

NOWCASTING OF GROSS REGIONAL PRODUCT OF JAPAN [ID 269]

Nariyasu Yamasawa ,Atomi University

June 30th 2014

Contents

1 Nowcasting of Japan's 47 Prefectures Monthly GRP

1 Application to Great East Japan Earthquake

Introduction

- Japanese Government release Gross Regional Product(Here after GRP) of 47 prefectures yearly, but timing is very late.
- So I tried to make monthly GRP to capture the current economic status as fast as possible
- It can be released at the same timing of National GDP, and moreover it is monthly
- It can apply various analysis. In this presentation I introduce an application to the Great East Japan Earthquake

Introduction

- Japanese Government release Gross Regional Product(Here after GRP) of 47 prefectures yearly, but timing is very late.
- So I tried to make monthly GRP to capture the current economic status as fast as possible
- It can be released at the same timing of National GDP, and moreover it is monthly
- It can apply various analysis. In this presentation I introduce an application to the Great East Japan Earthquake

Introduction

- Japanese Government release Gross Regional Product(Here after GRP) of 47 prefectures yearly, but timing is very late.
- So I tried to make monthly GRP to capture the current economic status as fast as possible
- It can be released at the same timing of National GDP, and moreover it is monthly
- It can apply various analysis. In this presentation I introduce an application to the Great East Japan Earthquake

Introduction

- Japanese Government release Gross Regional Product(Here after GRP) of 47 prefectures yearly, but timing is very late.
- So I tried to make monthly GRP to capture the current economic status as fast as possible
- It can be released at the same timing of National GDP, and moreover it is monthly
- It can apply various analysis. In this presentation I introduce an application to the Great East Japan Earthquake

Map of Japan and 47 prefectures



About Release Timing

- In Japan National GDP is released quarterly about 45 days after the period end.
- Each 47 local government makes each annual GRP. but it takes 2years and 3 months to make it public .
- Mainly because it takes time to compile the detail company production data.

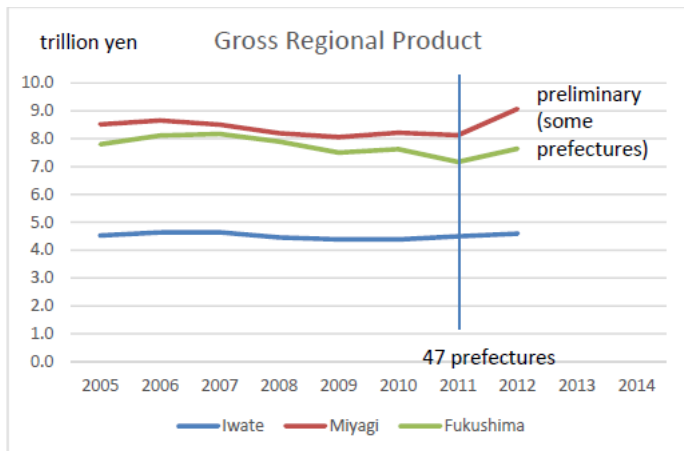
About Release Timing

- In Japan National GDP is released quarterly about 45 days after the period end.
- Each 47 local government makes each annual GRP. but it takes 2years and 3 months to make it public .
- Mainly because it takes time to compile the detail company production data.

About Release Timing

- In Japan National GDP is released quarterly about 45 days after the period end.
- Each 47 local government makes each annual GRP. but it takes 2years and 3 months to make it public .
- Mainly because it takes time to compile the detail company production data.

Release Timing of Gross Regional Product



Japan's 47 Prefectures Monthly GRP

47 Prefectures monthly GDP

- I tried to estimate monthly GRP from expenditure side
- $GRP = \text{Private Consumption} + \text{Private Residential Investment} + \text{Private Equipment Investment} + \text{Public Investment} + \text{Government Consumption} + \text{Net Export}$
- The cabinet office developed 47 prefectures monthly expenditure index.
- But there are no **Government Consumption and Net Export**
- I made the 2 components

47 Prefectures monthly GDP

- I tried to estimate monthly GRP from expenditure side
- $\text{GRP} = \text{Private Consumption} + \text{Private Residential Investment} + \text{Private Equipment Investment} + \text{Public Investment} + \text{Government Consumption} + \text{Net Export}$
- The cabinet office developed 47 prefectures monthly expenditure index.
- But there are no **Government Consumption and Net Export**
- I made the 2 components

47 Prefectures monthly GDP

- I tried to estimate monthly GRP from expenditure side
- $\text{GRP} = \text{Private Consumption} + \text{Private Residential Investment} + \text{Private Equipment Investment} + \text{Public Investment} + \text{Government Consumption} + \text{Net Export}$
- The cabinet office developed 47 prefectures monthly expenditure index.
- But there are no **Government Consumption and Net Export**
- I made the 2 components

47 Prefectures monthly GDP

- I tried to estimate monthly GRP from expenditure side
- $GRP = \text{Private Consumption} + \text{Private Residential Investment} + \text{Private Equipment Investment} + \text{Public Investment} + \text{Government Consumption} + \text{Net Export}$
- The cabinet office developed 47 prefectures monthly expenditure index.
- But there are no **Government Consumption and Net Export**
- I made the 2 components

47 Prefectures monthly GDP

- I tried to estimate monthly GRP from expenditure side
- $GRP = \text{Private Consumption} + \text{Private Residential Investment} + \text{Private Equipment Investment} + \text{Public Investment} + \text{Government Consumption} + \text{Net Export}$
- The cabinet office developed 47 prefectures monthly expenditure index.
- But there are no **Government Consumption and Net Export**
- I made the 2 components

Regional Domestic Expenditure Index

- Japanese Cabinet Office release "Regional Domestic Expenditure Index(RDEI)"
 - Released from May 2012
 - monthly, 47 prefectures
 - No Government Final Consumption , Export and Import

Regional Domestic Expenditure Index

- Japanese Cabinet Office release "Regional Domestic Expenditure Index(RDEI)"
- Released from May 2012
- monthly, 47 prefectures
- No Government Final Consumption , Export and Import

Regional Domestic Expenditure Index

- Japanese Cabinet Office release "Regional Domestic Expenditure Index(RDEI)"
- Released from May 2012
- monthly, 47 prefectures
- No Government Final Consumption , Export and Import

Regional Domestic Expenditure Index

- Japanese Cabinet Office release "Regional Domestic Expenditure Index(RDEI)"
- Released from May 2012
- monthly, 47 prefectures
- No Government Final Consumption , Export and Import

RDEI

- Tanabe et.al (2012) "Estimation of RDEI"

RDEI Estimation method1

Private Consumption

divided by 44 sorts of consumption, calculating by multiplying percent change by the reference point (2009 year average)

Private Residential Investment

Ministry of Land, Infrastructure, Transport and Tourism” statistics of construction starts”

Private Fixed Investment

Estimated by Building, Construction, Machinery, Aircraft, Motor Vehicle, other transportation machinery

RDEI Estimation method2

Public Investment

Ministry of Land, Infrastructure, Transport and Tourism” statistics of construction order by 47 prefectures”

Real data

make real data by deflater

change to amount base data

R D E I is index(2005=100). We need to change amount base.

Government Final Consumption

- Government Final Consumption consist of "originally " Government Final Consumption and actual final consumption of households (transfer from Government to Household)
- Originally Final Consumption is Expenditure of Government such as labor cost , goods cost and maintenance cost
- Actual final consumption of household is mainly medical expenditure and care for aged people expenditure

Government Final Consumption

- Government Final Consumption consist of "originally " Government Final Consumption and actual final consumption of households (transfer from Government to Household)
- Originally Final Consumption is Expenditure of Government such as labor cost , goods cost and maintenance cost
- Actual final consumption of household is mainly medical expenditure and care for aged people expenditure

Government Final Consumption

- Government Final Consumption consist of "originally " Government Final Consumption and actual final consumption of households (transfer from Government to Household)
- Originally Final Consumption is Expenditure of Government such as labor cost , goods cost and maintenance cost
- Actual final consumption of household is mainly medical expenditure and care for aged people expenditure

Estimation Result of Government Final Consumption

$$\text{governmentconsumption} = \alpha + \beta_1 \text{governmentexpenditure} + \beta_2 \text{medical1} + \beta_3 \text{medical2} + \beta_4 \text{careexpenditure}$$

- "medical1" is transfer from government to house hold of medical insurance for employees
- "medical2" is transfer from government to house hold of medical insurance for general people
- "medical" = "medical1+medical2"

Estimation Result of Government Final Consumption

$$\text{governmentconsumption} = \alpha + \beta_1 \text{governmentexpenditure} + \beta_2 \text{medical1} + \beta_3 \text{medical2} + \beta_4 \text{careexpenditure}$$

- "medical1" is transfer from government to house hold of medical insurance for employees
- "medical2" is transfer from government to house hold of medical insurance for general people
- "medical" = "medical1+medical2"

Estimation Result of Government Final Consumption

$$\text{governmentconsumption} = \alpha + \beta_1 \text{governmentexpenditure} + \beta_2 \text{medical1} + \beta_3 \text{medical2} + \beta_4 \text{careexpenditure}$$

- "medical1" is transfer from government to house hold of medical insurance for employees
- "medical2" is transfer from government to house hold of medical insurance for general people
- "medical" = "medical1+medical2"

Estimation Result of Government Final Consumption

variables	(1)	(2)	(3)	(4)
constant	1.361 *** (0.085)	6.156 *** (0.273)	1.133 *** (0.088)	4.875 *** (0.295)
government labor cost etc.	0.791 *** (0.022)	0.238 *** (0.029)	0.763 *** (0.040)	0.200 *** (0.029)
medical1			0.030 (0.034)	0.125 *** (0.013)
medical2			0.093 ** (0.043)	0.180 *** (0.018)
medical	0.155 *** (0.035)	0.050 *** (0.010)		
care	0.138 *** (0.041)	0.178 *** (0.013)	0.206 *** (0.043)	0.111 *** (0.014)
fixed effect	no	yes	no	yes
R ²	0.983261	0.999565	0.982696	0.999650
number of observations	423	423	423	423

note:*** is significant at 1% level,**is significant at 5% level.

Net Export

- Many prefecture release only net export
- We don't have export and import data
- In this estimation, Dependent variable is net export
- explanation variables are regional demand(private consumption+private residence investment etc.) , IIP(national industrial index of production) as a proxy of external demand and foreign exchange rate

Net Export

- Many prefecture release only net export
- We don't have export and import data
- In this estimation, Dependent variable is net export
- explanation variables are regional demand(private consumption+private residence investment etc.) , IIP(national industrial index of production) as a proxy of external demand and foreign exchange rate

Net Export

- Many prefecture release only net export
- We don't have export and import data
- In this estimation, Dependent variable is net export
- explanation variables are regional demand(private consumption+private residence investment etc.) , IIP(national industrial index of production) as a proxy of external demand and foreign exchange rate

Net Export

- Many prefecture release only net export
- We don't have export and import data
- In this estimation, Dependent variable is net export
- explanation variables are regional demand(private consumption+private residence investment etc.) , IIP(national industrial index of production) as a proxy of external demand and foreign exchange rate

Net Export Estimation Result

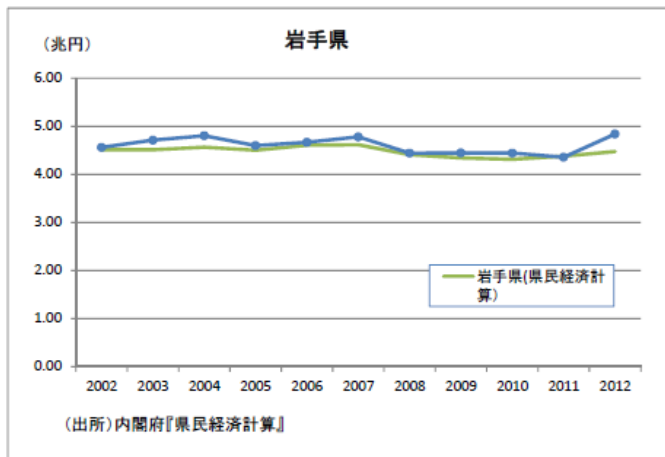
$NetExport =$

$$\alpha + \beta_1 RegionalExpenditure + \beta_2 IIP + \beta_3 ForeignExchangeRate$$

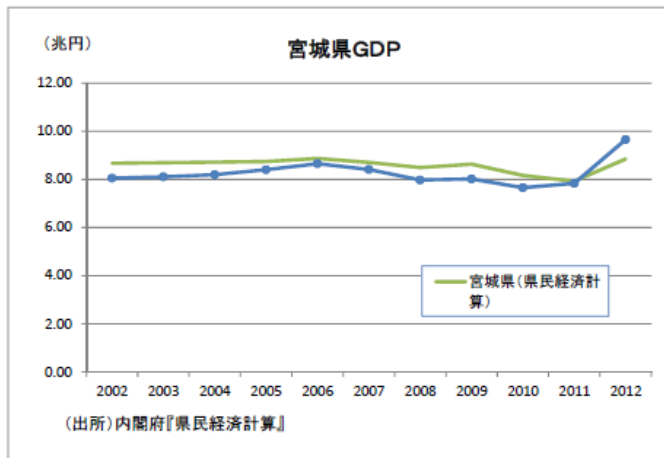
variables	(1)	(2)	(3)
C	-8814005 (15953921)	-7201767 *** (1198025)	-7660745 *** (1202202)
LOG(CP?+IOP?+IHP?+IPUB?)	2889269 (285406)	-1731358 ** (685674)	-2378045 *** (660222)
LOG(IIP)	1820599 (3673954)	2873846 *** (312229)	2705335 *** (310891)
LOG(FREXDA)	-852069 (2143021)	-510817 *** (165612)	
fixed effect	no	yes	yes
R ²	0.1915	0.9956	0.9955
number of observations	423	423	423

note:*** is significant at 1% level,**is significant at 5% level.

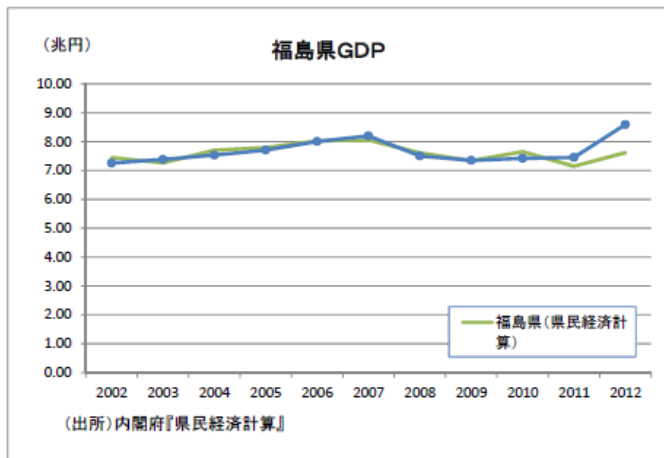
Iwate Prefecture GRP



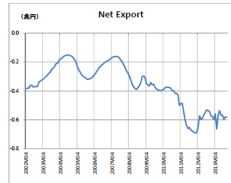
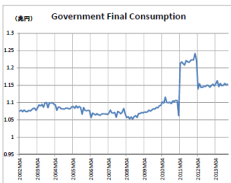
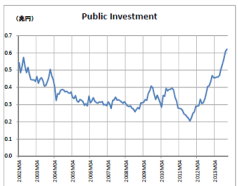
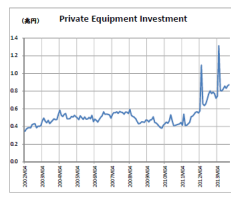
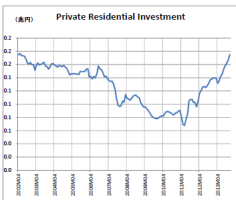
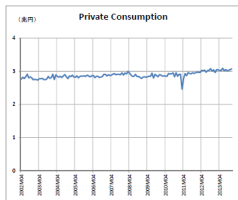
Miyagi Prefecture GRP



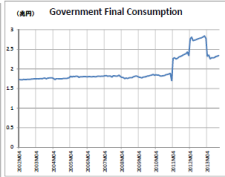
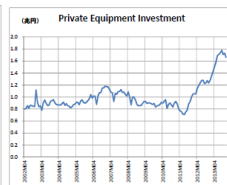
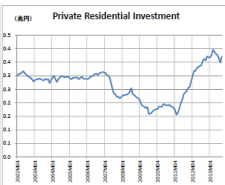
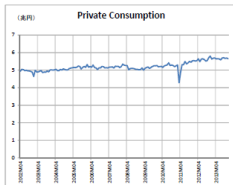
Fukushima Prefecture GRP



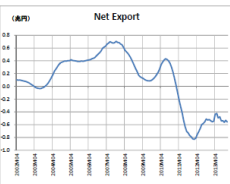
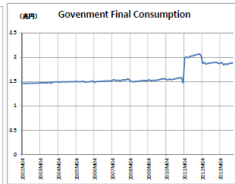
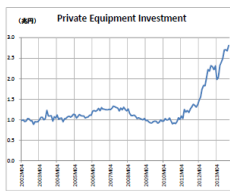
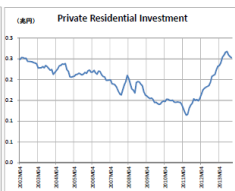
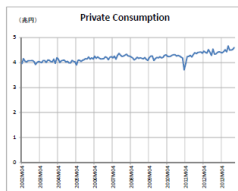
Component of Iwate GRP



Component of Miyagi GRP



Component of Fukushima GRP



Application to Great East Japan Earthquake

- I measured indirect loss and reconstruction demand.
- Using 47 prefectures monthly GRP especially 3 earthquake stricken prefectures

About Great East Japan Earthquake

- Great East Japan Earthquake on March 11,2011,
Magnitude 9.0 and an Intensity of 7 in Miyagi
- The dead:16 thousands people, The missing : 3
thousands people, completely destroyed residence 130
thousands, Partly destroyed residence: 240 thousands
- direct loss is 16 trillion and 900 billion yen(169billion
dollar) estimated by Cabinet office on July 24,2011

About Great East Japan Earthquake

- Great East Japan Earthquake on March 11,2011,
Magnitude 9.0 and an Intensity of 7 in Miyagi
- The dead:16 thousands people, The missing : 3
thousands people, completely destroyed residence 130
thousands, Partly destroyed residence: 240 thousands
- direct loss is 16 trillion and 900 billion yen(169billion
dollar) estimated by Cabinet office on July 24,2011

About Great East Japan Earthquake

- Great East Japan Earthquake on March 11,2011,
Magnitude 9.0 and an Intensity of 7 in Miyagi
- The dead:16 thousands people, The missing : 3
thousands people, completely destroyed residence 130
thousands, Partly destroyed residence: 240 thousands
- direct loss is 16 trillion and 900 billion yen(169billion
dollar) estimated by Cabinet office on July 24,2011

Economics of Natural Disaster

literature

- Cavallo and Noy(2009)
natural disaster have an negative impact on short term,
long-run effect of natural disasters is inconclusive
- Hallegatte and Przulski(2010)
after lost output because of capital losses、 additional
output because of reconstruction
- Fujiki and Hisao(2013)
mesuring the net economic impact of the 1996 Great
Hanshin-Awaji Earthquake

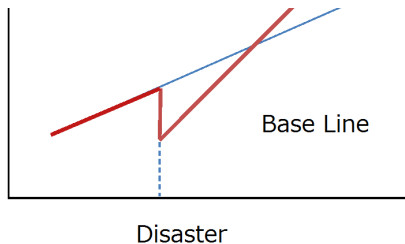
literature

- Cavallo and Noy(2009)
natural disaster have an negative impact on short term,
long-run effect of natural disasters is inconclusive
- Hallegatte and Przulski(2010)
after lost output because of capital losses、 additional
output because of reconstruction
- Fujiki and Hisao(2013)
mesuring the net economic impact of the 1996 Great
Hanshin-Awaji Earthquake

literature

- Cavallo and Noy(2009)
natural disaster have an negative impact on short term,
long-run effect of natural disasters is inconclusive
- Hallegatte and Przulski(2010)
after lost output because of capital losses、 additional
output because of reconstruction
- Fujiki and Hisao(2013)
mesuring the net economic impact of the 1996 Great
Hanshin-Awaji Earthquake

output after disaster



Direct loss is the damage of Production Equipment and Residence. Indirect loss is economic loss that is affected by the direct loss.

Current Status of Post-Disaster Recovery

Indirect Loss

- Aftermath of the 3.11 Disaster: An Analytical Evaluation Using Official Statistics(2012) Higuchi et. al ,cabinet office
- There are many data no indirect loss estimation
- There are several methods of measuring indirect loss
- method : Hsiao, Ching and Wan(2012), application :Fujiki and Hsiao(2013)

Indirect Loss

- Aftermath of the 3.11 Disaster: An Analytical Evaluation Using Official Statistics(2012) Higuchi et. al ,cabinet office
- There are many data no indirect loss estimation
- There are several methods of measuring indirect loss
- method : Hsiao, Ching and Wan(2012), application :Fujiki and Hsiao(2013)

Indirect Loss

- Aftermath of the 3.11 Disaster: An Analytical Evaluation Using Official Statistics(2012) Higuchi et. al ,cabinet office
- There are many data no indirect loss estimation
- There are several methods of measuring indirect loss
- method : Hsiao, Ching and Wan(2012), application :Fujiki and Hsiao(2013)

Indirect Loss

- Aftermath of the 3.11 Disaster: An Analytical Evaluation Using Official Statistics(2012) Higuchi et. al ,cabinet office
- There are many data no indirect loss estimation
- There are several methods of measuring indirect loss
- method : Hsiao, Ching and Wan(2012), application :Fujiki and Hsiao(2013)

Hsiao, Ching and Wan(2012)

- Estimation before disaster

$$y_{1t} = a + b'y_{0t}$$

- Counterfactual data estimation

$$y_{1t}^0 = a + b'y_{0t}$$

- y_{1t}^0 counterfactual(no disaster) data of y_{1t}
- y_{0t} actual data which was not stricken the disaster

Hsiao, Ching and Wan(2012)

- Estimation before disaster

$$y_{1t} = a + b'y_{0t}$$

- Counterfactual data estimation

$$y_{1t}^0 = a + b'y_{0t}$$

- y_{1t}^0 counterfactual(no disaster) data of y_{1t}
- y_{0t} actual data which was not stricken the disaster

Hsiao, Ching and Wan(2012)

- Estimation before disaster

$$y_{1t} = a + b'y_{0t}$$

- Counterfactual data estimation

$$y_{1t}^0 = a + b'y_{0t}$$

- y_{1t}^0 counterfactual(no disaster) data of y_{1t}
- y_{0t} actual data which was not stricken the disaster

Hsiao, Ching and Wan(2012)

- measuring correlation between damaged 3 prefecture(Iwate,Miyagi and Fukushima) and the rest of prefectures
- select some prefectures that is correlated
- coefficient is positive and significant
- Iwate related to Kagoshima,Tottori,Fukui and Ehime, Miyagi related to Aichi and Tottori,Fukushima related to Gifu,Aichi,Ishikawa,Saitama

Hsiao, Ching and Wan(2012)

- measuring correlation between damaged 3 prefecture(Iwate,Miyagi and Fukushima) and the rest of prefectures
- select some prefectures that is correlated
- coefficient is positive and significant
- Iwate related to Kagoshima,Tottori,Fukui and Ehime, Miyagi related to Aichi and Tottori,Fukushima related to Gifu,Aichi,Ishikawa,Saitama

Hsiao, Ching and Wan(2012)

- measuring correlation between damaged 3 prefecture(Iwate,Miyagi and Fukushima) and the rest of prefectures
- select some prefectures that is correlated
- coefficient is positive and significant
- Iwate related to Kagoshima,Tottori,Fukui and Ehime, Miyagi related to Aichi and Tottori,Fukushima related to Gifu,Aichi,Ishikawa,Saitama

Hsiao, Ching and Wan(2012)

- measuring correlation between damaged 3 prefecture(Iwate,Miyagi and Fukushima) and the rest of prefectures
- select some prefectures that is correlated
- coefficient is positive and significant
- Iwate related to Kagoshima,Tottori,Fukui and Ehime, Miyagi related to Aichi and Tottori,Fukushima related to Gifu,Aichi,Ishikawa,Saitama

correlations between prefectures

	Iwate		Miyagi		Fukushima	
1	Kagoshima	0.707	Aichi	0.777	Gifu	0.929
2	Tottori	0.706	Saitama	0.769	Aichi	0.914
3	Fukui	0.661	Tottori	0.747	Ishikawa	0.909
4	Ehime	0.637	Toyama	0.723	Saitama	0.890
5	Toyama	0.635	Fukushima	0.699	Okayama	0.888
6	Shizuoka	0.618	Hiroshima	0.697	Akita	0.883
7	Hyogo	0.609	Akita	0.687	Toyama	0.873
8	Hokkaido	0.590	Oita	0.686	Gunma	0.871
9	Tokushima	0.567	Hokkaido	0.666	Saga	0.869
10	Hiroshima	0.564	Gifu	0.661	Kumamoto	0.851

Estimation Result

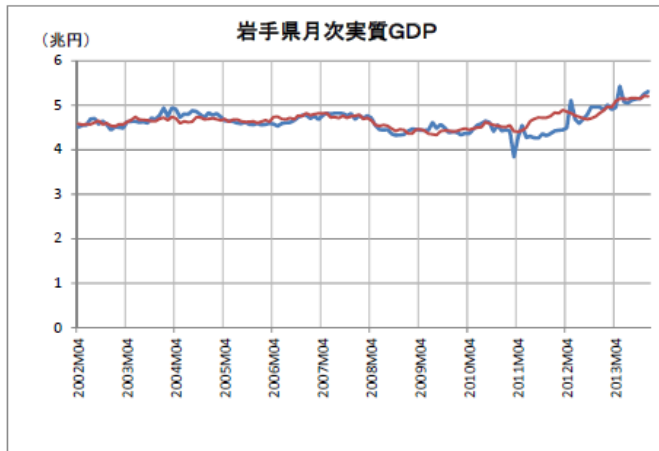
Iwate =

$$0.492 + 0.185 * \text{Kagoshima} + 0.541 * \text{Tottori} + 0.347 * \text{Fukui} + 0.176 * \text{Ehime}$$

$$\text{Miyagi} = 2.316 + 0.074 * \text{Aichi} + 1.592 * \text{Tottori}$$

$$\begin{aligned} \text{Fukushima} = & 1.924 + 0.197 * \text{Gifu} + 0.038 * \text{Aichi} + 0.253 * \text{Ishikawa} \\ & + 0.087 * \text{Saitama} \end{aligned}$$

Iwate monthly GRP



(注)細線は、震災がないと仮定した場合。

Miyagi monthly GRP



(注)細線は、震災がないと仮定した場合。

Fukushima monthly GRP



(注) 細線は、震災がないと仮定した場合。

Size of reconstruction demand

- actual data is beyond the counterfactual data
- after small reduction of production, reconstruction demand emerged
- but, reconstruction demand is still small

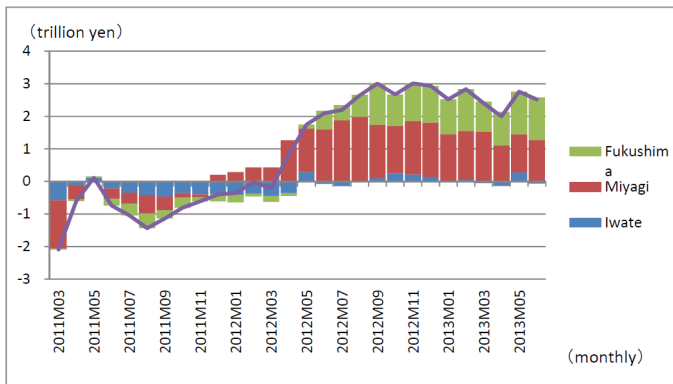
Size of reconstruction demand

- actual data is beyond the counterfactual data
- after small reduction of production, reconstruction demand emerged
- but, reconstruction demand is still small

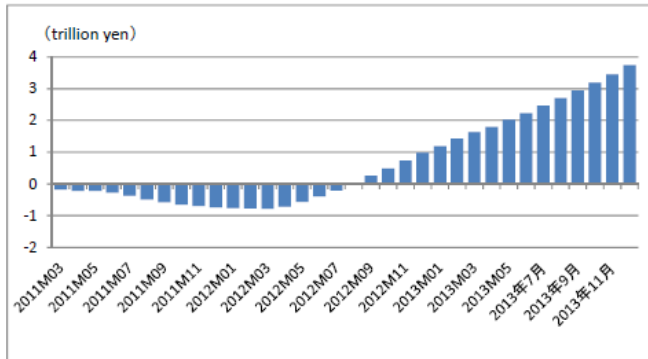
Size of reconstruction demand

- actual data is beyond the counterfactual data
- after small reduction of production, reconstruction demand emerged
- but, reconstruction demand is still small

Size of Reconstruction demand



Accumulated Reconstruction demand



conclusion

- In this paper , I made a monthly GDP for 47 prefectures. I estimate government consumption and net export.
- I estimate the influence of Great East Japan Earthquake. I use monthly GDP and counterfactual data.
- Accumulated reconstruction demand is about 4 trillion yen(40 billion dollar). by the end of 2013,

conclusion

- In this paper , I made a monthly GDP for 47 prefectures. I estimate government consumption and net export.
- I estimate the influence of Great East Japan Earthquake. I use monthly GDP and counterfactual data.
- Accumulated reconstruction demand is about 4 trillion yen(40 billion dollar). by the end of 2013,

conclusion

- In this paper , I made a monthly GDP for 47 prefectures. I estimate government consumption and net export.
- I estimate the influence of Great East Japan Earthquake. I use monthly GDP and counterfactual data.
- Accumulated reconstruction demand is about 4 trillion yen(40 billion dollar). by the end of 2013,