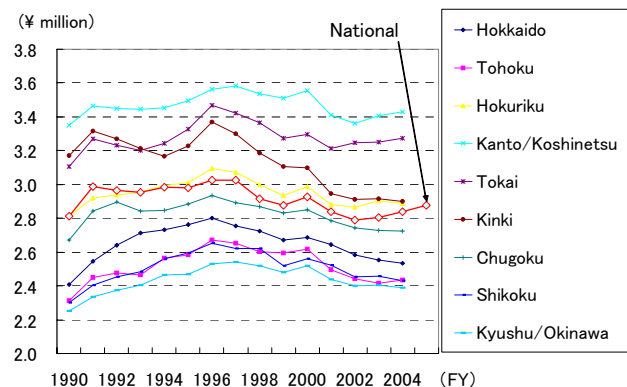
Source: Economic and Social Research Institute (Cabinet Office), *Annual Report on Prefectural Accounts*.

Of course, a gap in per capita income has traditionally existed between major metropolitan regions (Kanto, Tokai, and Kinki) and other regions (such as Hokkaido, Tohoku, and Shikoku). However, since fiscal 2002, income has risen in Kanto and Tokai, while continuing to slide elsewhere.

Since prefectural income data is not yet available for fiscal 2005 onward, we can only surmise about more recent trends. But considering the

disparity in business sentiment mentioned earlier, it is altogether likely that regional income inequality has widened since fiscal 2004. The combination of these two trends could be further accentuating the recovery's lackluster impression at the national level.

**Exhibit 3 Per Capita Income Trend (by region)**



Sources: ESRI, *Annual Report on Prefectural Accounts*, and *Annual Report on National Accounts*

## 3. Regional Disparity and Industrial Structure

### (1) Machinery Industry Drives Recovery

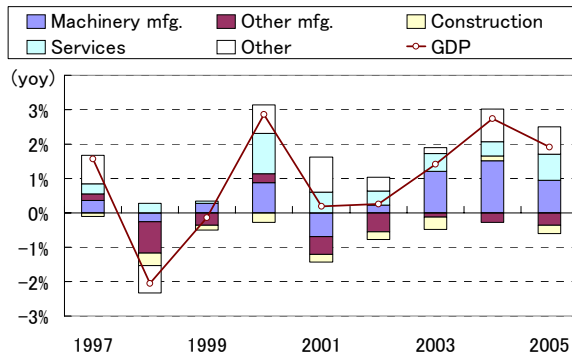
In analyzing the causes of regional disparity of economic conditions, we found that industrial structure plays a prominent role.

The current recovery gained traction when external demand picked up in early 2002, stimulating production in the manufacturing sector, and followed by domestic private demand such as business fixed investment and consumption. In particular, the recovery has been driven by the IT industry (personal computers, communications equipment, semiconductors, etc.) and automotive industry. As a whole, these are referred to as the export-oriented machinery industry—which includes general machinery, electrical machinery, transport equipment, and precision instruments.

In fact, the machinery industry accounts for most of real GDP growth from calendar year 2002 to

2005, contributing 1.0% to the 1.6% average real growth rate (Exhibit 4).

**Exhibit 4 Contribution to Real GDP Growth by Industry**

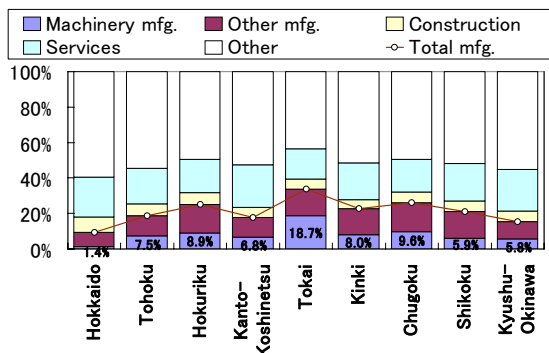


Source: ESRI, *Annual Report on Prefectural Accounts*.

Considering the machinery industry's key role in the current recovery, its weight in the industrial structure may help explain the regional disparity of economic growth.

Based on *Prefectural Accounts*, we compare industry weights in gross prefectural product for fiscal 2004, the latest year for which data is available. By far, the weight of manufacturing is highest in Tokai at 33.7%, with the machinery industry comprising 18.7%. Meanwhile, Hokkaido, Kyushu-Okinawa, and Shikoku have the lowest weights for manufacturing and the machinery industry (Exhibit 5).

**Exhibit 5 Industrial Structure by Region (value-added basis, FY 2004)**



Note: Machinery manufacturing includes general machinery, electrical equipment, transport equipment, and precision instruments.

Source: ESRI, *Annual Report on Prefectural Accounts*.

**(2) Machinery Industry Weight and Economic Growth**

The weight of the machinery industry in the economy appears to affect economic growth. This becomes apparent from the contribution of the machinery industry to the real economic growth rate. From fiscal 2002 to 2004, the contribution is significant in all regions, which is also consistent with the national data (Exhibit 6).

**Exhibit 6 Contribution of Machinery Industry to Economic Growth**

	2002 - 2004		2002-04 avg.
	Average growth rate	Contrib. of machinery	Machinery as ratio of gross product
Hokkaido	0.2%	0.1%	1.4%
Tohoku	1.3%	1.4%	7.2%
Hokuriku	1.9%	1.5%	8.8%
Kanto-Koshinetsu	1.7%	0.8%	6.8%
Tokai	2.9%	2.4%	18.2%
Kinki	1.6%	1.0%	7.9%
Chugoku	1.3%	1.3%	9.2%
Shikoku	0.7%	1.0%	5.6%
Kyushu-Okinawa	1.5%	0.9%	5.4%
Nationwide	1.5%	1.0%	8.3%

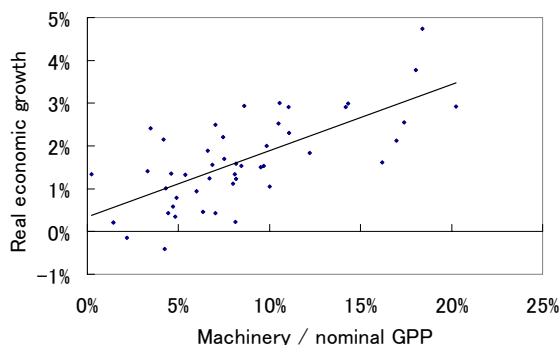
Notes: Chain-linked data is shown. Calendar year data is shown for national data, and fiscal year data for prefectural data. Shows average annual contribution to growth for the period.

Source: ESRI, *Annual Report on Prefectural Accounts*.

The Tokai region, which has the highest machinery industry weight, also has the highest average economic growth rate of 2.9%, and by far the highest contribution by the machinery industry at 2.4%. Other regions with a high machinery industry weight such as Hokuriku and Chugoku also have a relatively high contribution by the machinery industry, which tends to push up the growth rate.

Moreover, machinery industry weight is correlated with the real economic growth rate (Exhibit 7).<sup>2</sup>

**Exhibit 7 Economic Growth and Machinery Industry Weight (avg., FY 2002-04, by pref.)**



Notes: Chain-linked data is used for real economic growth rate.  
Source: ESRI, *Annual Report on Prefectural Accounts*.

Drawing on the *Prefectural Accounts* from fiscal 2002 to 2004, we plot the weight of the machinery industry in gross prefectural product on the horizontal axis, and average real economic growth rate on the vertical axis. As the graph shows, the correlation is positive.

Based on our analysis, the weight of the machinery industry is correlated with economic growth by region, and thus likely to explain part of the regional disparity in recovery's strength.

#### 4. Public Investment Cutbacks

##### (1) Dependence on Public Investment

Another cause of regional disparity is attributed to cutbacks in public investment under fiscal structural reforms that accelerated in the Koizumi administration from 2001. In recent years, public investment (public fixed capital formation in the GDP data) has decreased nationally, and contributed negatively to the real economic growth rate since fiscal 2000. Although consumption and private fixed investment have absorbed the slack at the national level, some regional economies have suffered from the cutbacks, causing the disparity to widen.

To measure the dependence on public investment, we calculated the proportion of public fixed capital formation in nominal gross prefectural product (referred to below as the public

investment ratio) based on the *Prefectural Accounts* (Exhibit 8).

Compared to the metropolitan regions of Kanto, Tokai and Kinki, dependence is higher in outlying regions such as Hokkaido, Tohoku, Shikoku and Kyushu. In these regions, public investment has played a key role in building social and industrial infrastructure, propping up the weak local economy, and reallocating income to reduce regional income inequality.

Following the collapse of the bubble economy, public investment was expanded significantly in an effort to stimulate the economy. As a result, in the early 1990s, dependence on public investment rose nationally, and particularly in outlying regions (Exhibit 8).

**Exhibit 8 Ratio of Public Investment in Nominal GDP**

	1990	1995	2000	2004	90-95	95-00	00-04
Hokkaido	11.6%	14.7%	12.4%	8.5%	3.2%	-2.3%	-3.9%
Tohoku	9.1%	11.4%	9.5%	6.4%	2.3%	-1.9%	-3.1%
Hokuriku	8.1%	10.4%	9.2%	7.0%	2.3%	-1.2%	-2.2%
Kanto-Koshinetsu	5.2%	6.5%	4.8%	3.6%	1.2%	-1.7%	-1.2%
Tokai	5.0%	6.4%	5.2%	4.1%	1.4%	-1.2%	-1.2%
Kinki	5.5%	8.0%	5.5%	4.0%	2.6%	-2.5%	-1.5%
Chugoku	7.6%	9.7%	8.8%	6.1%	2.2%	-1.0%	-2.7%
Shikoku	9.2%	10.9%	9.6%	6.9%	1.6%	-1.3%	-2.7%
Kyushu-Okinawa	9.3%	10.9%	9.8%	7.1%	1.6%	-1.1%	-2.7%
National	6.5%	8.5%	6.8%	4.8%	2.0%	-1.7%	-2.0%

Sources: ESRI, *Annual Report on National Accounts* (for national data), and *Annual Report on Prefectural Accounts*.

But the vigorous fiscal spending of the 1990s inevitably caused the government deficit to mushroom. By 2000, Japan's national debt was the worst among industrialized economies, and the spending level of the 1990s was clearly unsustainable. As public investment spending was scaled down, the outlying economies—who were most dependent, and whose industrial base was the weakest—were the hardest hit.

## (2) Contribution of Public Investment

To examine the correlation between regional economic growth and public investment, we compare the contribution of public investment to economic growth over three periods (Exhibit 9).

In the 1990s, regional growth rates were clustered in the mid 1% range. Public investment, which had grown most in outlying regions, contributed more to economic growth in Hokkaido and Tohoku than in metropolitan regions.

However, in the four-year period from fiscal 2001 (when fiscal structural reform accelerated) to fiscal 2004 (the latest available data), the real economic growth rate dropped, led by outlying regions. Part of the reason for the drop was the recession during all of 2001. But in addition, during this four-year period, public investment spending fell compared to the 1990s, and contributed negatively to growth in all regions.

The same trend appears in the current recovery from fiscal 2002. In particular, the negative contribution of public investment has been greater in outlying regions than in metropolitan regions, partly as a correction to the strong growth of the 1990s. Compared to a negative contribution of only -0.2% to -0.3% (annual

average) in the Kanto and Tokai regions, it is as large as -1% in Hokkaido, Tohoku and Shikoku.

Thus in the 1990s, public investment contributed to economic growth in outlying regions, helping to reduce the widening regional growth gap. On the other hand, in the current recovery, public investment cutbacks have widened the growth gap between metropolitan and other regions.

In the current recovery, we found that dependence on public investment is correlated with real economic growth at the prefectural level (Exhibit 10). Drawing on the *Prefectural Accounts*, we plot average growth from fiscal 2002 to 2004 against the average ratio of public investment in GPP. As the graph shows, regions that depend heavily on public investment tend to have a lower economic growth rate.<sup>3</sup>

The stimulative fiscal policy that characterized the post-bubble 1990s served to heighten the economy's dependence on public investment, particularly in outlying regions. Later, when fiscal deficits mounted and public investment had to be reined in, these outlying regions were the hardest hit.

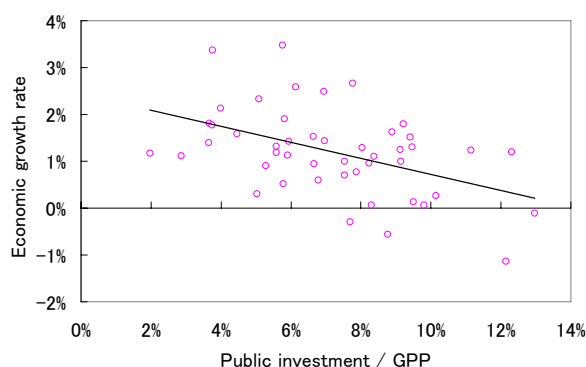
**Exhibit 9 Contribution of Public Investment to Economic Growth**

	(Percent)					
	1991-2000		2001-04		2002-04	
	Gro. rate	Con-trib.	Gro. rate	Con-trib.	Gro. rate	Con-trib.
Hokkaido	1.0	0.3	0.1	-1.0	0.1	-1.1
Tohoku	1.8	0.3	0.1	-0.8	1.0	-1.1
Hokuriku	1.1	0.3	0.6	-0.6	1.3	-0.7
Kanto-Koshinetsu	0.9	0.0	0.9	-0.3	1.4	-0.2
Tokai	1.3	0.1	1.9	-0.2	2.7	-0.3
Kinki	0.5	0.1	0.3	-0.4	1.2	-0.5
Chugoku	0.7	0.3	0.4	-0.7	0.9	-0.7
Shikoku	1.4	0.2	0.1	-0.7	0.1	-0.9
Kyushu-Okinawa	1.4	0.3	0.8	-0.6	1.3	-0.8
National	1.4	0.1	1.3	-0.5	2.0	-0.5

Notes: Fixed-base data is used. Shows average contribution to the average annual growth rate in each period.

Sources: ESRI, *Annual Report on National Accounts* (for national data), and *Annual Report on Prefectural Accounts*.

**Exhibit 10 Economic Growth and Dependence on Public Investment (avg., FY 2002-04, by pref.)**



Note: Fixed-base data is used for real economic growth rate.  
Source: ESRI, *Annual Report on Prefectural Accounts*.

The growth of public investment in the 1990s helped reduce regional disparities by boosting economic growth in regions with a weak industrial base. But in the current recovery, the scaling down of public investment has likely



widened the structural gap, accentuating the regional growth gap.

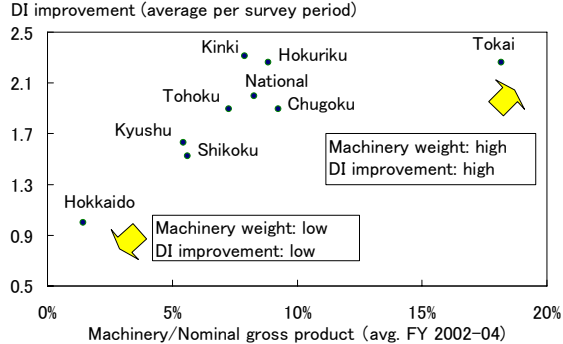
### 5. Business Sentiment, Industrial Structure, and Public Investment

Unfortunately, while the *Annual Report on Prefectural Accounts* is the most comprehensive source of regional economic data, it is available only up to fiscal 2004. Thus for the current recovery from 2002 to the present, we examine instead the extent to which industrial structure and public investment ratio explain economic conditions at the prefectural level.

As an indicator of regional economic conditions, we use the business conditions DI (all industries) mentioned earlier. We first plot the DI against the machinery industry weight by region (Exhibit 11).

The vertical axis shows the average quarterly change in DI from March 2002 to December 2006. The horizontal axis shows the average weight of machinery in nominal gross regional product from fiscal 2002 to 2004, based on the *Prefectural Accounts*. The upper quadrant denotes a high machinery weight and strong improvement in business sentiment, while the lower left quadrant denotes a low machinery weight and weak improvement in business sentiment.

**Exhibit 11 Machinery Industry Weight and Business Sentiment Improvement**



Notes: Improvement of business conditions DI is expressed as average improvement per quarter from March 2002 to December 2006. December 2003 data is omitted due to data discontinuity associated with the *Tanken* revision.  
Sources: ESRI, *Annual Report on National Accounts*, and *Annual Report on Prefectural Accounts*; BOJ, *Tanken*.

The Kanto region is excluded because no DI data exists prior to June 2004. In addition, due to data discontinuity associated with the March 2004 survey revision, December 2003 survey data is excluded.

As Exhibit 11 shows, business sentiment has improved significantly in high machinery-weight regions such as Tokai, Kinki and Hokuriku, and less so in low-weight regions such as Hokkaido, Kyushu and Shikoku. The correlation with business sentiment improvement suggests that machinery industry weight explains part of the regional disparity in economic growth.

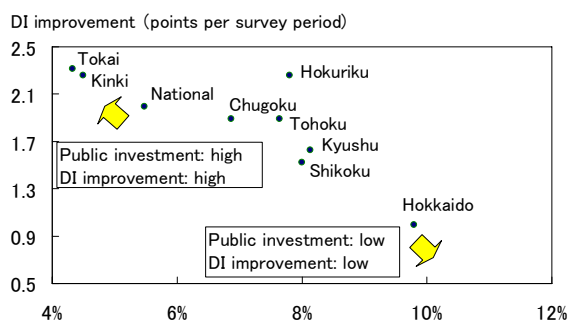
Next, we examine how dependence on public investment may have affected regional economic conditions in the current recovery. Again, we plot the average improvement in business sentiment on the vertical axis, but now we plot the average ratio of public investment in gross regional product (fiscal 2002–04) on the horizontal axis. The upper left quadrant denotes low dependence on public investment and strong improvement in business sentiment, while the lower right quadrant denotes high dependence on public investment and weak improvement in business sentiment (Exhibit 12).

According to the results, regions with a low dependence on public investment such as Tokai and Kinki show stronger improvement in business sentiment, while regions with a high dependence such as Hokkaido, Tohoku, Shikoku and Kyushu show a weak improvement in business sentiment.

In the Tokai region, where business sentiment has risen very strongly, the industrial structure is characterized by a low public investment ratio and exceptionally high machinery industry weight of 18.7% (fiscal 2004). Due to its robust machinery-centered manufacturing base, the economy appears to be less vulnerable to public investment cutbacks.

In contrast, business sentiment in Hokkaido has improved the least. Hokkaido has the highest public investment ratio, and a relatively low manufacturing ratio and machinery industry weight. These characteristics suggest that public

## Exhibit 12 Public Investment Ratio and Business Sentiment Improvement



Public investment/Nominal gross product (avg. FY 2002-04)

Notes: Improvement of business conditions DI is expressed as the average improvement per quarter from March 2002 to December 2006. December 2003 data is omitted due to data discontinuity associated with the *Tanken* revision.

Sources: ESRI, BOJ

investment cutbacks have had an especially acute impact.

Due to data limitations, our results are by no means conclusive. However, in the current recovery, business sentiment appears to have improved the most in regions with a high manufacturing ratio, and a high machinery industry weight in particular. Moreover, the results suggest that since public investment cutbacks have the largest impact on regions with a high public investment ratio, their business sentiment improvement tends to be relatively low.

We explained earlier that differences in industrial structure may explain part of the disparity in regional economic growth, and that public investment cutbacks may have accentuated this tendency. The results presented above appear to support this view.

## 6. Conclusion

Differences in industrial structure—particularly in the machinery industry weight—help to explain the disparity in regional economic growth under the current recovery. In addition, public investment cutbacks have made it more difficult to reduce the regional gap, and may have also aggravated income inequality. This is because

public investment has contributed heavily to growth in outlying regions, which tend to lag behind metropolitan regions.

However, in light of Japan's current fiscal condition, public investment can no longer be relied on to drive the outlying economies. Of course, public investment spending will still be necessary for essential infrastructure. But fiscal reality dictates that unnecessary spending be downscaled or eliminated at the national level. Regions that now depend on public investment inevitably must shift their industrial structure and rely more on private demand in the long term.

The structural shift cannot happen overnight. Among other things, it will require a policy shift to promote regulatory reform and expand the role of the private sector, as well as a sustained collaboration with the private sector to develop human resources and the industrial base appropriate for the local economy.

## End notes

1. The BOJ defines the nine regions as follows.

Region	Prefectures		
Hokkaido	Hokkaido		
Tohoku	Miyagi	Aomori	Akita
	Iwate	Yamagata	
	Fukushima		
Hokuriku	Ishikawa	Toyama	Fukui
Kanto-Koshinetsu	Tokyo	Chiba	Saitama
	Ibaraki	Tochigi	Gunma
	Kanagawa	Niigata	Yamanashi
	Nagano		
Tokai	Aichi	Shizuoka	Gifu
	Mie		
Kinki	Osaka	Kyoto	Shiga
	Wakayama	Hyogo	Nara
Chugoku	Hiroshima	Okayama	Tottori
	Shimane	Yamaguchi	
Shikoku	Kagawa	Tokushima	Ehime
	Kochi		
Kyushu-Okinawa	Fukuoka	Saga	Oita
	Nagasaki	Kumamoto	Miyazaki
	Kagoshima	Okinawa	

2. In the regression analysis of average economic growth rate and machinery industry weight (Exhibit 7), the coefficient for the machinery industry weight is significant at 1%, confirming the upward slope of the regression line.

Sample: 47 prefectures

Explained variable: Average real economic growth rate (2002-04)

	<b>Machinery wt. (2002-04 avg.)</b>		<b>Constant</b>		<b>R2</b>
Coefficient	0.155 **		0.003		0.474
t-value	6.512		1.460		

\*\* Significant at 1% level. \* Significant at 5% level.

3. In the regression analysis of average economic growth rate and public investment ratio (Exhibit 10), the coefficient for public investment is significant at the 1% level, confirming the downward slope of the regression line.

Sample: 47 prefectures

Explained variable: Average real economic growth rate (2002-04)

	<b>Public invest. wt. (2002-04 avg.)</b>		<b>Constant</b>		<b>R2</b>
Coefficient	-0.171 **		0.024 **		0.200
t-value	-3.533		6.601		

\*\* Significant at 1% level. \* Significant at 5% level.