

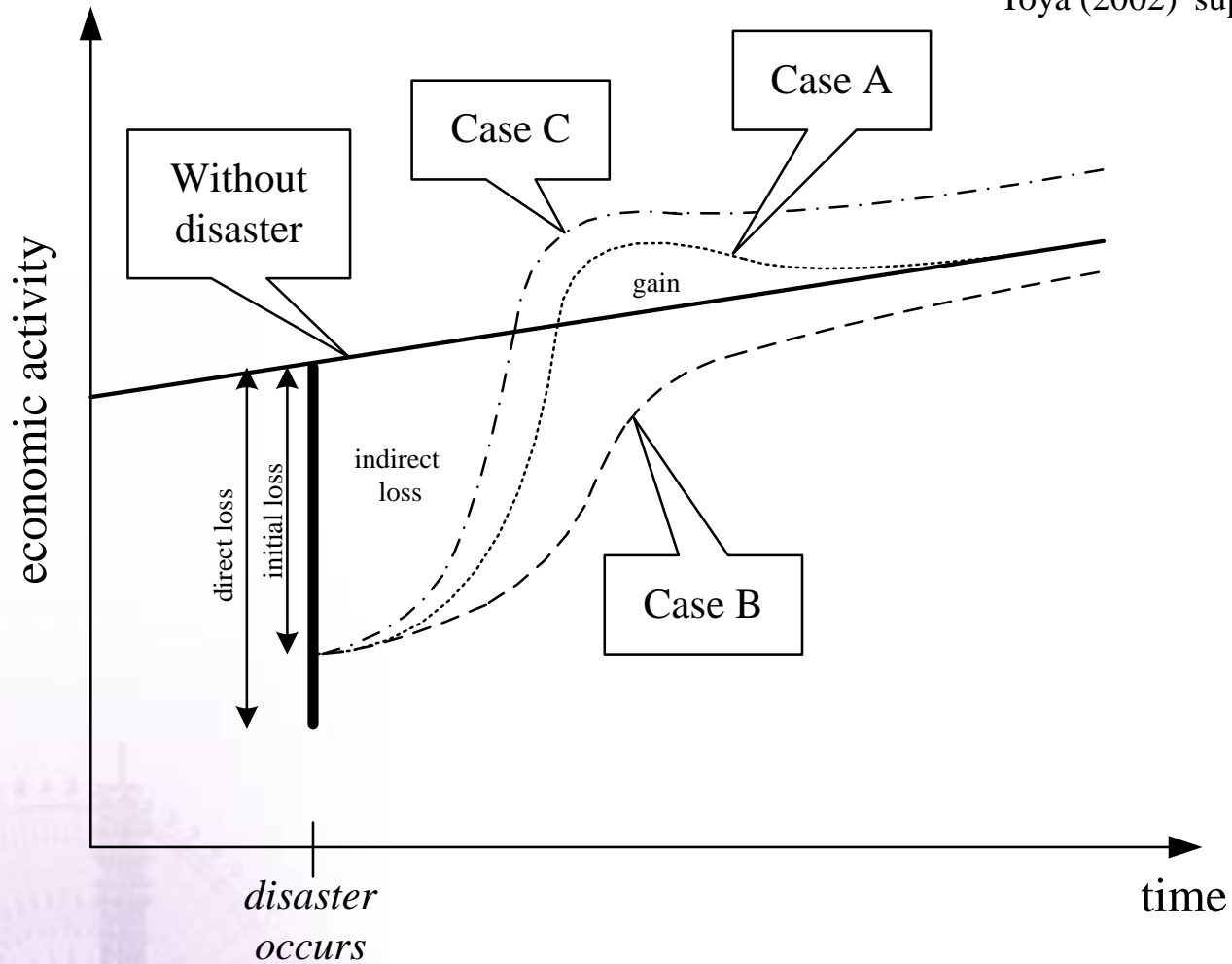
# *Economic Impacts of Kobe Earthquake*

Toshihisa Toyoda

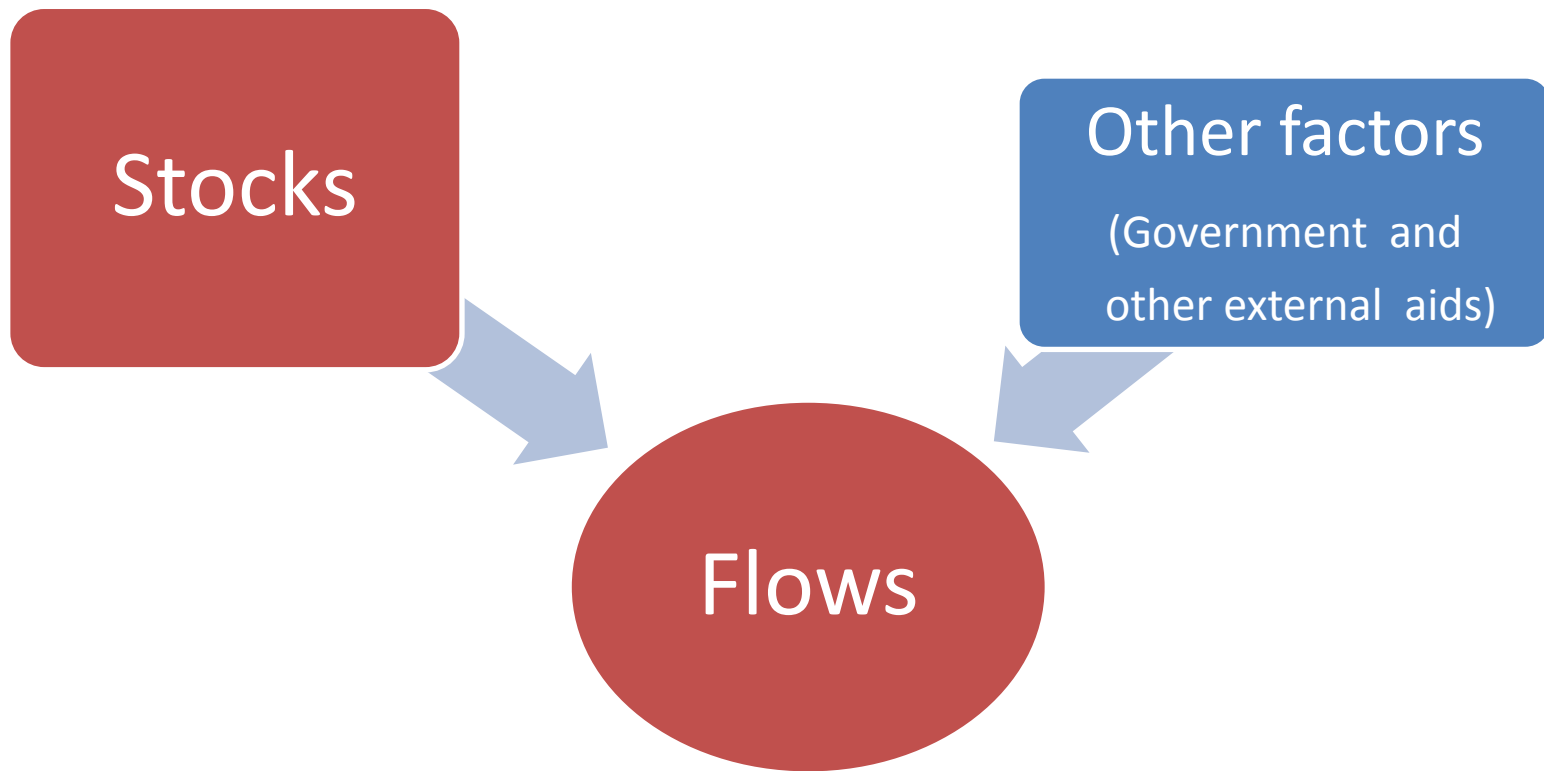
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# Concept of Economic Losses

Recent Study by Skidmore and Toya (2002) supports Case C.



# *Stocks and Flows*



# Comparison of Losses of the Great Disasters (1)

Disasters	Investigators	Amounts of losses		Total losses
		Direct losses	Indirect losses	
<b>East Japan (2011)</b>	Cabinet of Japan	<b>\$160 billion</b>		<b>\$160 billion</b>
<b>Hanshin-Awaji Quake (1995)</b>	Hyogo Prefect.	<b>\$ 99 billion</b>	-	<b>\$ 99 billion</b>
	Toyoda=Kochi	<b>\$ 133 billion</b>	<b>\$ 7.2 billion</b>	<b>\$ 205 billion</b>
<b>9/11 NY Terror (2001)</b>	NY City	<b>\$ 30.5 billion</b>	<b>\$ 52-64 billion</b>	<b>\$ 83-95 billion</b>
	Fed of NY	<b>\$ 29.4 billion</b>	<b>\$ 3.6-6.4 billion</b>	<b>\$ 33-36 billion</b>
<b>Katorina (2005)</b>	CBO	<b>\$ 70-130 billion</b>	<b>\$ 36-62.5 billion</b>	<b>\$ 106-193 billion</b>
	BEA	<b>\$ 96 billion</b>	-	<b>\$96 billion</b>

# Comparison of Losses of the Three Great Disasters (2)

Disasters	Investigators	Purposes of Estimation	Evaluation methods of stocks		Evaluation methods of flows	
			re-acquisition price	current price	private and business losses	GDP/GR P
Hanshin-Awaji Quake	Hyogo Prefect.	policy purposes to prepare funds, request for approval of devastating disaster	○	○		
	Toyoda=Kochi	provide more precise basic data for policy	○	○	●	
9/11 NY Terror	NY City	assessing economic and fiscal effects	○			●
	Fed of NY	assessing effects on physical capital and labor market	○		●	
Katorina	CBO	report to congress, effects on macro economy and budget	-	-		●(predict)
	BEA	calculating losses of fixed assets		○		

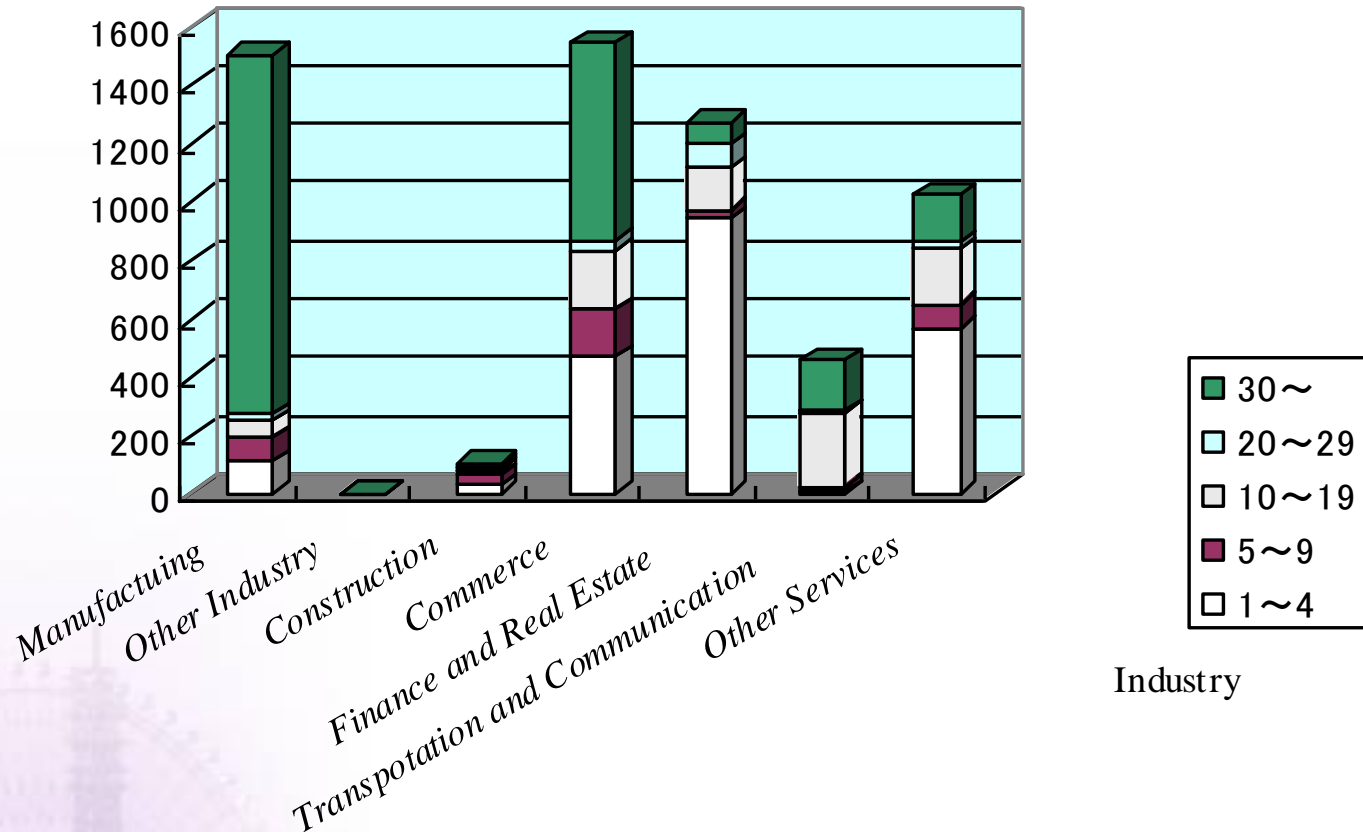
# *Estimates of Direct Losses*

- *Official Estimates (April 1995):*  
*9.9 trillion yen*  
*(≈ US\$ 124 billion)*
- *The Modified Estimates (Toyoda, 1997):*  
*13.3 trillion yen*  
*(≈ US\$ 166 billion)*  
*[Exchange Rate \$1≈¥80]*

# Direct Losses by Industry and Size

Based on a survey on about 1,000 enterprises.

billion yen



# *Characteristics of Recovery from Direct Damage (the case of Kobe EQ)*

- (1) The Government budget for disaster management is mainly allocated to direct losses of physical stocks. (About 5/7 of the central government were spent on them).*
- (2) The central government promised to provide recovery cost but denied to cover BBB cost. The composition of recovery costs are: the central government – about 6 tri. yen, Hyogo prefecture – 2.3 tri. yen, the local municipalities – 3 tri. yen, the public organizations – 800 billion yen, and the private sector – the rest.*
- (3) The government budget is allocated through related ministries and agencies.*
- (4) No well-established system to assist victim's livelihood for great disasters existed. ⇒ Reconstruction Fund, Act on Victims' Livelihood Reconstruction (1998, 2007 amendment), etc.*



# *A Without-disaster Line*

$$GRP = F(\textcircled{1}\text{trend}, \textcircled{2}\text{country's economic condition})$$

# *Estimation Result*

(using adjusted stationary time-series data  
after ADF test)

$$\Delta HGRP = -1970.9 + 212.41G\hat{D}P + 189.03T$$

(-2.83)                      (4.02)                      (3.43)

$$\bar{R}^2 = 0.67, DW = 1.79$$

*HGRP*: Gross regional product of Hyogo Pref.

*RP* : Growth rate of the Japanese economy

*T* : Time trend.

We get estimated values of  $\Delta HGRP^*$

Since  $\Delta HGRP = HGRP - HGRP_{-1}$ ,

We get the estimated HGRP without disaster as follows:

$$HGRP^* = HGRP_{-1} + \Delta HGRP^*$$

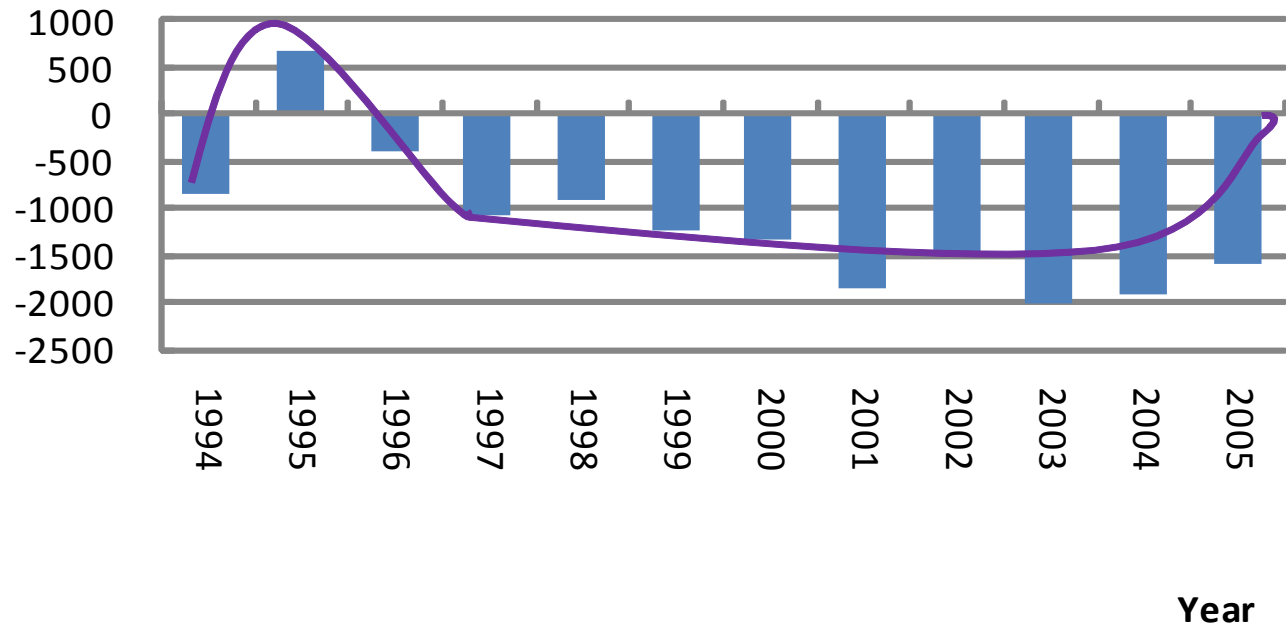
Therefore, we get

$$Loss = HGRP - HGRP^*$$

# *Estimated Indirect Losses*

billion yen

## Estimated Losses



# *Sum of Indirect Losses*

**Loss**  $\approx$  *14.0 trillion yen*  
 $(\approx$  *US\$ 175 billion)*

# *Characteristics of Indirect Losses*

*(1) They are large.*

*(1) They arise for longer than 10 years.*

*(2) They are almost equal to direct losses.*

# *Factors to have caused large indirect costs*

## 1. Supply side

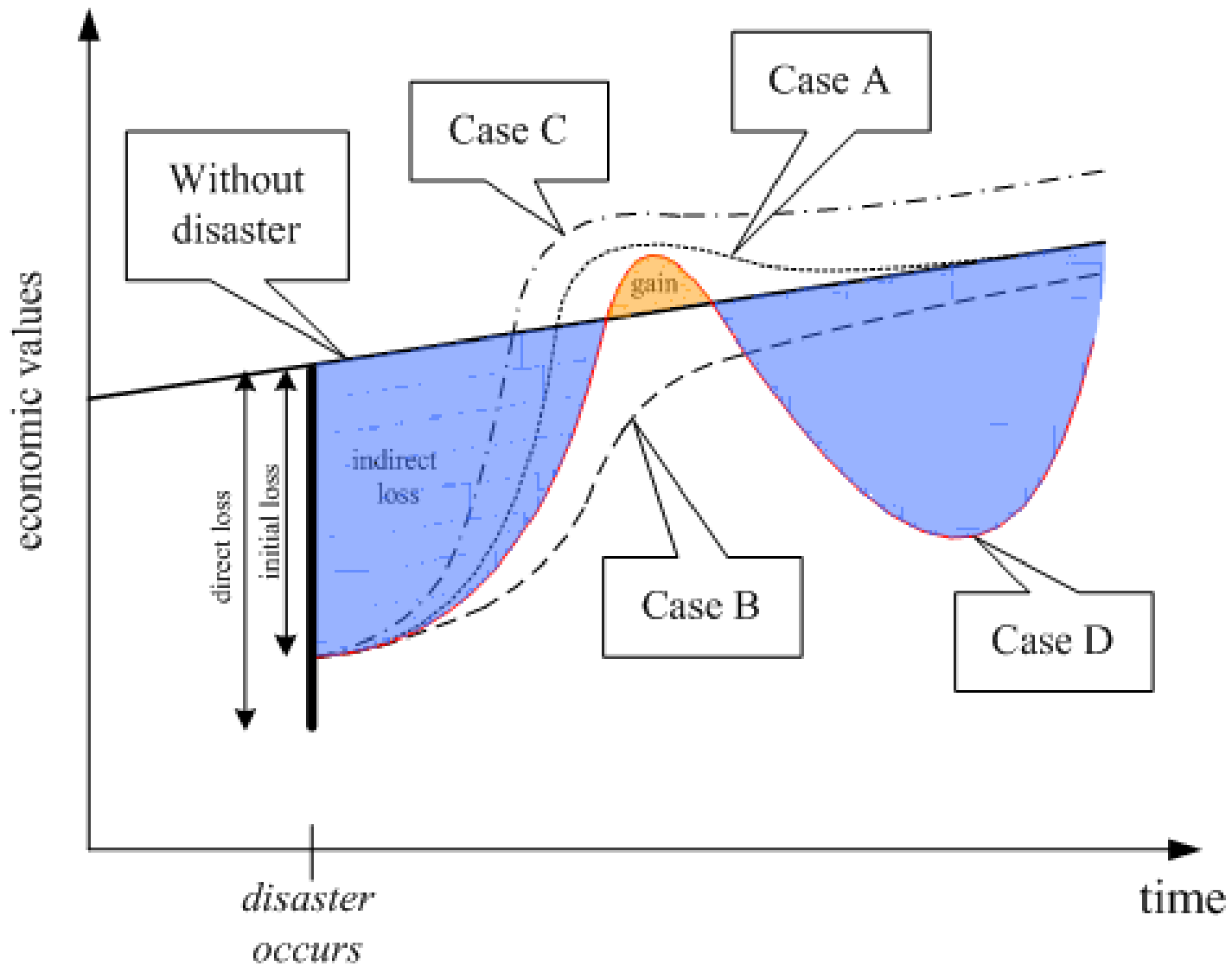
- ◆ Discontinuity of supply chain (e.g., damage of Kobe Port)
- ◆ Bankruptcy and closing businesses (e.g., traditional local industries and small-scale stores)
- ◆ Worsening employment situation (decrease in job offers, mismatch of employment conditions, population loss, etc.)

## 2. Demand side

- ◆ Temporary upward-shift of reconstruction demand
- ◆ Discontinuity of demand chain (a “vicious circle” of demand shrinkage)
- ◆ Prolonged decline in consumption (a very unusual phenomenon)

## 3. Insufficient support by the central government

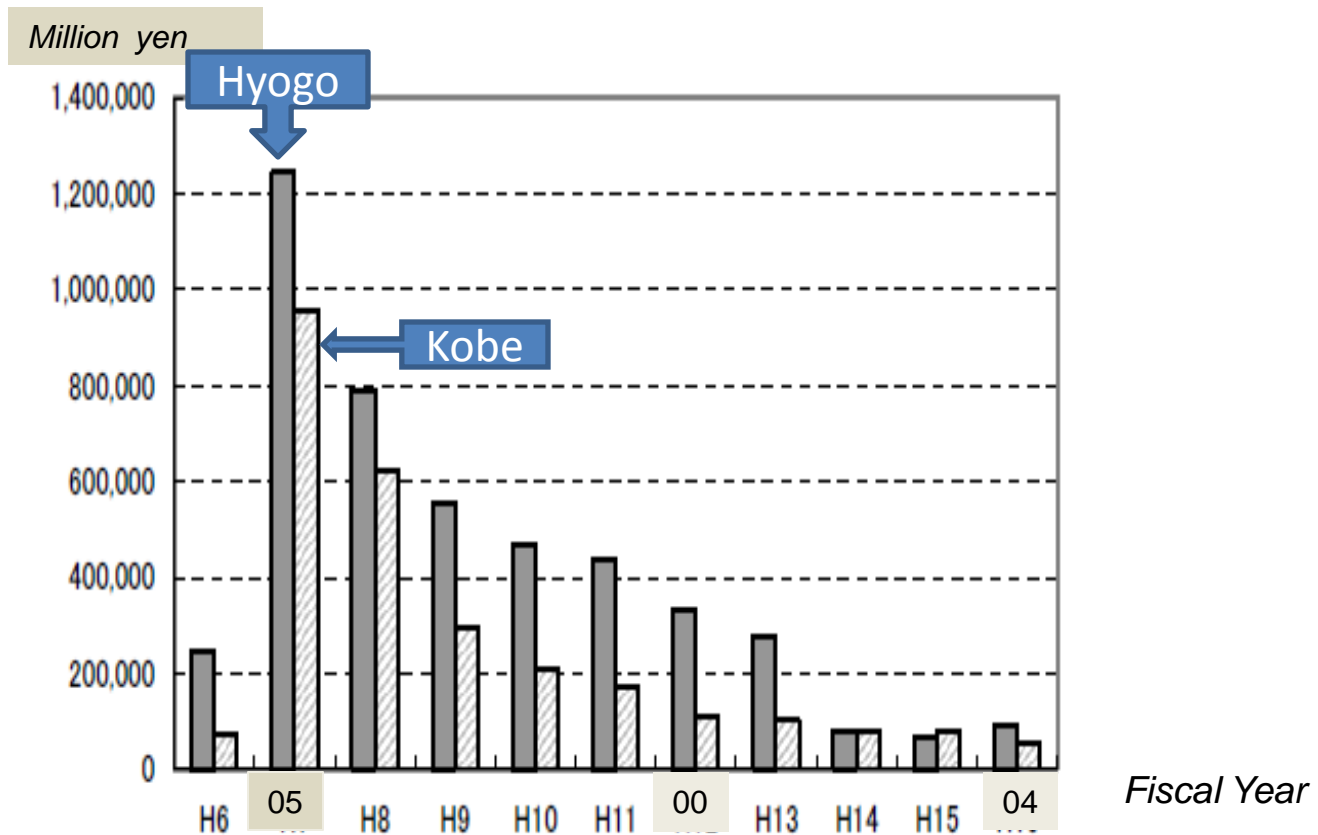
- ◆ Severe deficits of municipalities
- ◆ Weak recovery of households' livelihoods and business activities of SME.



## Kobe's Case (D)



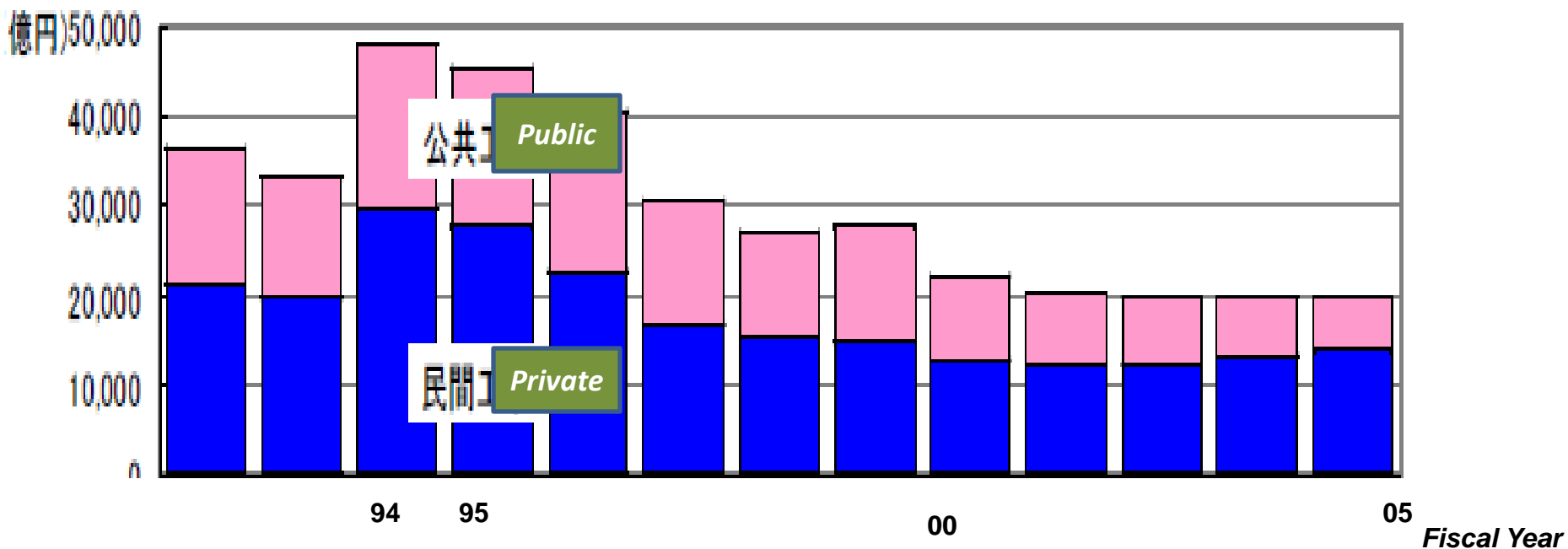
# Budget for Reconstruction



# Amount of Orders of Construction

(図表)

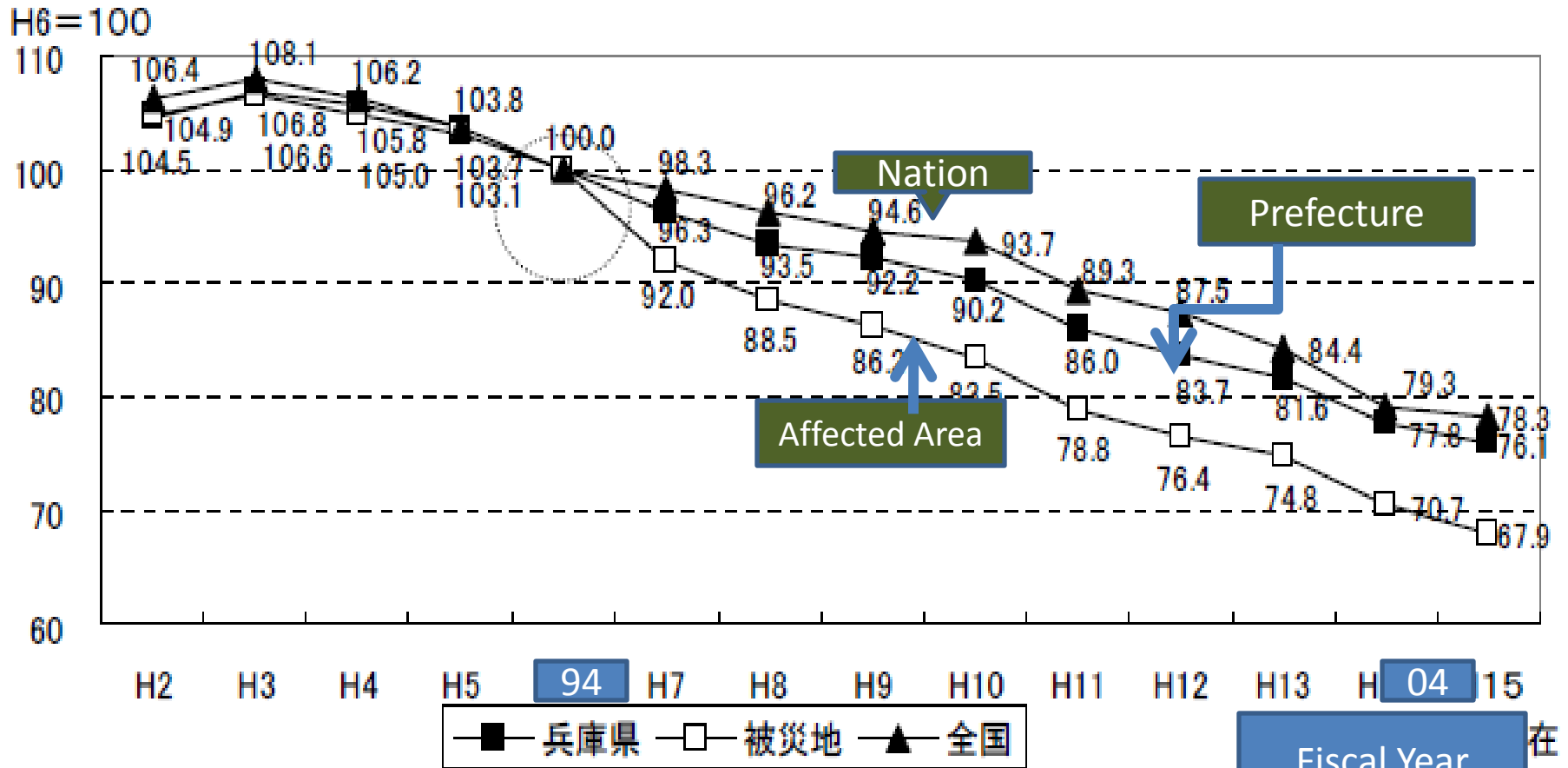
Public or Private Fund ?



Public : Private = 3 : 7

(Nagamatsu (2008))

# Number of Employees, 1994=100



Source: Industrial Statistics

# *Implications*

- (1) Disaster management policy paying more attention to indirect losses is necessary.*
- (2) Regional economic and industrial policy is very important.*
- (3) Supporting livelihood revival of disaster victims is important.*

# *And Now*

- ◆ *After the Kobe Earthquake, some progresses have been made. (E.g. the amendment of Act on Victims' Livelihood Reconstruction (2007))*
- ◆ *For the Great East Japan Earthquake, these progresses have been formalized but their realizations are still on the process. Despite the huge amount of budget allocation, I fear the similar prolonged stagnant process will continue as the case of Kobe EQ,*