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## Korean Economy 10 years before and after the Currency Crisis

Some results of Okun's Law Test  
with special attention on the youth  
unemployment

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- Part V. Concluding Remarks

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## Part I General Economic Tendency in Korea since the Currency Crisis

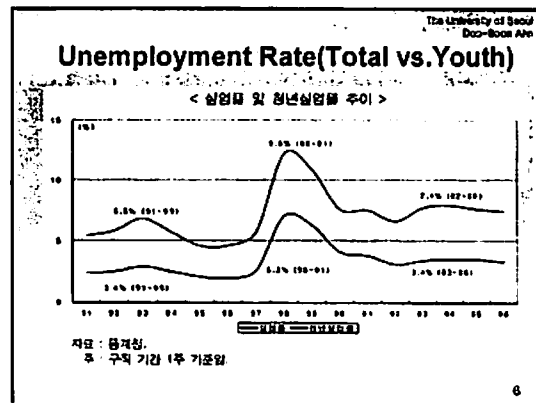
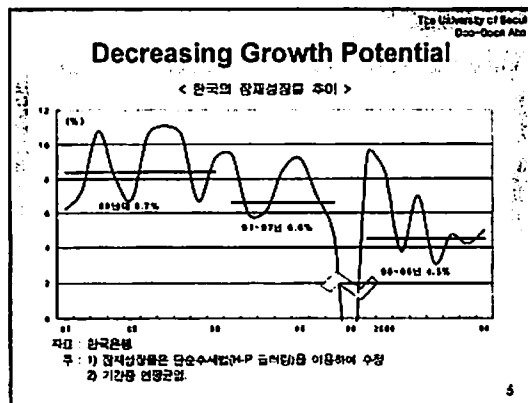
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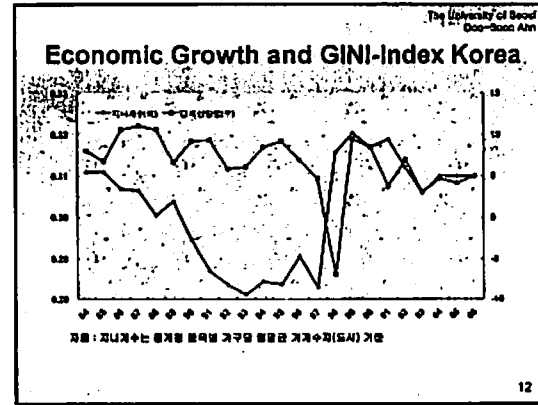
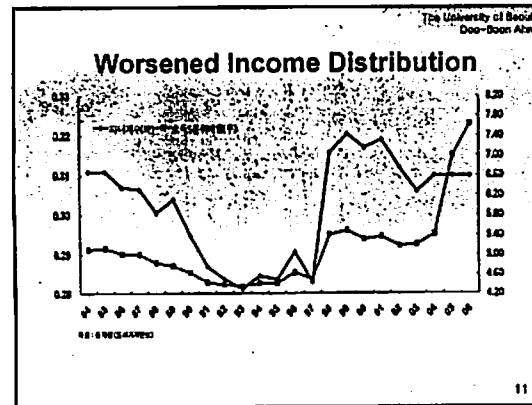
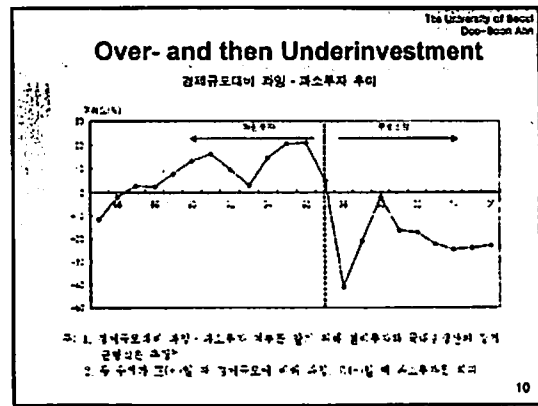
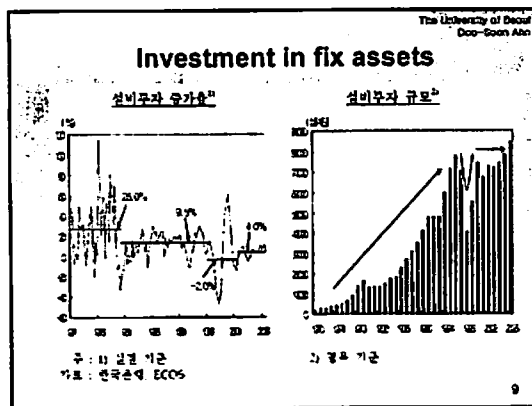
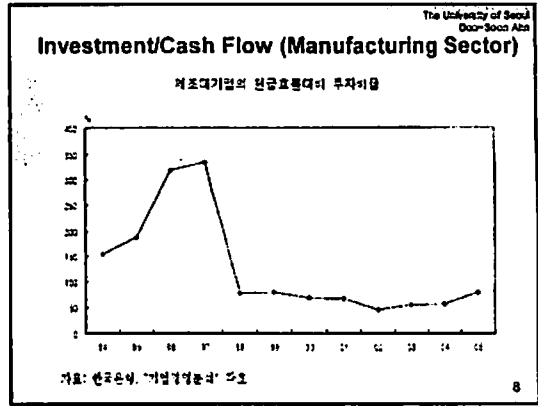
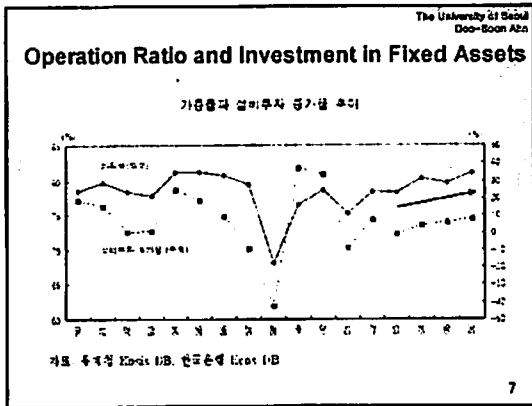
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## Korean Economy; Lost Dynamics?

- Sharp Decrease of Economic Growth Potential
  - ↓ Stagnating Inland's Demand
  - ↓ GDP growth without employment effects
  - ↓ Sluggish investment by plenty of liquidities
  - ↓ Ever Growing Youth-Unemployment
  - ↓ Worsening Distribution Data

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## Part II

# Okun's Law for Korean Economy

### Economic Growth and Unemployment in Korea

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## Okun's Law is...

- ▣ Okun's Law:
  - ▣ "Increased economic growth rate coincides with falling unemployment rates: A negative relations between the two variables" Arthur Okun(1962); Edward S. Knotek(2007)
- ▣ Diverse Methods of Approach
  - Difference Version - Gap Version
  - Dynamic Version - Production function

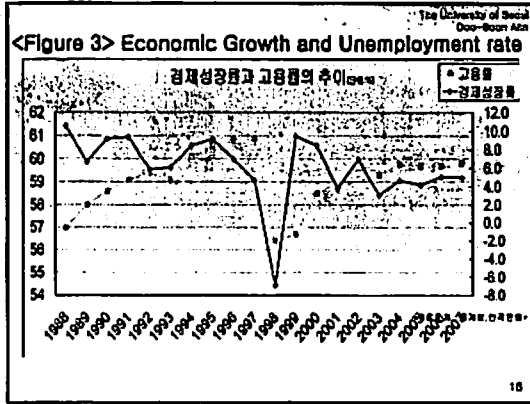
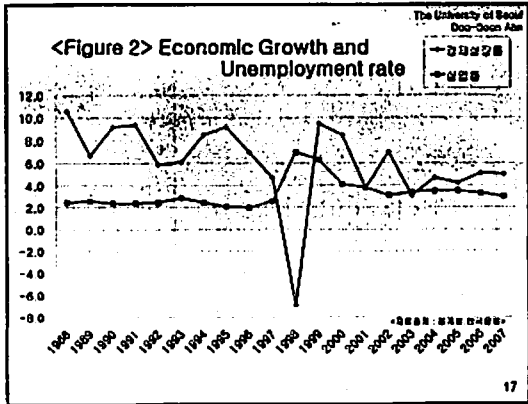
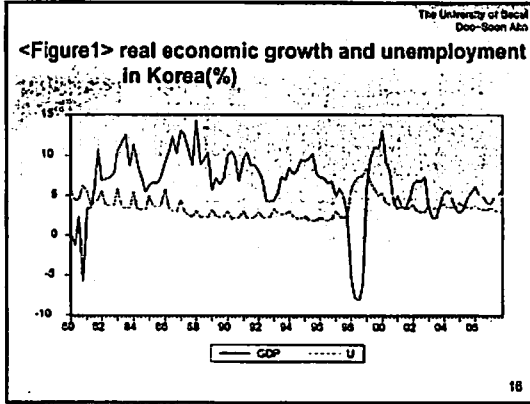
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## Korean Economy and Okun's Law

- ▣ Data: economic growth rate and unemployment rate in Korea between 1st q'ter 1980 - 4th q'ter 2007
- ▣ Source of Data: Korean Statistical Information Service(www. kosis.kr)
- ▣ Average real GDP growth rate 6.49%
- ▣ Average unemployment rate 3.59%
- ==>Table <A1>

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## 1. Okun's Difference Version

▣ **Difference Version:** contemporaneous correlation between real GDP growth and unemployment.

$\Delta \text{Unemployment rate} = a + b \cdot (\text{Real Output Growth})$   
 $b = \text{"Okun's coefficient"} < 0.$

▣  $-a/b =$  real GDP growth rate consistent with stable unemployment rate. I.e. real GDP growth rate to maintain a constant (or stable) unemployment rate.

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▣ **Results: <Table 3>**

- When the real GDP growth rate stays at 0%, the unemployment rate will raise at 0.3%, and when the unemployment rate stays at a stable level, the real GDP growth rate  $(-a/b)$  will be ca. 6%.
- When the real GDP growth rate is higher than 6% p.a., the unemployment rate will fall, and rise when less than 6%.

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▣ Okun's coefficient  $-0.05$  means the unemployment rate will rise at 0.05% by every 1% fall of real GDP growth.

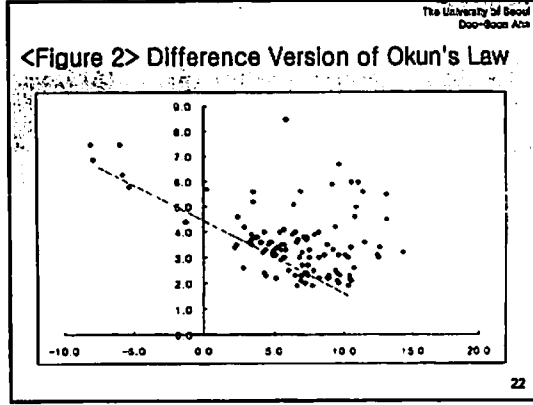
**<Table 3> Difference Version Regression Analysis :**

$$\Delta U = 0.3 - 0.05 \cdot \text{GDP}$$

	$\beta$ -estimate	Standard Error	t-Statistics
a	0.3*	0.16	1.91
b	-0.05**	0.02	-2.40

\*\* means statistically significant at 1%, and \* means at 10%

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## 2. Okun's Dynamic Version

▣ **Dynamic Version** based on the idea that, not only the present, but also the past economic performances influence the present unemployment rate.

▣  $\Delta U_t = \beta_0 + \beta_1 G_t + \beta_2 G_{t-1} + \beta_3 G_{t-2} + \beta_4 \Delta U_{t-1} + \beta_5 \Delta U_{t-2}$

▣ **<Table 4>** shows the result of regression analysis:

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- Potential GDP growth rate (growth rate at natural rate of unemployment): 6%.
- Results: 1% real GDP growth at present ( $G_t$ ) reduces 0.3% of present unemployment.
- 1% real GDP growth at 1 quarter before ( $G_{t-1}$ ) reduces 0.66% of present unemployment.

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- 1% real GDP growth at 2 quarters before ( $G_{t-2}$ ) increases 0.48% of present unemployment.
- 1% increased unemployment at 1 quarter before reduces 0.41% of present unemployment.
- 1% increased unemployment at 2 quarters before reduces 0.25% of present unemployment.

<Table 4> Dynamic Version Regression Analysis :

$$\Delta U_t = 0.52 - 0.05G_t - 0.11G_{t-1} + 0.08G_{t-2} - 0.41\Delta U_{t-1} - 0.25\Delta U_{t-2}$$

	Estimate	Standard Error	t-Statistics
$\beta_0$	0.52**	0.18	3.12
$\beta_1$	-0.05**	0.03	-1.86
$\beta_2$	-0.11**	0.04	-2.81
$\beta_3$	0.08**	0.03	2.92
$\beta_4$	-0.41**	0.09	-4.53
$\beta_5$	-0.25**	0.08	-2.87

\*\* means statistically significant at 1%, and \* means at 5%

#### 4. Okun's Law Summary

- Korean economy for the time period 1980-2007 shows that the Okun's law is applicable:  
The increased economic growth rate reduces the unemployment rate.
- According to the Difference Version, the sustainable economic growth rate at stable (or natural) rate of unemployment is about 6% p.a.
- When the real GDP growth rate exceeds 6%, the unemployment rate decreases, while it increases by the real GDP growth rate less than 6% p.a.

- Assumed that sustainable GDP growth rate being 6% for Korean economy, the Dynamic Version shows following results:

$$\Delta U_t = 0.52 - 0.05G_t - 0.11G_{t-1} + 0.08G_{t-2} - 0.41\Delta U_{t-1} - 0.25\Delta U_{t-2}$$

- Some detailed investigation is required for the result that "1% real GDP growth at 2 quarters before ( $G_{t-2}$ ) increases 0.48% of present unemployment."

### Part III Youth Unemployment and Okun's Law in Korea

#### 1. Difference Version

Period: Quarterly Data (Samples: 80)  
1st q'ter 1988 - 4th q'ter 2007

Applied Analytical Method: same as Part III

<Table 5> Basic Statistics

	Real GDP growth	Unempl.
Average	6.1	6.45
Mean	6.5	6.2
Max.	14.3	12.9
Min.	-8.1	3.9
Std. Deviation	3.92	1.93
Samples	80	80

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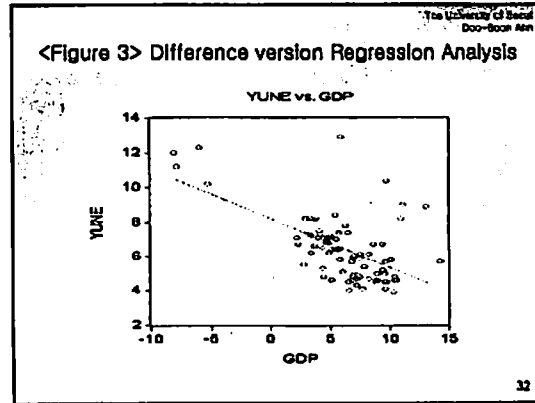
<Table 6> Difference version Regression

	$\beta$ -estimate	Standard Error	t-Statistics
a	0.65 ***	0.20	1.91
b	-0.10 ***	0.02	-2.40

statistically significant at \*\*\*1%, \*\*5%, \*10%

$\Delta U = 0.65 - 0.10 \times GDP$

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2. Dynamic Version

3 Models in Comparison

- Model 1: Total period (1<sup>st</sup> q'ter '88-4<sup>th</sup> q'ter '07)
- Model 2: 10 years before crisis (1<sup>st</sup> q'ter '88-4<sup>th</sup> q'ter '97)
- Model 3: 10 years after crisis (1<sup>st</sup> q'ter '98-4<sup>th</sup> q'ter '07)

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Results of Dynamic Version

Model	(1) Total period (1 <sup>st</sup> q'ter '88-4 <sup>th</sup> q'ter '07)	(2) 10 years before crisis (1 <sup>st</sup> q'ter '88-4 <sup>th</sup> q'ter '97)	(3) 10 years after crisis (1 <sup>st</sup> q'ter '98-4 <sup>th</sup> q'ter '07)
Const.	2.98*** (0.844)	5.075 (1.291)	3.375** (1.012)
GDP <sub>t</sub>	-0.116** (0.430)	-0.443 (0.763)	0.193 (0.101)
GDP <sub>t-1</sub>	-0.07 (0.273)	-0.059 (0.694)	-0.254** (0.098)
GDP <sub>t-2</sub>	+0.01 (0.052)	-0.028 (0.073)	0.251 (0.079)
YUNE <sub>t-1</sub>	+0.81*** (0.117)	0.337* (0.181)	0.300*** (0.174)
YUNE <sub>t-2</sub>	+0.039 (0.103)	-0.093 (0.161)	-0.023 (0.153)
R-squared	0.808	0.2162	0.6367

\*\*\*p<0.01, \*\*p<0.05, \*p<0.1

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Model 1:

$$\Delta Un = 2.98 - 0.116G_t - 0.07G_{t-1} + 0.01G_{t-2} + 0.61U_{t-1} + 0.099U_{t-2}$$

- 1% GDP growth at t(G<sub>t</sub>) reduces present unemployment by  $-0.116 \times 6.5 = -0.754$
- 1% GDP growth at t-1(G<sub>t-1</sub>) reduces present unemployment by  $-0.07 \times 6.5 = -0.455$
- 1% GDP growth at t-2(G<sub>t-2</sub>) increase present unemployment by  $0.01 \times 6.5 = 0.0715$
- 1% increased unemployment 1 q'ter before increases present unemployment by 0.61%
- 1% increased unemployment 2 q'ter before increases present unemployment by 0.099%

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Model 2:

$$\Delta Un = 5.075 - 0.443G_t - 0.098G_{t-1} - 0.026G_{t-2} + 0.357U_{t-1} - 0.095U_{t-2}$$

- 1% GDP growth at t(G<sub>t</sub>) reduces present unemployment by  $-0.443 \times 6.5 = -2.8795$
- 1% GDP growth at t-1(G<sub>t-1</sub>) reduces present unemployment by  $-0.098 \times 6.5 = -0.637$
- 1% GDP growth at t-2(G<sub>t-2</sub>) increase present unemployment by  $-0.026 \times 6.5 = -0.169$
- 1% increased unemployment 1 q'ter before increases present unemployment by 0.357%
- 1% increased unemployment 2 q'ter before decreases present unemployment by 0.095%

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**Model 3:**  

$$\Delta U_t = 3.375 + 0.193G_t - 0.254G_{t-1} + 0.051G_{t-2} + 0.560U_{t-1} - 0.026U_{t-2}$$

- 1 • 1% GDP growth at t(Gt) increases present unemployment by  $0.193 \times 6.5 = 1.2545$
- 2 • 1% GDP growth at t-1(Gt-1) reduces present unemployment by  $-0.254 \times 6.5 = -1.651$
- 3 • 1% GDP growth at t-2(Gt-2) reduces present unemployment by  $-0.051 \times 6.5 = -0.3315$
- 4 • 1% increased unemployment 1 q'ter before increases present unemployment by 0.560%
- 5 • 1% increased unemployment 2 q'ter before decreases present unemployment by 0.026%

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**3. Comparison between general Okun's law (Difference Version)**

<p>• In case of Youth Unemp: <math>\Delta U = 0.65 - 0.10 \times \text{GDP}</math></p> <p>• Okun's law in general: <math>\Delta U = 0.3 - 0.05 \times \text{GDP}</math></p>	<p>• 1) Okun's coefficient by Youth Unemp: 0.10 vs. by general: 0.05</p> <p>• 2) GDP growth rate by stable unemp. rate by Youth Unemp: 6.5 vs. by general: 6.0</p>
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**4. Comparison between general Okun's Law (Dynamic Version)**

- 1) By Youth Unemployment  

$$\Delta U_t = 0.89 - 0.15G_{t-1} + 0.09G_{t-2} - 0.22U_{t-1} - 0.39U_{t-2}$$
- 2) By General Unemployment  

$$\Delta U_t = 0.52 - 0.05G_{t-1} + 0.11G_{t-2} - 0.08U_{t-1} - 0.41\Delta U_{t-1} - 0.25\Delta U_{t-2}$$

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**5. Okun's Law and Youth Unemployment: Summary**

- 1) The Currency Crisis (97-98) was a turning point.
  - Total number of employment was decreasing, to recover since the beginning of 2000s.
  - But the youth employment shows still a declining tendency.
- 2) A misleading labour market data
  - The general unemployment rate fell from around 4% to around 3%
  - Even though that of youth fell from it's highest level from 7.8 to about 7.3%, this figure is misleading, since the number of youth employed is going down

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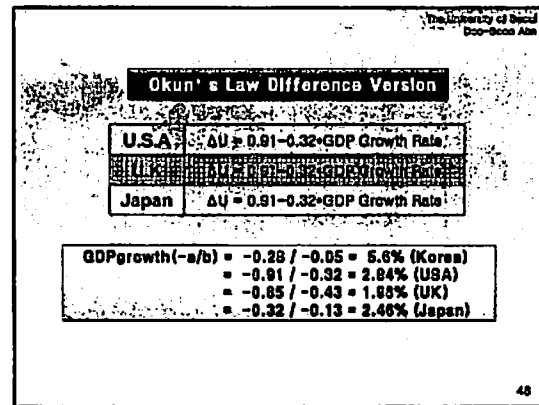
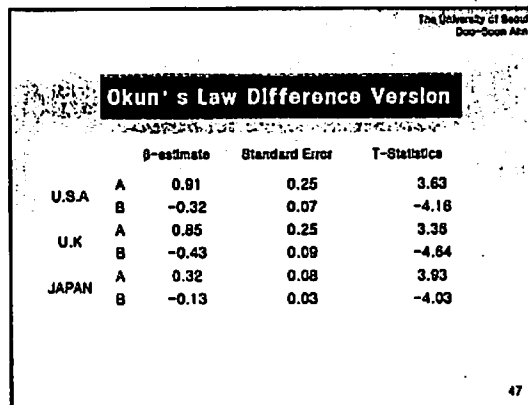
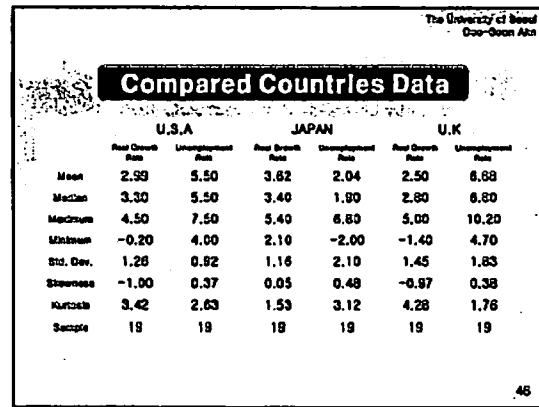
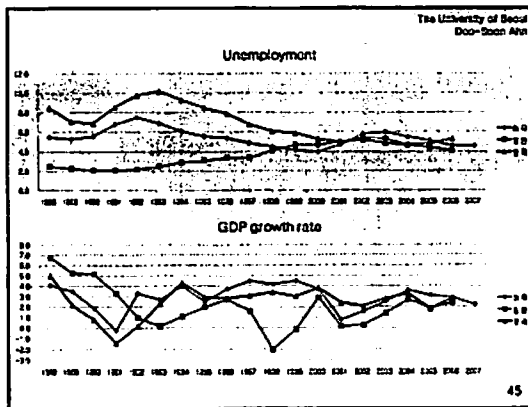
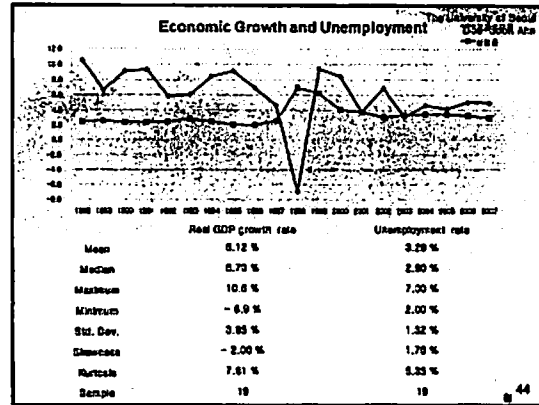
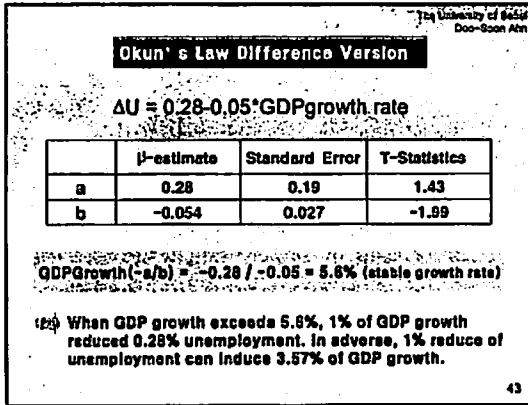
- 3) **Irregular Employees Problem**
  - The share of Irregular Employees by SMEs has tripled since the crisis
- 4) **Sensitive Youth Unemployment to GDP growth**
  - The Okun's Law test tells that the Youth Unemployment rate responses more sensitive to the GDP growth than general Unemployment rate.

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**Part IV**  
**International Comparison of Okun's Coefficient**

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## International Comparison

- e UK > GDP growth higher than 1.98%,  
Unemp. rate falls by 0.43%
- e USA > GDP growth higher than 2.84%,  
Unemp. rate falls by 0.32%
- e Japan > GDP growth higher than 2.46%,  
Unemp. rate falls by 0.13%
- e Korea > GDP growth higher than 5.6%,  
Unemp. rate falls by 0.05%

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## Part V : Concluding Remarks

- Where from the Difference between Countries
- Why shift the Okun's coefficient in the same country?
- Why sensitive response of youth employment to GDP growth?
- Ant policy implications from the results?
- Due to the differences in the labour market structure (flexibilities)?

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## <Appendix> Results of Statistical Analysis

### <A 1> Basic Statistics

Mean	
Median	
Maximum	
Minimum	
Std. Dev.	
Skewness	
Kurtosis	
Jarque-Bera	
Probability	
Observations	51

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### <A 2> ADF Test

ADF Test Statistic: -3.84222    1% Critical Value: -3.4222  
5% Critical Value: -2.8824  
10% Critical Value: -2.5828

Standardized critical values for rejection of hypothesis of a unit root.

Regression Diagnostics Test Statistics

Dependent Variable: D(UNEMP)

Method: Least Squares

Date: 04/15/08 Time: 10:43

Sample (adjusted): 1980:2-2007:4

Included observations: 127 after excluding endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
GDPI-1	-0.244221	0.025246	-3.44222	0.0008
D(UNEMP-1)	0.182848	0.025722	1.91223	0.0586
D(UNEMP-2)	0.227922	0.024138	2.82178	0.0057
D(UNEMP-3)	0.082228	0.028722	0.84438	0.3222
D(UNEMP-4)	-0.172822	0.028131	-2.08228	0.0388
C	1.222228	0.025241	2.32228	0.0214

R-squared: 0.222779    Mean dependent var: 0.022281  
Adjusted R-squared: 0.192224    S.D. dependent var: 2.322228  
S.E. of regression: 2.022471    Akaike info criterion: 4.372228  
Sum squared resid: 442.9141    Schwarz criterion: 4.222727  
Log Likelihood: -227.2422    F-statistic: 8.222222  
Durbin-Watson stat: 1.822229    Prob(F-statistic): 0.022228

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### <A 2> ADF Test

ADF Test Statistic: -4.22222    1% Critical Value: -3.4222  
5% Critical Value: -2.8824  
10% Critical Value: -2.5828

Standardized critical values for rejection of hypothesis of a unit root.

Regression Diagnostics Test Statistics

Dependent Variable: D(UNEMP)

Method: Least Squares

Date: 04/15/08 Time: 10:52

Sample (adjusted): 1980:2-2007:4

Included observations: 127 after excluding endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
UN-1	-0.182848	0.042228	-1.372228	0.16222
D(UN-1)	0.192848	0.071424	1.492228	0.14222
D(UN-2)	0.041148	0.022228	0.222224	0.82222
D(UN-3)	-0.122228	0.022228	-2.042227	0.04222
D(UN-4)	0.718818	0.022228	31.22222	0.00000
C	0.822228	0.122228	4.022229	0.00000

R-squared: 0.881286    Mean dependent var: 4.022229  
Adjusted R-squared: 0.670222    S.D. dependent var: 9.504227  
S.E. of regression: 0.512222    Akaike info criterion: 1.122222  
Sum squared resid: 27.12222    Schwarz criterion: 1.122222  
Log Likelihood: -78.52222    F-statistic: 44.17222  
Durbin-Watson stat: 1.522228    Prob(F-statistic): 0.000000

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### <A 3> Difference Version Regression Analysis

Dependent Variable: UCHANGE

Method: Least Squares

Date: 04/15/08 Time: 10:52

Sample (adjusted): 1980:2-2007:4

Included observations: 115 after excluding endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.302228	0.142228	1.922228	0.05222
GDPI	-0.222228	0.022228	-2.422228	0.01222

R-squared: 0.020478    Mean dependent var: -0.024224  
Adjusted R-squared: 0.041728    S.D. dependent var: 0.813227  
S.E. of regression: 0.824078    Akaike info criterion: 2.518022  
Sum squared resid: 87.12218    Schwarz criterion: 2.682229  
Log Likelihood: -144.0654    F-statistic: 5.704222  
Durbin-Watson stat: 2.603446    Prob(F-statistic): 0.017755

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### <A 4> Dynamic Version Regression Analysis

Dependent Variable: UCHANGE  
Method: Least Squares  
Date: 04/15/02 Time: 10:57  
Sample: 1982:4 2002:4  
Included observations: 120 (after adjusting end-points)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.524748	0.169072	3.12159	0.0023
GDP	-0.057754	0.031029	-1.86154	0.0667
GDP(-1)	-0.112772	0.040170	-2.80758	0.0060
GDP(-2)	0.068818	0.030360	2.25482	0.0242
UCHANGE(-1)	-0.412518	0.080842	-5.13828	0.0000
UCHANGE(-2)	-0.257878	0.083054	-3.07173	0.0040
R-squared	0.220053	Mean dependent var		-0.014579
Adjusted R-squared	0.254725	S.D. dependent var		0.913259
S.E. of regression	0.796286	Alaska info criterion		2.410481
Sum squared resid	63.87006	Schwarz criterion		2.558029
Log likelihood	-125.3712	F-statistic		8.520257
Durbin-Watson stat	2.304280	Prob(F-statistic)		0.000001

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### <A 4> Dynamic Version Regression Analysis

Dependent Variable: UCHANGE  
Method: Least Squares  
Date: 04/15/02 Time: 10:57  
Sample: 1982:4 2002:4  
Included observations: 120 (after adjusting end-points)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.524748	0.169072	3.12159	0.0023
GDP	-0.057754	0.031029	-1.86154	0.0667
GDP(-1)	-0.112772	0.040170	-2.80758	0.0060
GDP(-2)	0.068818	0.030360	2.25482	0.0242
UCHANGE(-1)	-0.412518	0.080842	-5.13828	0.0000
UCHANGE(-2)	-0.257878	0.083054	-3.07173	0.0040
R-squared	0.220053	Mean dependent var		-0.014579
Adjusted R-squared	0.254725	S.D. dependent var		0.913259
S.E. of regression	0.796286	Alaska info criterion		2.410481
Sum squared resid	63.87006	Schwarz criterion		2.558029
Log likelihood	-125.3712	F-statistic		8.520257
Durbin-Watson stat	2.304280	Prob(F-statistic)		0.000001

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