Tohoku University DRR Actions
Contributing to Global Disaster Resilience

Regional Industries Restoration Support Project

Regional Innovation Research Center, Graduate School of Economics and Management, Tohoku University
Masahiko FUJIMOTO

2015.03.16

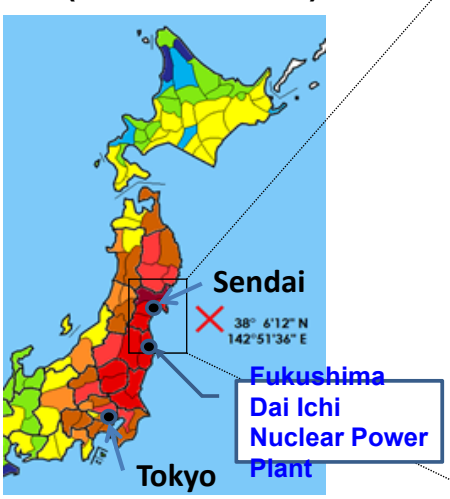
Regional Innovation Research Center supports the Third UN World Conference on Disaster Risk Reduction.

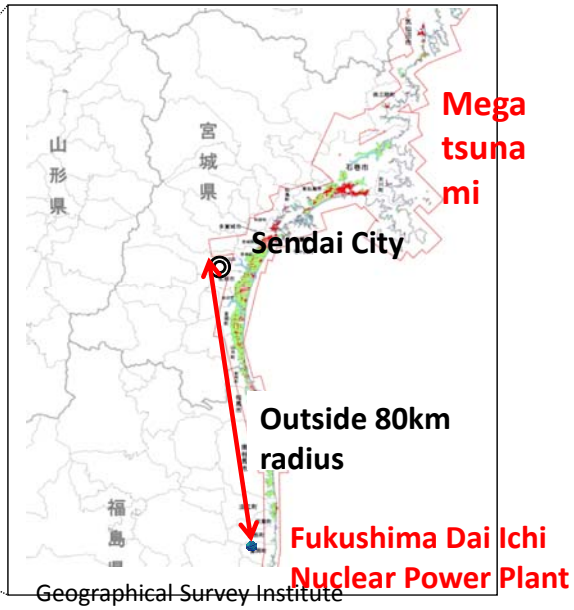
Tohoku University DRR Actions
Contributing to Global Disaster Resilience

How Tohoku University is Contributing to Rebuilding the Regional Economy as a University in the Disaster Area.

Tohoku Earthquake caused Multi-hazards: Mega Earthquake, Mega Tsunami and Nuclear Power Plant Accident.

- 11 March, 2011 at 14:46 JST
- Magnitude (Richter Scale): M 9.0





Tohoku University DRR Actions
Contributing to Global Disaster Resilience

Damage from the Mega Tsunami

- Total flooded area: 561 km^2
- Dead or missing: approx. 19,000

Damage from the Nuclear Power Plant Accident

- **Evacuated residents: approx. 140,000**

Tohoku University DRR Actions
Contributing to Global Disaster Resilience

Tohoku University, located in the disaster affected area, was significantly damaged:

- Fatalities: 3 students (died off campus in tsunami)
- Huge damage to buildings and facilities
- Lifeline: Electricity, water and gas, disconnected for a long period
- Many valuable cells/samples were lost in biology research labs (deep freezer stopped due to electric power outage)

Eight Projects

Project 1 International Research Projects on Disaster Science

Project 2 Project on the Reconstruction of Community Health Care

Project 3 Project on Environmental Energy

Project 4 ICT Reconstruction Project

Project 5 Tohoku Marine Science Project

Project 6 Radioactive Decontamination Project

Project 7 Regional Industries Restoration Support Project

Project 8 Industry-University Collaboration Development Project for Reconstruction

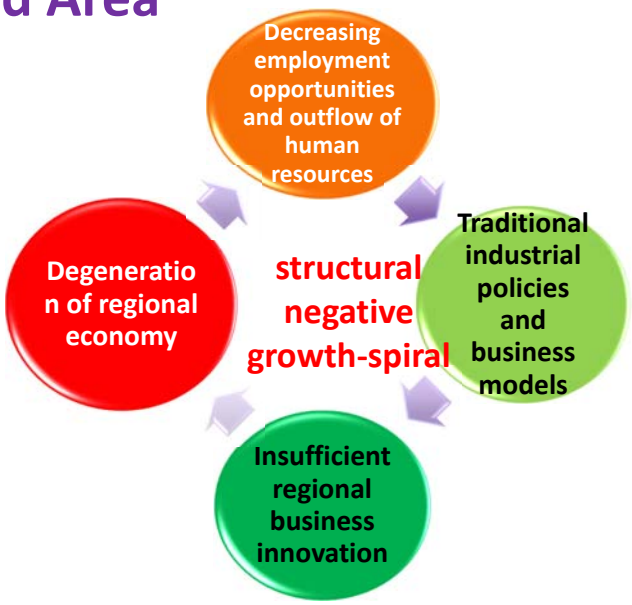
Tohoku University DRR Actions
Contributing to Global Disaster Resilience

The Problems of Economics and Society in the Damaged Tohoku region

- Depopulation
- High unemployment
- High ageing
- Conservative culture

・・・etc.

The Negative Growth-Spiral Which has Covered the Damaged Area



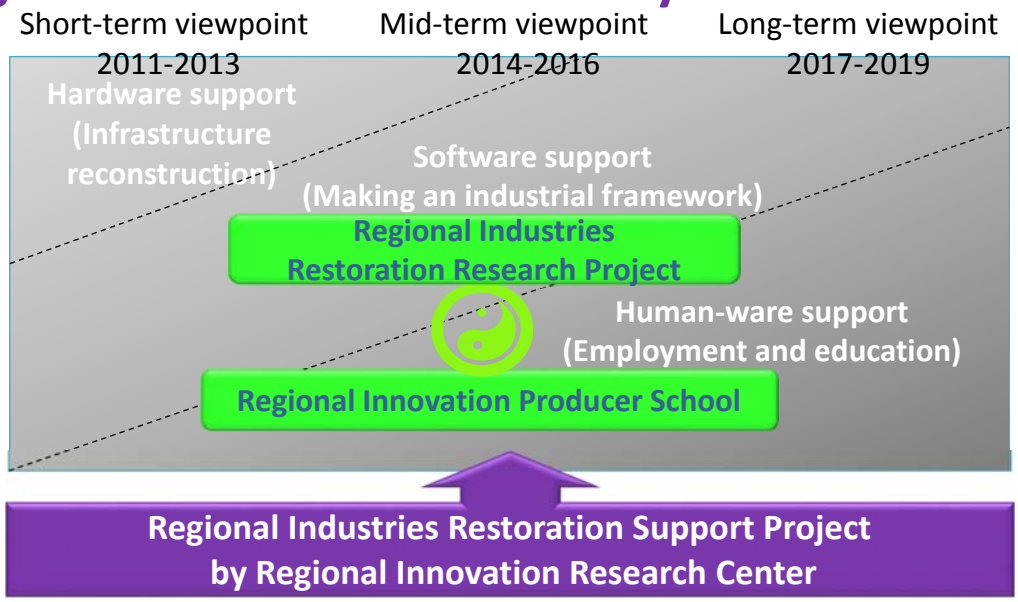
Tohoku University DRR Actions
Contributing to Global Disaster Resilience

The New Growth-Spiral Towards the Restoration of Regional Industries and Society

1) Renewal policy proposal based on survey and research

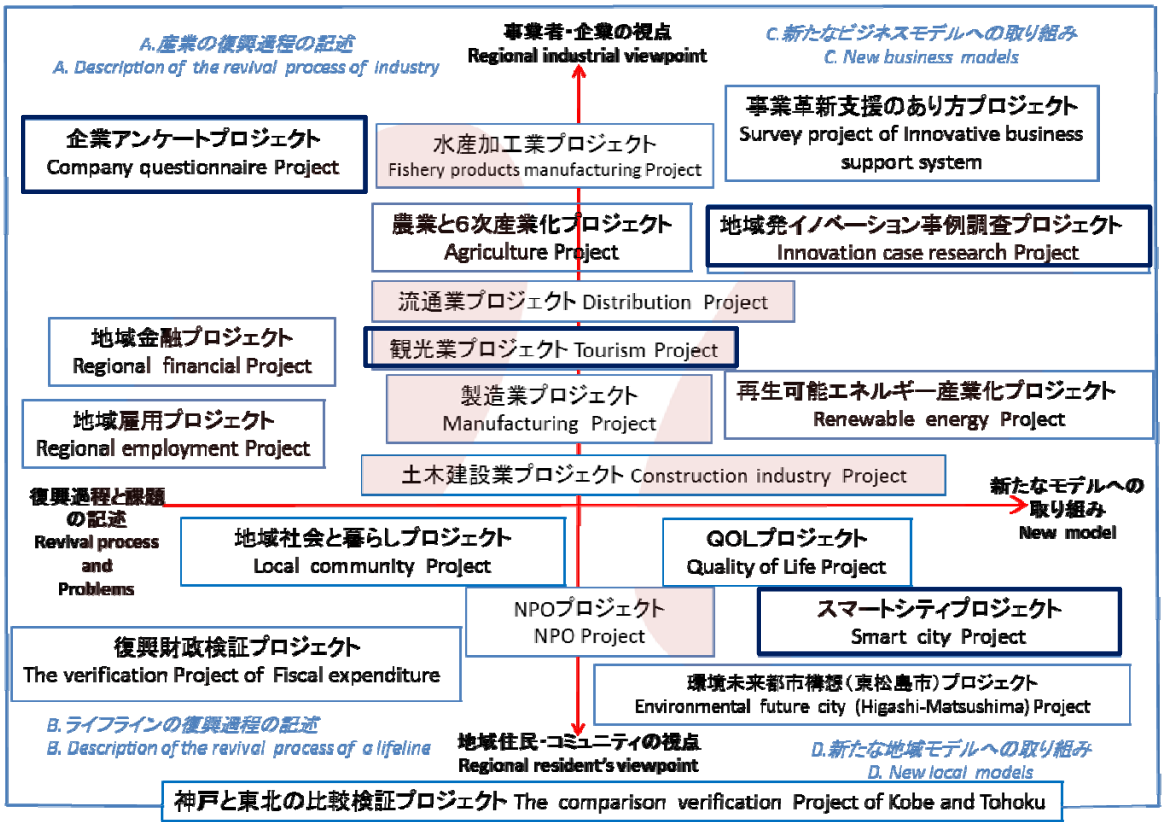
2) Training and facilitation of regional business innovation

Two Pillars of Support for the Restoration of Regional Industries and Society

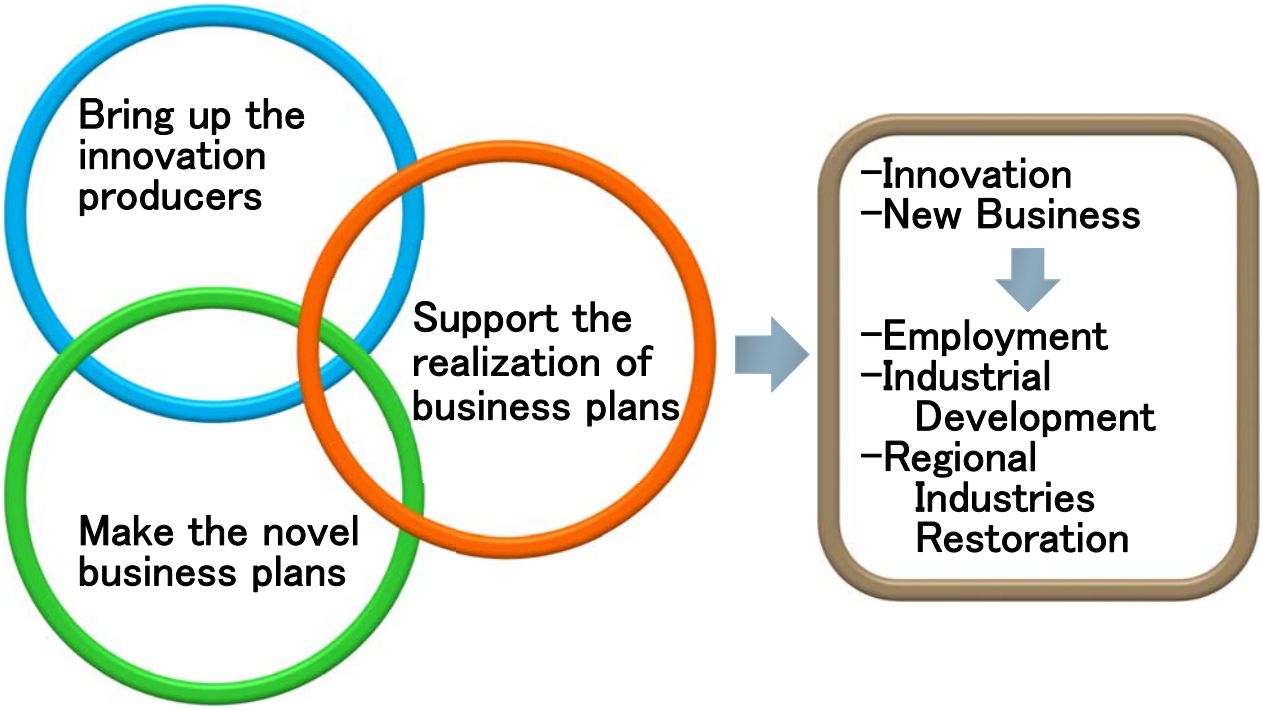


Tohoku University DRR Actions
Contributing to Global Disaster Resilience

2014年度 地域産業復興調査研究プロジェクトのコンセプト The activity of the research project plans in FY2014



Regional Innovation Producer School



Tohoku University DRR Actions
Contributing to Global Disaster Resilience

Thank you for listening

Tohoku University DRR Actions
Contributing to Global Disaster Resilience

東日本大震災後の被災地企業の復興状況

東北大学大学院経済学研究科
西山　慎一

2015.03.16

東北大学大学院経済学研究科地域イノベーション研究センターは第3回国連防災世界会議を支援しています。

Tohoku University DRR Actions
Contributing to Global Disaster Resilience

Economic Recovery in the Tohoku Region after the Great East-Japan Earthquake Disaster

Graduate School of Economics and Management,
Tohoku University
Shin-Ichi NISHIYAMA

2015.03.16

Regional Innovation Research Center supports the Third UN World Conference on Disaster Risk Reduction.

About "Tohoku University Earthquake Recovery Firm Survey" (TERFS)

- Aim: To keep records on the recovery process of the firms in Tohoku region.

  - Feature 1: Capturing the business activities including financial, logistical, and HR management.
  - Feature 2: Capturing the recovery process broadly (not just only sea-side, but including in-land area).
  - Feature 3: Capturing the cross-industry recovery process
  - Feature 4: Capturing the recovery process continuously (at least for 5 years).

Tohoku University DRR Actions
Contributing to Global Disaster Resilience

About "Tohoku University Earthquake Recovery Firm Survey" (TERFS)

- Who conducts TERFS?: Regional Innovation Research Center, Faculty of Economics, Tohoku University
- Survey Target: Firms whose HQ are in disaster region (Iwate, Miyagi, Fukushima, Hachinohe). Excludes non-profit organizations.
- Survey Periods: July 2012, Aug. 2013, and Aug. 2014
- Number of Firms: 30,000 (2012 and 2013), 11,000 (2014)
- Number of Responses:
  2012 Survey: 7,021 (response rate 23.4%)
  2013 Survey: 7,481 (response rate 24.9%)
  2014 Survey: 5,713 (response rate 52.1%)

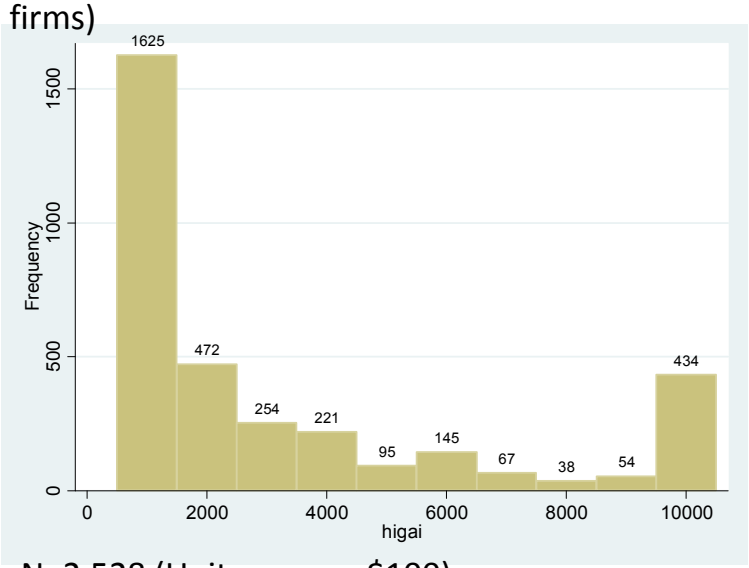
Disaster and Insurance Coverage of the Firms

Damage Status

Damage caused by the earthquake

	# of firms
Damaged	3,701
No Damage	1,655
Total	5,356

Distribution of Cost of Damage (Only damaged firms)

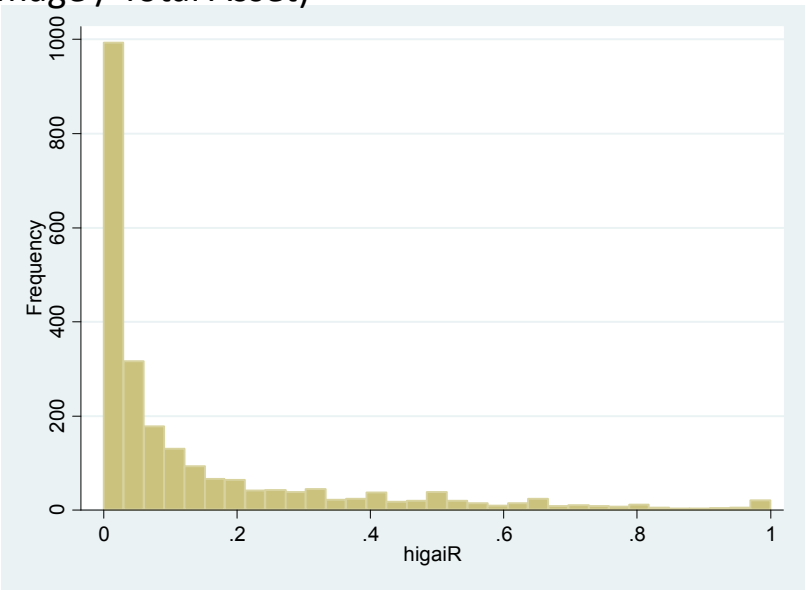


N=2,528 (Unit: approx. $100)

- Here, “damaged” only refers to direct damage. Indirect damage not included.
- “Cost of Damage” refers to the cost of damage to physical capital.

Damage Status

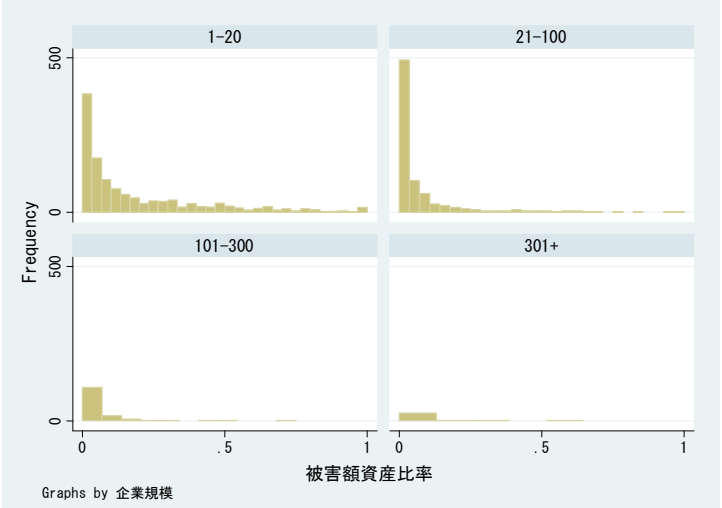
Distribution of Cost of Damage-Total Asset ratio (Cost of Damage / Total Asset)



	# of Obs.	Median	Average	Std. Dev.
Total	2,198	0.045	0.138	0.204

Damage Status

Dist. of Cost of Damage-Total Asset ratio by firm size



Cost of Damage-Total Asset ratio by Firm Size

	Obs.	Median	Average	Std. Dev.
Small	1,237	0.087	0.190	0.232
Medium	794	0.021	0.074	0.140
Medium-Large	137	0.014	0.051	0.100
Large	30	0.019	0.066	0.135
Total	2,198	0.045	0.138	0.204

✓ Cost of Damage-Total Asset ratio tends to be larger for smaller firms.

Damage Status

Cost of Damage-Total Asset ratio by Region

	Obs.	Median	Average	Std. Dev.
Hachinohe	111	0.030	0.088	0.129
Iwate (Sea-side)	182	0.123	0.238	0.265
Iwate (In-land)	218	0.015	0.077	0.159
Miyagi (Sea-side)	857	0.085	0.183	0.224
Miyagi (In-land)	251	0.021	0.060	0.122
Fukushima (Sea-side)	302	0.051	0.145	0.213
Fukushima (In-land)	252	0.020	0.061	0.111
Fukushima (West-side)	25	0.017	0.046	0.074
Total	2,198	0.045	0.138	0.204

- Cost of Damage-Total Asset ratio is higher for sea-side, compared to in-land.

Earthquake Insurance

- How were the firms covered by earthquake insurance?

Firm Size	With Insurance	No Insurance	Total
Small	1,610 (32.8%)	3,082 (62.8%)	4,910
Medium	409 (22.3%)	1,378 (75.1%)	1,834
Medium-Large	48 (21.5%)	173 (77.6%)	223
Large	15 (27.8%)	38 (70.4%)	54
Total	2,082 (29.7%)	4,671 (66.5%)	7,021

- In total, 29.7% of the firms had earthquake insurance.
- Smaller firms tend to join earthquake insurance more than larger firms.
- Why is that so?

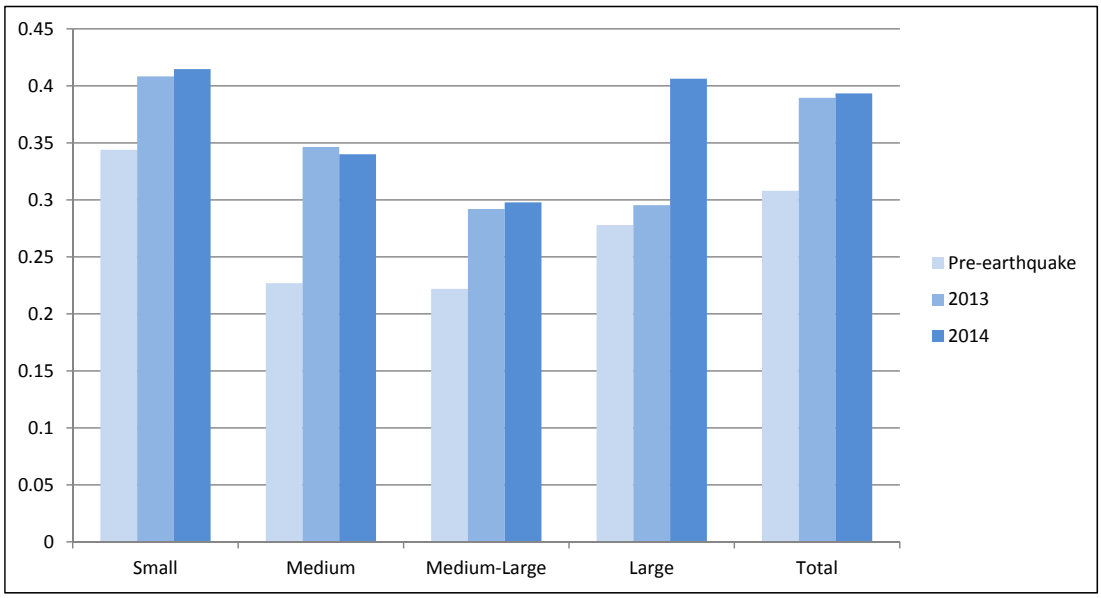
Earthquake Insurance Coverage

Earthquake insurance coverage against cost of damage

	Obs.	Average	Std. Dev.
Firms receiving insurance payment	768	0.529	0.458
Firms who held insurance	875	0.464	0.463
All the damaged firms	2,932	0.127	0.317

- On the average, the firms who held earthquake insurance were able to cover the cost of damage by 50% .
- Overall, however, earthquake insurance was able to cover only 13% of the total damage caused by the earthquake. This is due to low earthquake insurance contract rate.

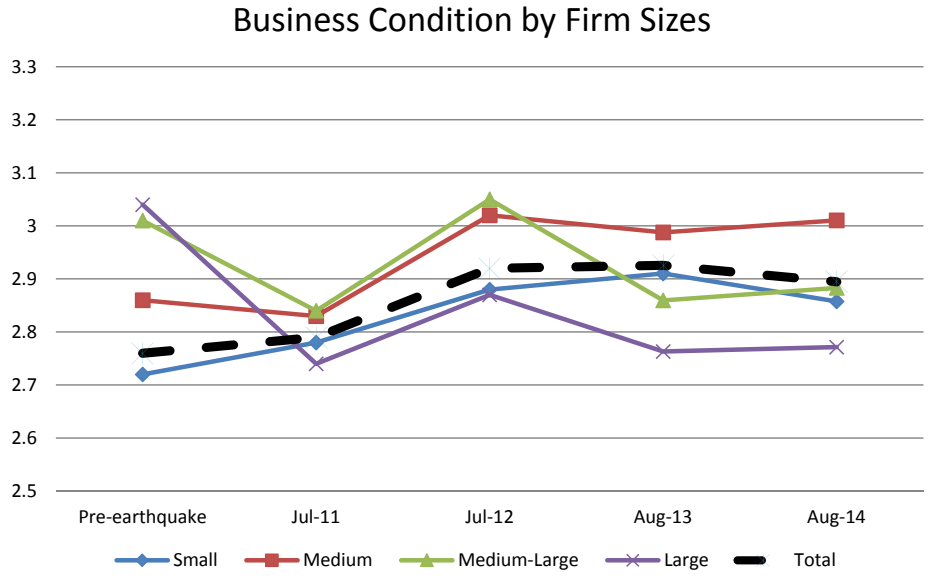
Earthquake Insurance Participation Rate



- Earthquake Insurance participation rate was around 30% before the earthquake, but increased to nearly 40% at Aug. 2014.
- However, participation rate is not increasing after 2013, except for large firms.

Recovery Status of the Firms

Business Conditions

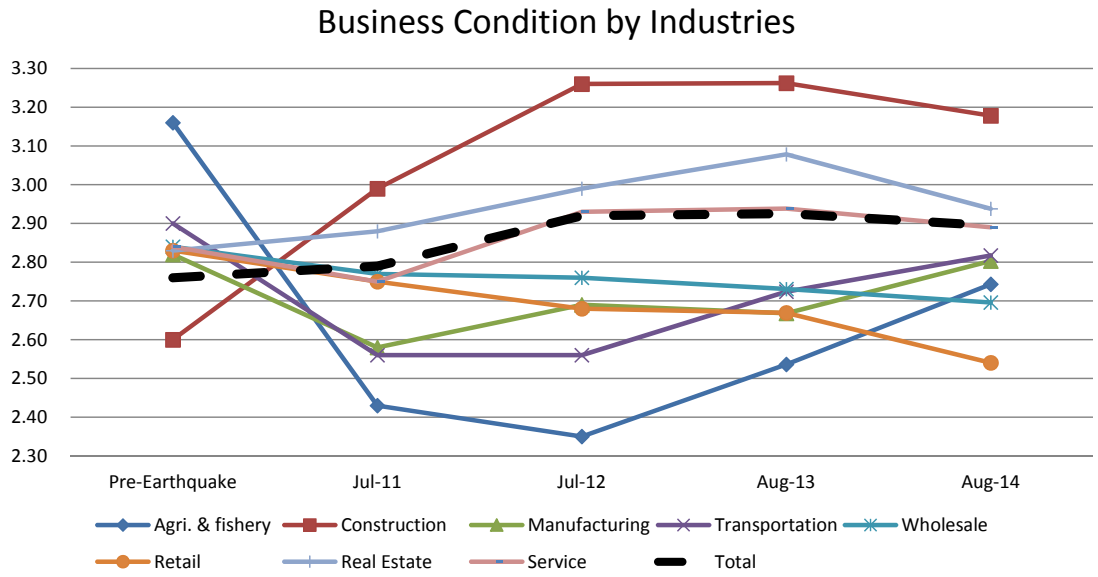


Firm Size	# of Employees
Small	1～20
Medium	21～100
Mid-Large	101～300
Large	over 301

Scale: Very Good=5pts, Good=4pts, Fair=3pts, Bad=2pts, Very Bad=1pt

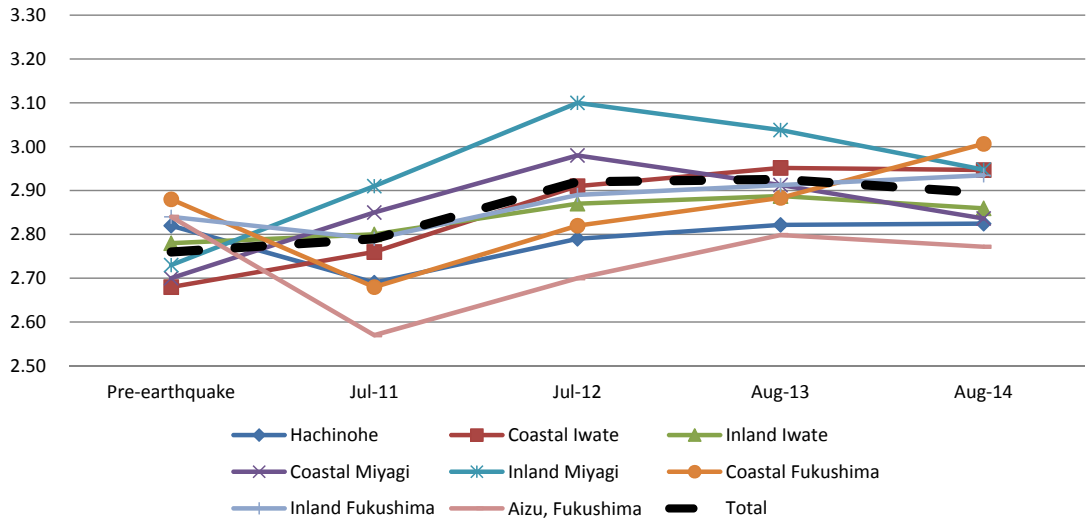
- Overall, business conditions of the firms are recovering after the earthquake, but slowed down slightly in 2014. Still better than pre-earthquake level.
- Recovered in Medium, Mid-Large and Large firms in 2014. Slowed down in Small firms.

Business Condition



- Construction and real estate industry recovered significantly after the earthquake, but slowed down slightly in 2014.
- Agricultural and fishery, manufacturing, transportation industry slowed down quite a bit after the earthquake, but steadily recovered thereafter.
- No sign of recovery in wholesale and retail sectors.

Business Condition



- Inland and coastal Miyagi were recovering steadily until 2012, but somehow slowed down thereafter.
- Coastal Fukushima and Aizu, Fukushima were affected significantly after the earthquake, but steadily recovering after the earthquake. Indeed, the business condition in coastal Fukushima is now the highest among the regions.
- The gap of business conditions widened until 2012, but shrinking thereafter.

Business Condition

Other Factors affecting the business conditions in 2014 (by firm size)

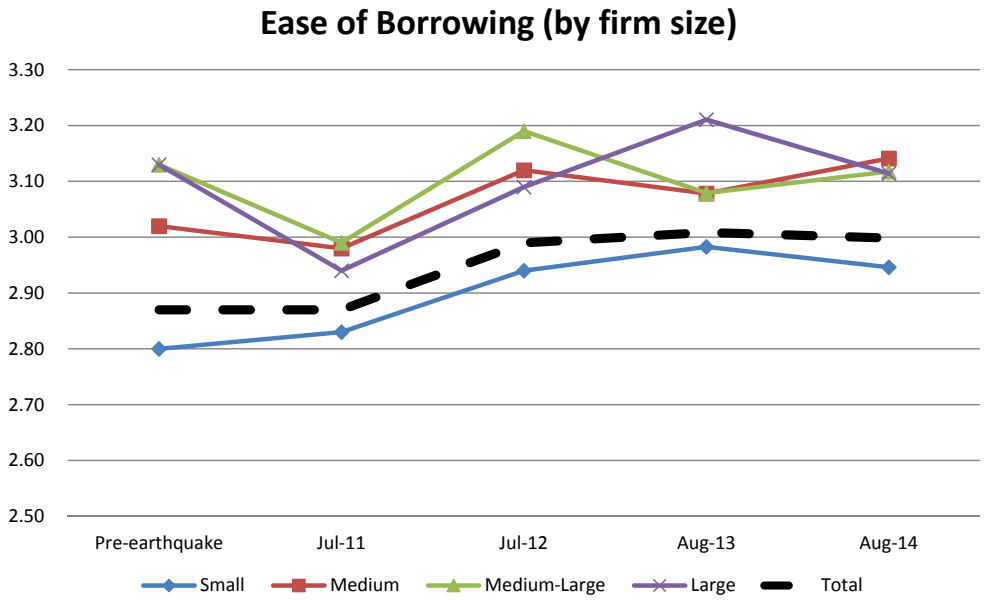
	Small	Medium	Mid-large	Large	Total
1. Appreciation of Yen	3.41%	3.15%	2.05%	0.00%	3.29%
2. Depreciation of Yen	10.93%	12.27%	12.33%	12.12%	11.30%
3. Economic Recovery due to Abenomics	7.18%	8.42%	7.53%	0.00%	7.44%
4. Oversee economic conditions	3.33%	3.07%	3.42%	3.03%	3.27%
5. Increase of electric costs	24.69%	24.47%	23.29%	18.18%	24.56%
6. Shortage of construction materials	35.44%	40.52%	36.99%	33.33%	36.69%
7. Shortage of labor force	43.27%	46.81%	45.21%	30.30%	44.10%
8. Shortage of real estate	3.70%	3.15%	4.11%	0.00%	3.55%
9. Increase in consumption tax	50.56%	48.31%	44.52%	42.42%	49.80%
10. Other natural disasters	9.47%	10.23%	9.59%	3.03%	9.62%
11. Not affected by above factors	20.17%	17.07%	23.29%	39.39%	19.63%

- Consumption tax, shortage of labor force, shortage of construction materials are three major factors affecting the business conditions in 2014.
- Increase in consumption tax is a one-time event, but shortage of labor force and construction materials are the factors persistently affecting the business condition.

Tohoku University DRR Actions
Contributing to Global Disaster Resilience

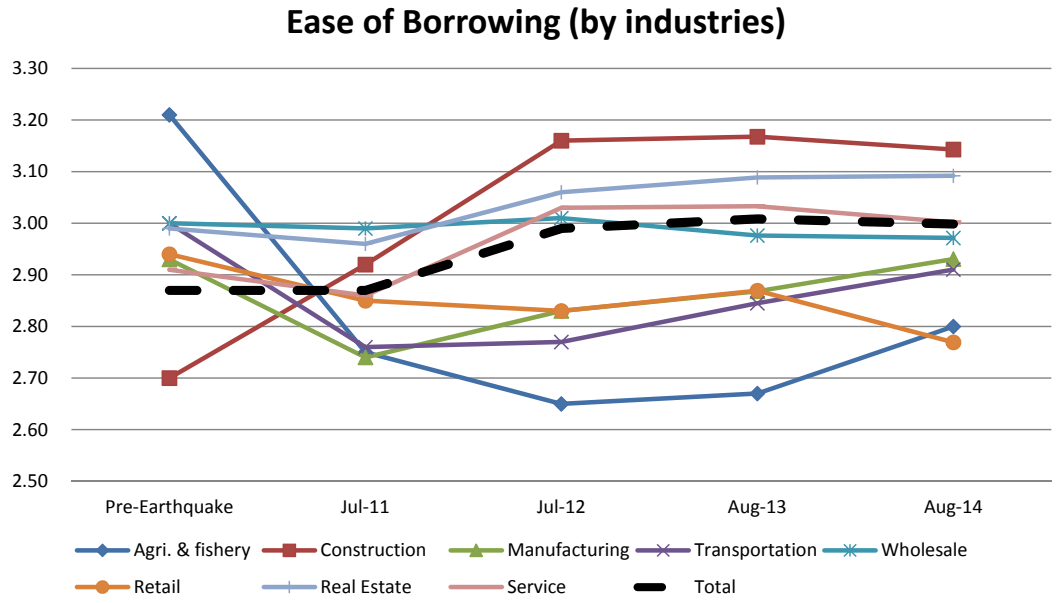
Financial Conditions

Financial Condition



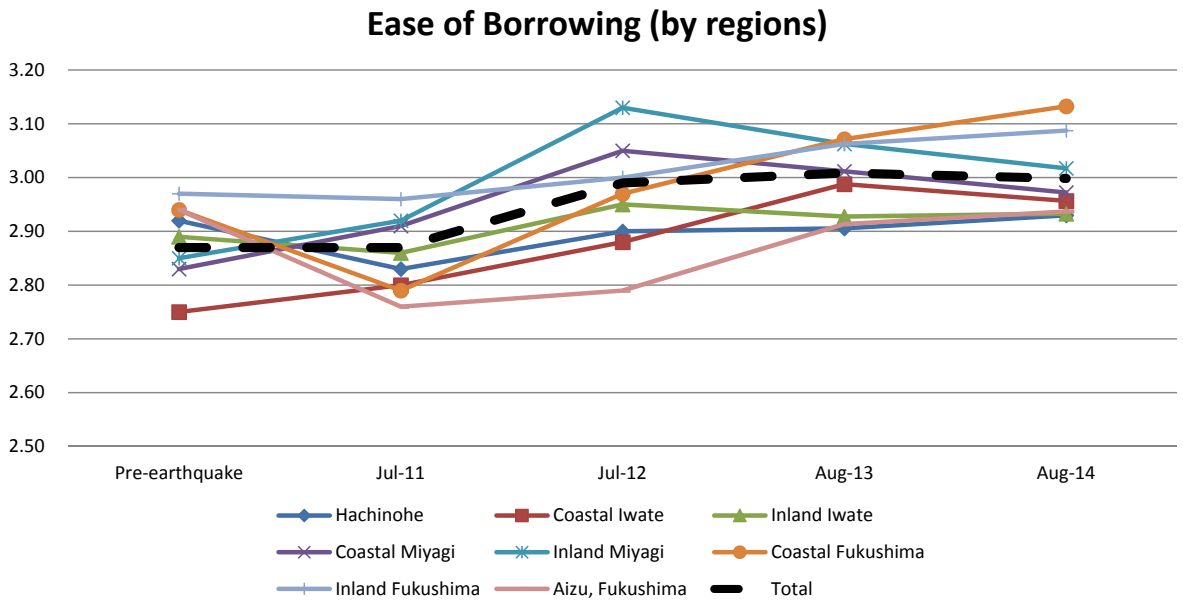
- Overall, relatively easier to borrow funds from financial institutions after the earthquake.
- Small firms relatively more difficult to borrow funds compared to other larger firms.

Financial Condition



- Construction and real estate industries are in good condition.
- Agricultural and fishery, manufacturing, transportation industries experienced some difficulties right after the earthquake, but now getting easier to borrow funds.
- Retail sector experienced some difficulties in 2014.

Financial Condition



- Inland and coastal Miyagi were at ease in borrowing funds after the earthquake, but slightly became difficult after 2012.
- Coastal Fukushima and Aizu experienced some difficulties after the earthquake, but became easier to borrow there after.

Financial Conditions in 2014

By Firm Size

	Small	Medium	Mid-large	Large	Total
Financed enough amount	42.13%	47.50%	52.31%	46.43%	43.75%
Financed necessary amount	53.58%	47.95%	43.85%	50.00%	51.91%
Not able to finance necessary amount	4.30%	4.55%	3.85%	3.57%	4.34%

By Regions

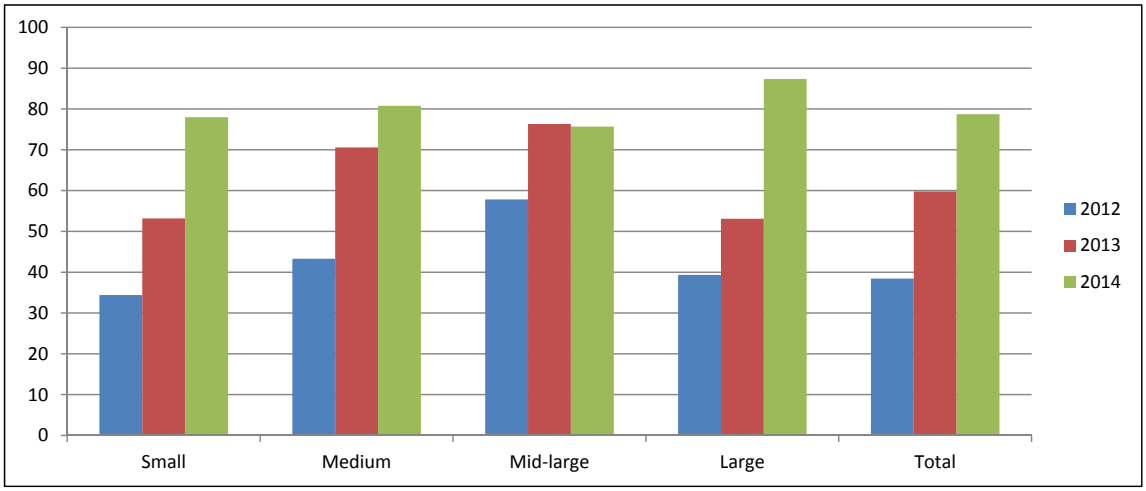
	Hachinohe	Coastal Iwate	Inland Iwate	Coastal Miyagi	Inland Miyagi	Coastal Fukushima	Inland Fukushima	Aizu Fukushima
Financed enough amount	38.75%	39.94%	43.91%	44.27%	44.11%	47.73%	42.80%	47.88%
Financed necessary amount	56.09%	55.19%	52.41%	51.53%	51.89%	47.73%	52.16%	47.27%
Not able to finance necessary amount	5.17%	4.87%	3.68%	4.20%	4.00%	4.53%	5.04%	4.85%

- More than 90% of the firms were able to finance the necessary amounts of money in 2014, regardless of firms size or region.
- Financial conditions of the firms seem to be OK. However, financial intermediaries might be too lax in lending the money to the firms.

Physical Investment and Supply Chains

Physical Investment

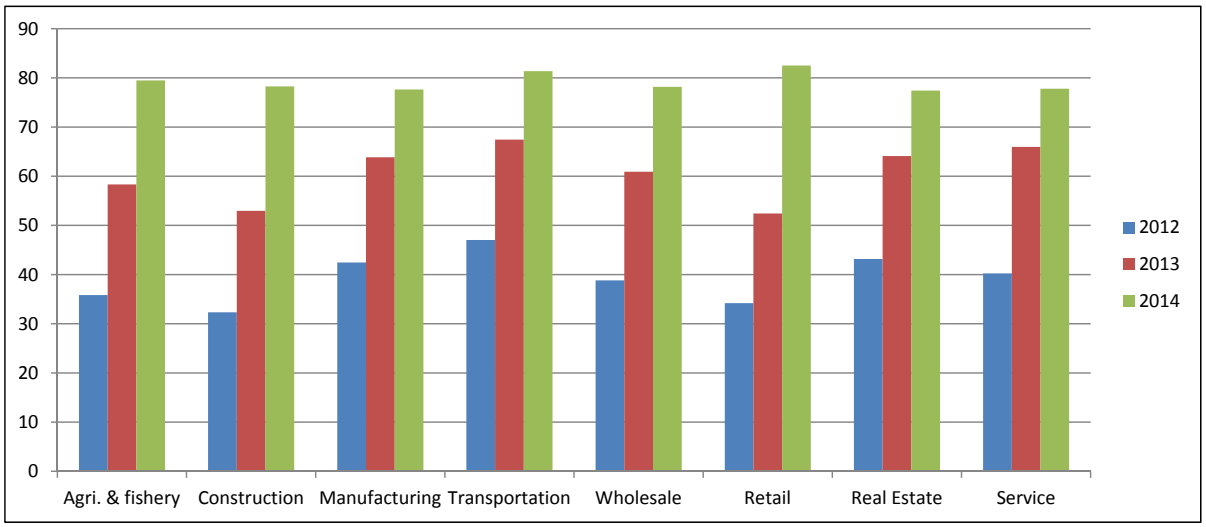
Physical Investment for Recovery (by firm size, average %)



- Overall, physical investment for recovery is proceeding steadily, reaching 79% achievement level at 2014.
- Small firms were lagging behind until 2013 only achieving 50% level, but have caught up with other larger firms at 2014. Regardless of the firm size, physical investment for recovery is proceeding well.

Physical Investment

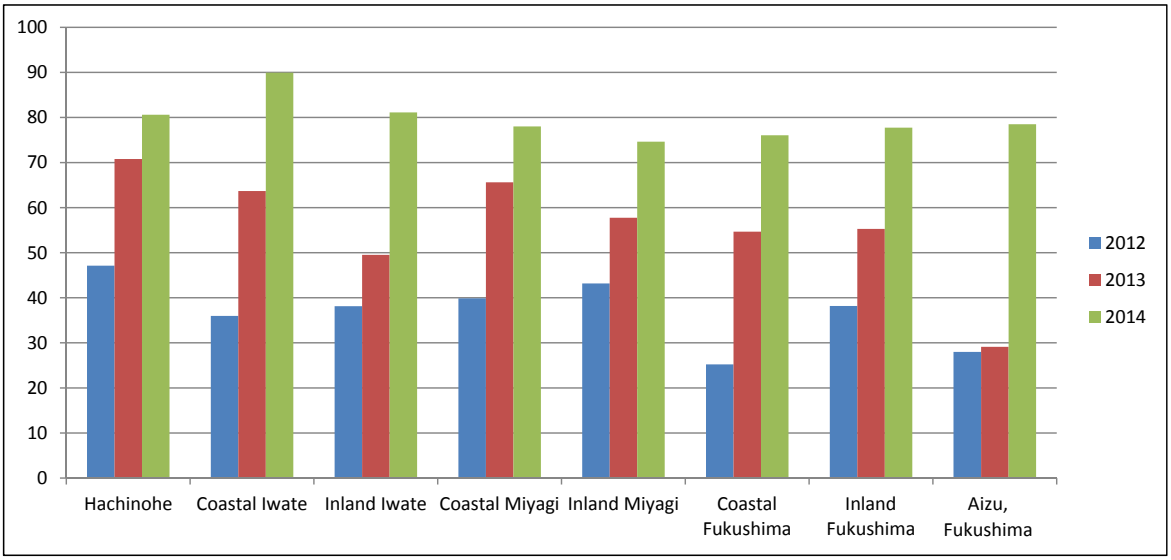
Physical Investment for Recovery (by industries)



- Physical investment for recovery is proceeding steadily for all the industries.
- Achievement level is more or less 80% for all the industries.

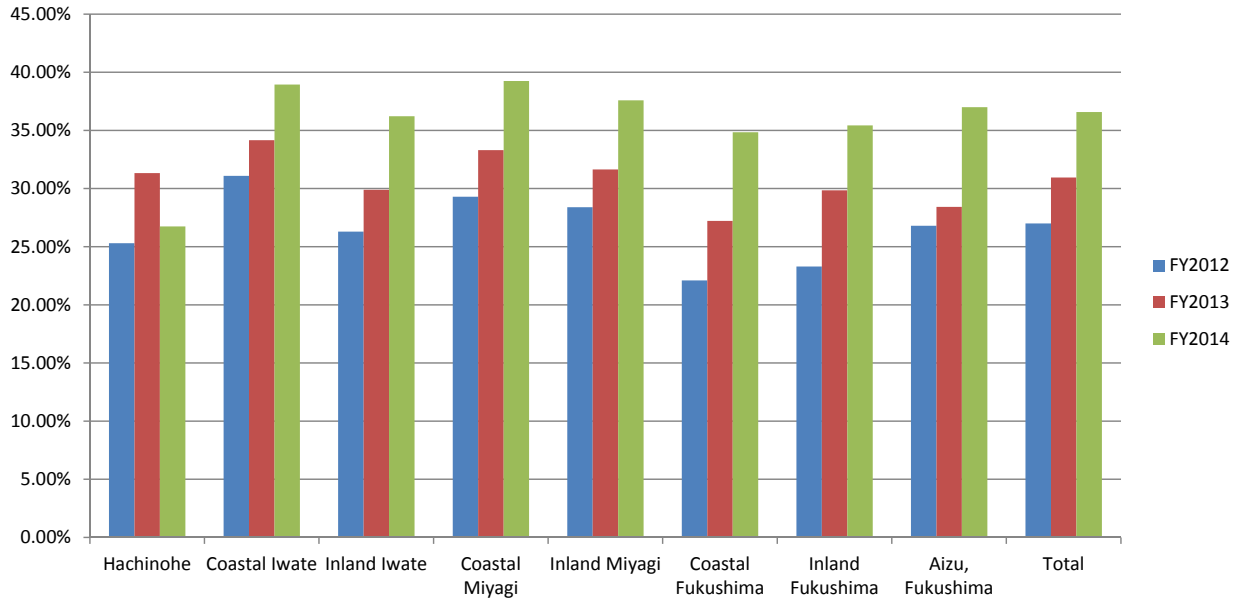
Physical Investment

Physical Investment for Recovery (by regions)



- Physical investment for recovery is proceeding steadily for all the regions.
- Hachinohe, coastal Iwate, inland Iwate relatively high in achievement level, but not too different from other regions.

Shortage of Construction Materials



- Overall, more than 35% of the firms say that their business are affected by the shortage of construction materials.
- Most of the regions are affected by the shortage of construction materials.

Sales Price and Purchase Price

Change of Sales Price in 2014 (by industries)

	Agri. & Fishery	Construction	Manufacturing	Transportation	Wholesale	Retail	Real Estate	Service	Total
Increased	6.06%	4.52%	4.49%	4.94%	6.22%	4.51%	3.82%	4.17%	4.67%
Slightly increased	25.76%	28.50%	28.22%	30.56%	28.74%	25.39%	30.92%	26.65%	27.97%
No change	50.00%	46.70%	47.76%	41.67%	46.22%	48.80%	42.75%	49.48%	47.10%
Slightly decreased	15.15%	16.45%	14.47%	18.83%	15.97%	17.77%	16.41%	15.53%	16.25%
Decreased	3.03%	3.83%	5.07%	4.01%	2.86%	3.53%	6.11%	4.17%	4.01%

Change of Purchase Price in 2014 (by industries)

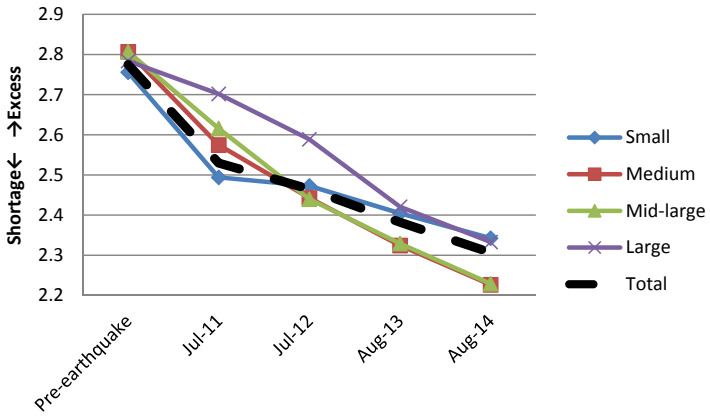
	Agri. & Fishery	Construction	Manufacturing	Transportation	Wholesale	Retail	Real Estate	Service	Total
Increased	16.92%	15.39%	14.49%	15.38%	15.82%	14.49%	14.50%	13.97%	14.92%
Slightly increased	40.00%	45.35%	45.77%	46.15%	44.05%	44.16%	41.98%	47.11%	45.24%
No change	33.85%	29.96%	31.56%	29.85%	30.78%	31.93%	32.44%	30.02%	30.75%
Slightly decreased	4.62%	7.47%	6.31%	7.08%	7.65%	9.00%	9.16%	6.58%	7.37%
Decreased	4.62%	1.82%	1.87%	1.54%	1.70%	0.42%	1.91%	2.31%	1.71%

- Sales price increased for 32% of the firms, whereas purchase price increased for 60% of the firms. Implies that profit margins are shrinking for many firms.
- This trend is common for all the industries.

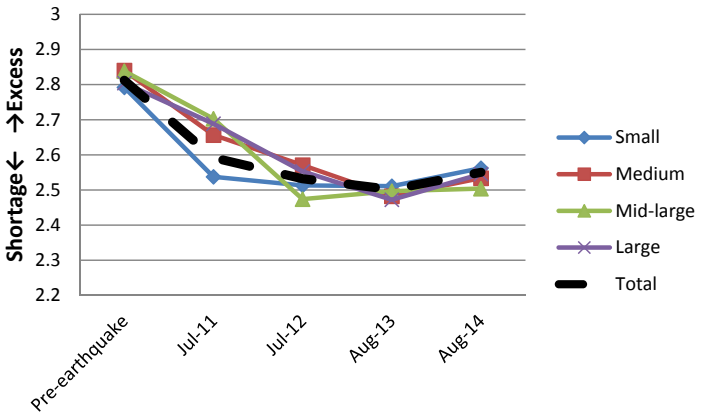
Employment Status of the Firms

Shortage of Employees

Amount of Regular Employees (by firm size)



Amount of Non-regular Employees (by firm size)

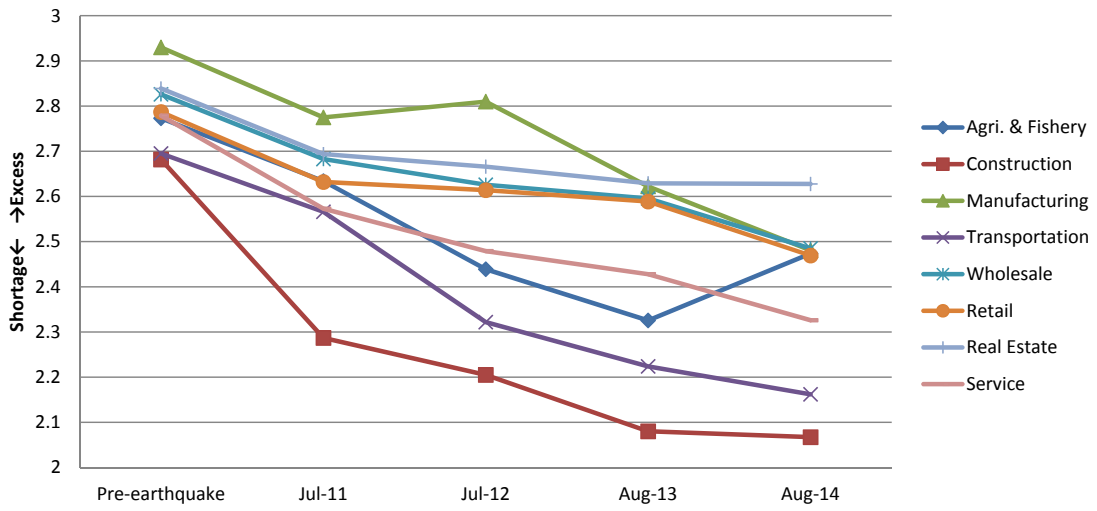


Scale: Excess=5pts, slightly excess=4pts, adequate=3pts, slightly shortage=2pts, Shortage=1pt

- Shortage of regular employees are getting severe after the earthquake.
- Non-regular employees also in shortage, but somewhat alleviated in 2014.
- Regardless of firm size, employees are in shortage.

Shortage of Employees

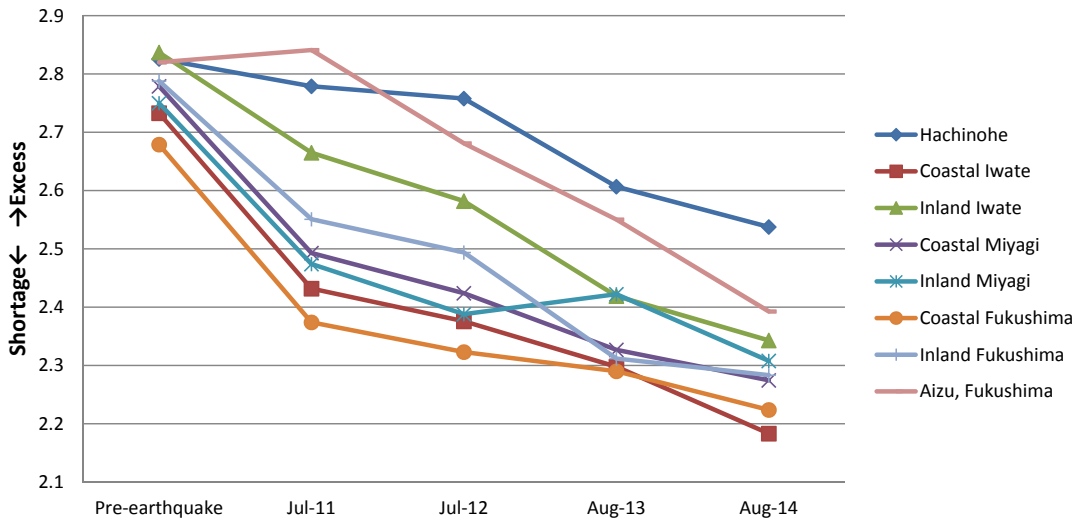
Amount of Regular Employees (by industries)



- Shortage of employees especially strong in construction and transportation industries.
- Shortage are getting severe after the earthquake in most of the industries.

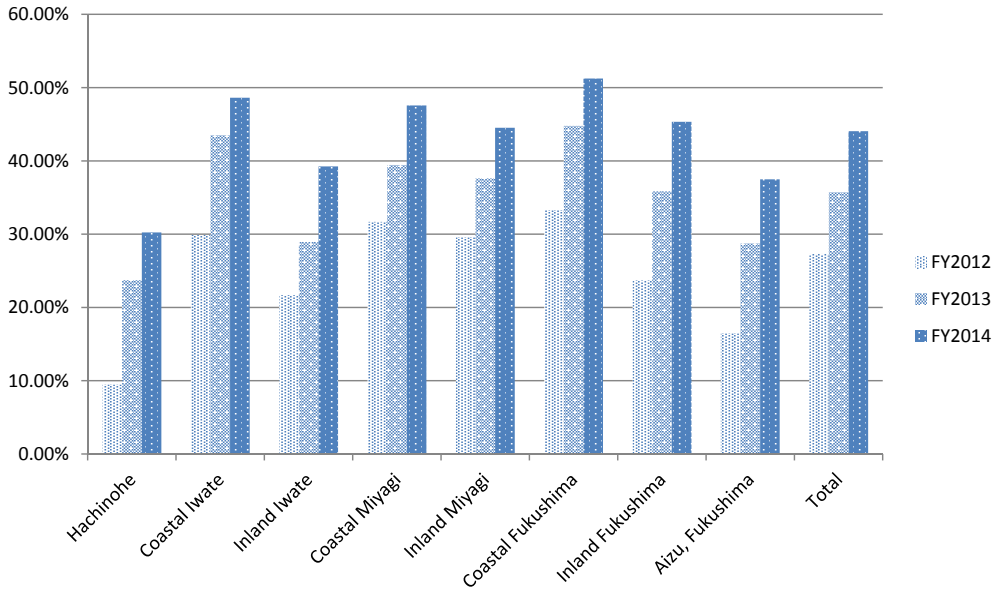
Shortage of Employees

Amount of Regular Employees (by regions)



- Shortage are severe in coastal areas.
- Shortage are getting severe in all the regions after the earthquake.

Labor Shortage affecting Business



- Overall, more than 40% of the firms say that their business were affected by labor force shortage.
- The number is steadily increasing from 27% (2012) to 44% (2014).
- This trend is common for all the regions, especially stronger in coastal areas.

Labor Costs

Change in labor costs in 2014 (by industries)

	Agri. & Fishery	Construction	Manufacturing	Transportation	Wholesale	Retail	Real Estate	Service	Total
Increased	7.46%	7.92%	8.74%	8.00%	9.02%	8.04%	8.27%	8.32%	8.28%
Slightly increased	58.21%	40.59%	43.27%	42.46%	41.90%	40.92%	38.35%	41.50%	41.52%
No change	32.84%	44.58%	40.69%	41.85%	43.74%	43.27%	44.74%	44.05%	43.39%
Slightly decreased	1.49%	6.05%	6.02%	6.15%	5.01%	6.93%	6.02%	4.97%	5.79%
Decreased	0.00%	0.87%	1.29%	1.54%	0.33%	0.83%	2.63%	1.16%	1.02%

Change in labor costs in 2014 (by regions)

	Hachinohe	Coastal Iwate	Inland Iwate	Coastal Miyagi	Inland Miyagi	Coastal Fukushima	Inland Fukushima	Aizu Fukushima	Total
Increased	8.79%	7.63%	9.95%	8.45%	7.44%	6.53%	8.02%	8.33%	8.28%
Slightly increased	40.07%	43.79%	40.62%	43.07%	41.82%	42.19%	40.59%	35.42%	41.52%
No change	44.95%	39.83%	42.87%	42.48%	43.71%	43.59%	44.66%	48.44%	43.39%
Slightly decreased	4.56%	7.63%	5.54%	4.90%	6.08%	6.53%	6.23%	6.25%	5.79%
Decreased	1.63%	1.13%	1.03%	1.10%	0.94%	1.17%	0.51%	1.56%	1.02%

- Overall, nearly 50% of firms experienced an increase in labor costs in 2014.
- This trend is common for all the industries and regions.

Summary

1. Business conditions of the firms at the disaster-affected regions are recovering steadily after the earthquake, especially for construction and real estate industries. However, wholesale and retail industries' recovery seem to be slow.
2. Financial conditions are quite good for all the industries and regions.
3. Physical investment for reconstruction is proceeding steadily, but the rise of the costs of construction materials is impeding the recovery.
4. Labor force shortage and a rise of labor costs are the major factors impeding the recovery. Labor shortage is getting more and more severe, showing no sign of slowing down.

Tohoku University DRR Actions
Contributing to Global Disaster Resilience

3. 地域産業復興調査研究プロジェクト　調査研究報告②
（観光産業調査チーム）

宮城大学事業構想学部
教授　宮原　育子

2015.03.16

東北大学大学院経済学研究科地域イノベーション研究センターは第3回国連防災世界会議を支援しています。

Tohoku University DRR Actions
Contributing to Global Disaster Resilience

Report by Tourism Industry Research Team

Miyagi University, Dept. of Business & Project Planning
Ikuko MIYAHARA

2015.03.16

Regional Innovation Research Center supports the Third UN World Conference on Disaster Risk Reduction.

Introduction

Tourism is the one of the most promising businesses for Tohoku where the acceleration of an aging society with a falling birth rate have occurred even before the Great East Japan Earthquake in 2011.

Tourism is an important activity for a depopulated area to invite visitors from the outer area and to promote economical effects.

Tourism expenditure and economical effects

・Foreign tourists	1.4 trillion yen	137,000/person ・travel
・Domestic tourists	15.4 trillion yen	48,000/person with accommodation
	4.8 trillion yen	18,000/person by daytrip

・1 inhabitant = 10 foreign tourists or 26 domestic tourists with accom. ,
(1.24million yen/year) 83 domestic tourists by daytrip

Estimated by Japan Tourism Agency (2013)

Outline of research

Tourism Industry Research Team

3 research members

- **Ikuko MIYAHARA, Miyagi Uniersity**
- **Maki SHOJI, Ishinomaki Senshu University**
- **Kiyoshi UCHIYAMA, Aomori Chuo Gakuin University**

4 years research

- **2011 Assess the state of tourism damage from the quake**
- **2012 Survey the recovery from the damage**
- **2013 Study the recovery status by region**
- **2014 Analyze the firm survey on lodging industry**

by data and information from Japan Tourism Agency, MLIT, local governments, tourist offices and business people

Overview of damages by The GEJE, 2011

All Tohoku

Loss of tourists from outside of Tohoku and overseas

Aomori＊

Tsunami

Akita

Unfavorable rumors about tsunami and nuclear accident

Iwate

Serious damage by Tsunami
Loss of tourism facilities

Yamagata

Sendai

Miyagi

Matsushima

Minor damage

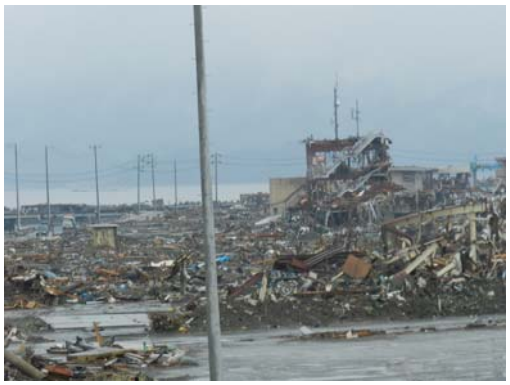
Affected

Unaffected

Fukushima

Tsunami and Nuclear accident
Off limit area

Damages of Minami Sanriku-cho, Miyagi



Photos taken on October, 2002 and April 9., 2011

Damages of Higashimatsushima cirty, Miyagi

Miyatojima Island :
The resort area near Matsushima with beautiful sand beach and pine forest changed into lifeless place by tsunami.
86% of accommodation such as fisherman's lodge also destroyed.

Photos taken on May 24., 2011

Decline of Population and tourists after the GEJE

2010	2011
Population (Million)	
Number of tourists (Million)	

2010	2011
1.10	1.09
43.89	29.45

2010	2011
1.17	1.16
40.40	35.20

2010	2011
1.40	1.38
34.21	31.53

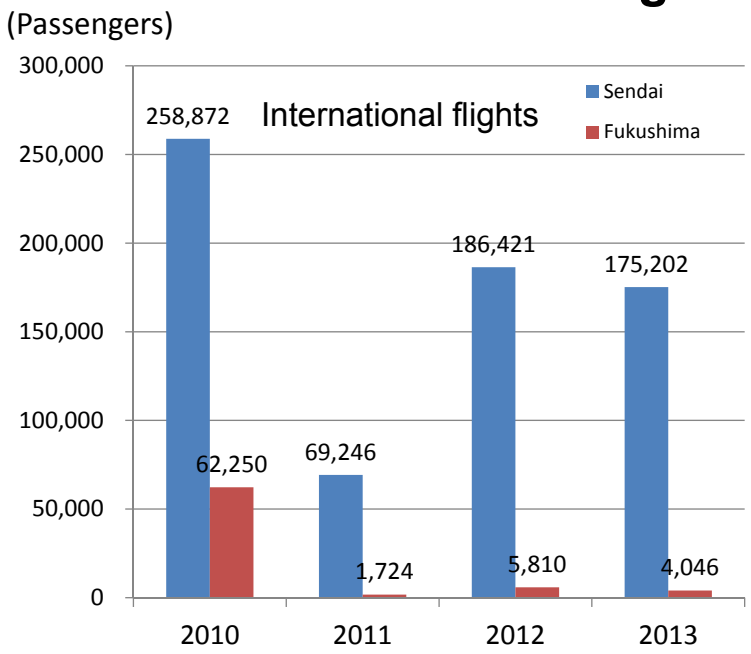
2010	2011
1.32	1.32
27.87	22.71

2010	2011
2.32	2.30
61.29	43.16

2010	2011
2.01	1.99
57.18	35.21

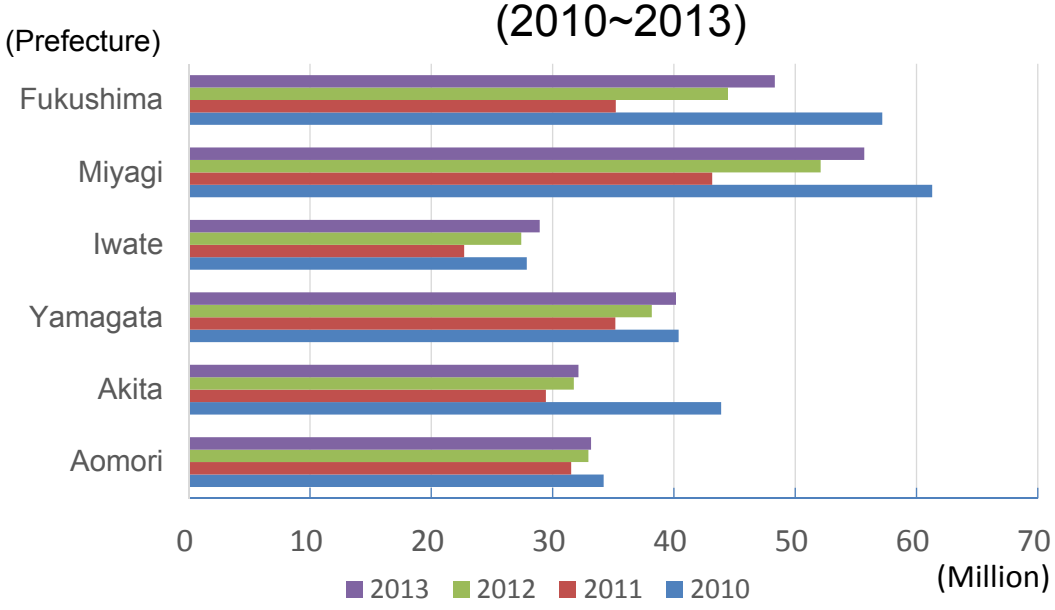
Restoration and recovery from the damage

Transportation
・Shinkansen



Data from Tohoku District Transport Bureau, MLIT

Trend of tourists in Tohoku (2010~2013)



Data from Tohoku District Transport Bureau, MLIT

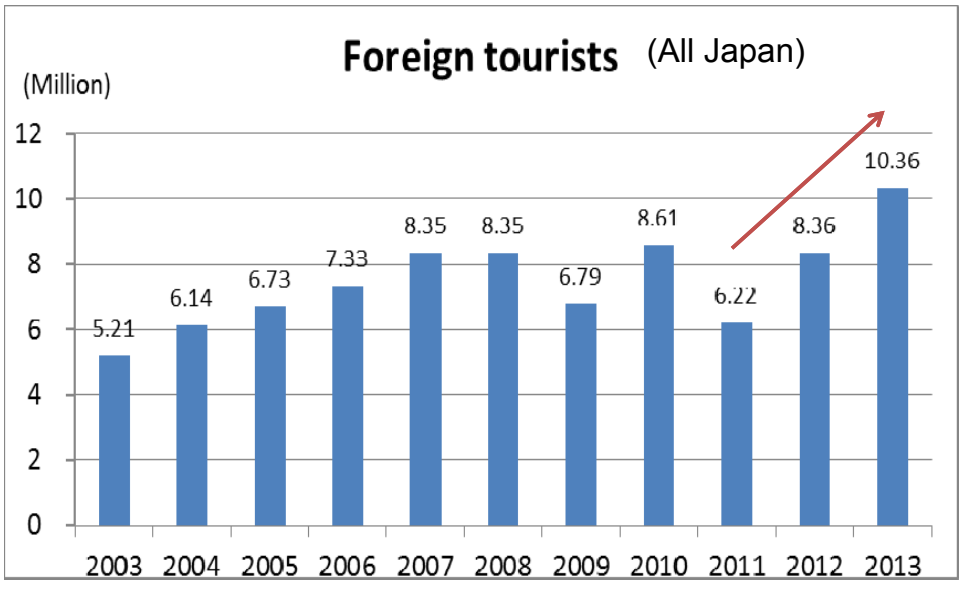
Trend of tourists accommodation in Tohoku (2011~2013) compare to the previous year of the GEJE

Tohoku	2011 Jul-Sep.	2012 Jul.-Sep.	2013 Jul.-Sep
*Accommodation for tourists	−11.4%	−17.2%	−17.9
**Accommodation	5.7%	−2.4%	1.7%

*50% of the guests are tourists
**Including business use

Data from Tohoku District Transport Bureau, MLIT

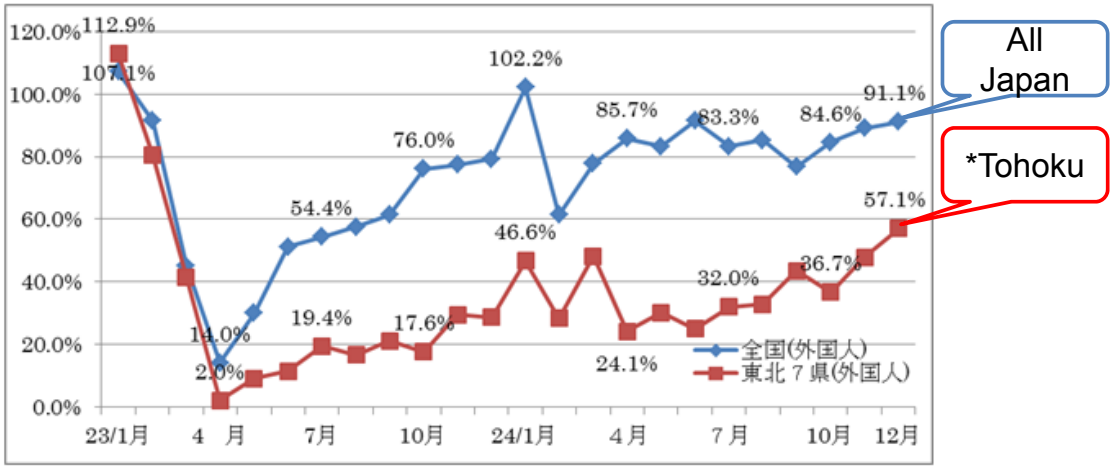
More foreign tourists to Japan



Visit Japan Campaign

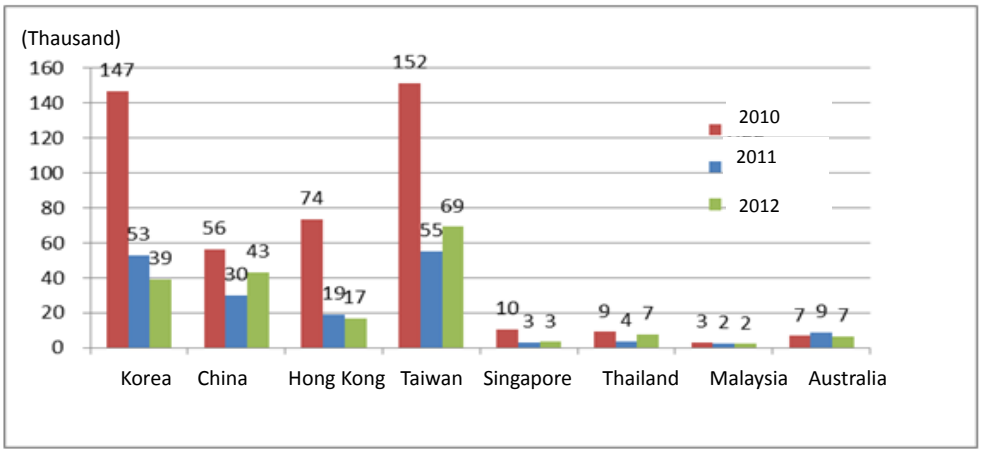
Data by Japan Tourism Agency, MLIT

Trend of foreign tourists accommodation (2011&2012) compare to the previous year of the GEJE



*Tohoku including Niigata Prefecture
Data by Japan Tourism Agency

Foreign accommodation in Tohoku by country



Including Niigata Prefecture
Data by Japan Tourism Agency

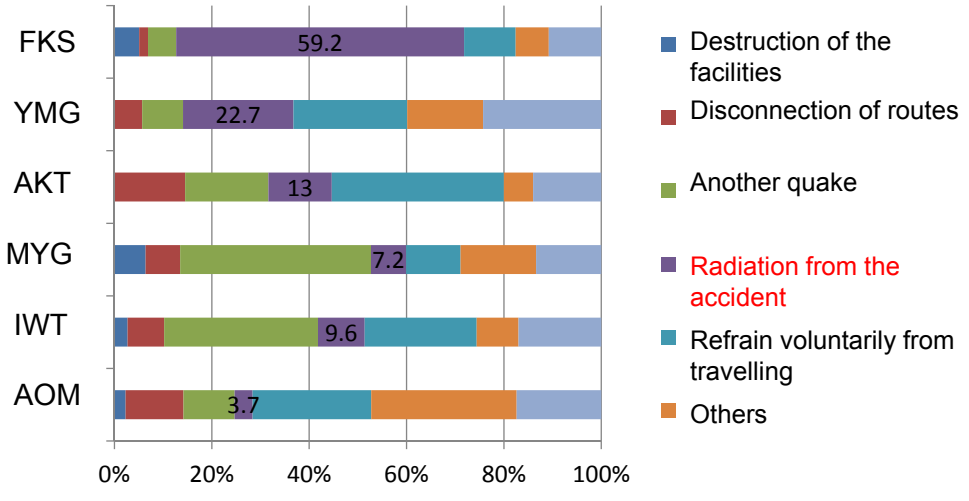
Case of Fukushima

Ratio of accommodation based on the data of 2010

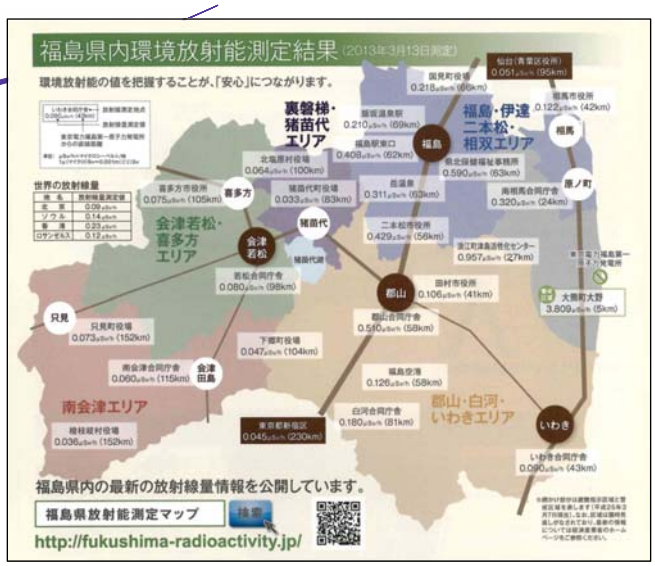
	2011				2012			
	All	Tourism	Business	Foreigners	All	Tourism	Business	Foreigners
Aomori	1.01	1.04	0.99	0.47	1.00	0.99	1.01	0.67
Iwate	1.15	0.94	1.46	0.39	1.13	1.00	1.41	0.51
Miyagi	1.13	0.83	1.50	0.30	1.17	0.89	1.47	0.47
Akita	0.87	0.75	1.01	0.35	0.90	0.73	1.10	0.38
Yamagata	1.00	0.93	1.10	0.57	1.01	0.89	1.11	0.44
Fukushima	1.02	0.82	1.42	0.28	0.98	0.73	1.39	0.33
All JP.	0.97	0.93	1.02	0.65	1.03	0.98	1.09	0.92

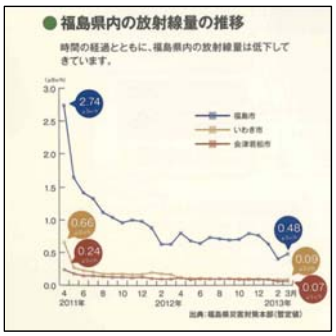
Data by Japan Tourism Agency

Reasons for the cancellation of accommodation in Sep. 2011



Data by Japan Tourism Agency





Fukushima

The goal of tourism in the recovery plan of Fukushima Prefecture

Goal :
Welcome the tourists from all over the world by brushing up the tourism resources in Fukushima and by promoting cultural and arts events.

Projects:
Tourism recovery campaign with local tourism industries and media.
Promotion of convention, cultural and arts events and educational trips utilizing Fukushima Airport.

Methods:
Clear the unfavorable rumors by providing the scientifically correct information about radiation from the nuclear accident.
Establish friendly ties with people from all over the world.

The Challenge

for further tourism recovery from the earthquake

Promote to tourists from all over the world

1. Build the accommodations and restaurants.
   (Stay longer and consume more)
2. Develop the new and attractive tourism programs to encourage the tourists to discover the new aspects of the area.
   (Attractive programs)
3. Create the scientific and disaster-prevention programs
   (Geoparks, utilize the remains for education)
4. Promote the tours to both affected and unaffected area
   (All Tohoku)
5. Recreate tourism related business to encourage local people to take over (New jobs)
6. Establish friendly ties with tourists to make them repeaters.

New possibilities of local tourism:

Visit the affected areas to learn from the nature, landscape and people

Temporary Markets

New products for tourists

Storytellers

Architectural remain of Tsunami

Closing comment

The recovery from the GEJE will take a long time.
Tourism has the strong energy to connect people and create the new activities.

We, Tohoku people would like to invite people from all over the world to show people how we survived from the many difficulties.
The event of the earthquake and tsunami made us hopeless.
However, that incident made us strong and creative instead.

We would like to introduce you to the beauty and the strength of nature in Tohoku and our new life in the post-quake through local tourism.

So please visit us many times. Thank you.