THE RELATIONSHIP BETWEEN ECONOMIC GROWTH AND UNEMPLOYMENT IN THE KOREAN ECONOMY

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CONTENTS

요 약

본 논문에서는 세가지 방법을 이용하여 미국과 일본에서 이미 성립된다고 밝혀진 오쿤법칙(Okun's Law)이 한국에도 적용될 수 있음을 보인다. 또한 얻어진 오쿤계수는 11.9에서 15.4까지의 값을 갖고 있어서 일본의 반, 미국의 6배정도의 값에 해당된다. 이는 한국의 실업율의 산출 증가율에 대한 반응도가 일본에 비해서는 낮고 미국에 비해서는 매우 높다는 것을 보여주는 것이다.

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I. Introduction

Many economists have been searching for the relationships among various macroeconomic variables. In any text of economics, we can easily find the relationship between output and unemployment, inflation and unemployment, output and price and so on.[1] These relationships among various macroeconomic variables are expected to take different forms from country to country, depending on historical, customary, institutional and regional backgrounds. Especially, there may be considerable differences between developing and developed countries. However we can think that capitalistic economies may have similar relationships among basic macroeconomic variables, because these economies have in common some properties of capitalism.

In this respect it is interesting to observe that a macroeconomic realtionship recognized in a developed economy holds good in a developing economy and to ask what forms it takes in the developing economy.

This paper studies the question whether the well-known Okun's law(1962, 1973), a stable relation between excess capacity and unemployment discovered in U.S.A. and Japan[2], applies to the Korean economy as well. I can observe that Okun's law holds good in the Korean economy and also that the degree of responsiveness of the output gap with respect to the unemployment is much larger than that of U.S.A., but smaller than that of Japan.[3]

In section 2 we describe what is Okun's law. In section 3 we shall try to estimate Okun's law by three methods using annual data in the Korean economy. In section 4 we shall compare Korean Okun coefficient with that of U.S.A. and Japan. The final section presents econmic implications of this result and concluding remarks.

2. Okun's Law and its Implications[4]

A relationship between real growth rate and changes in the unemployment rate is known as

1) The relationship between output and unemployment can be represented by Okun's law which is main tonic of this paper. The curve which expresses the relationship between inflation and unemployment is called Phillip's Curve. The relationship between output and price can be expressed by aggregate demand curve or aggregate supply curve.
2) See Hamada and Kurosaka (1984) for the application of Okun's law to the Japanese economy.
3) There have been few papers about the application of Okun's law to a developing economy.
4) The explanations of this section are considerably extracted from Dornbusch and Fischer(1984).

Okun's law, named after its discoverer, the late Arthur Okun of the Brookings Institution, former chairperson of the Council of Economic Advisers. Okun's law says that in the case of U.S.A. economy for $2\frac{1}{2}$ percentage points of growth in real GNP above the trend that is sustained for a year, the unemployment rate declines by 1 percentage point. This $2\frac{1}{2}-1$ relationship in the U.S.A. economy, the status of which is somewhat exaggerated by calling it a law rather than an empirical regularity, provides a rule of thumb for assessing the implications of real growth for unemployment. While the rule is only approximate and will not work very precisely from year to year, it still gives a sensible relation between growth and unemployment. The relation is a useful guide to policy because it allows us to ask how a particular growth target will affect the unemployment over time. Suppose the American economy were in a deep recession with 9 percent unemployment. How many years would it take the American economy to return, say, 6 percent unemployment ? The answer depends, of course, on how fast the economy grows in the recovery. Assume the growth rate of porential output is 3 percent per year. One possible path to the return to 6 percent unemployment is for output to grow at $5\frac{1}{2}$ percent per year for three years. On this path, each year U.S.A. economy are growing $2\frac{1}{2}$ percent above trend, and thus each year we take 1 percentage point of the unemployment rate. An alternative recovery strategy may be front-loded; growth is high at the beginning and then slow down. Such a path might be one of growth rates in successive years equal to $6\frac{1}{2}$, $5\frac{1}{2}$, $4\frac{1}{2}$ percent, also allowing a return to 6 percent unemployment in 3 years. Also another alternative recovery strategy may be back-loded; growth rates in successive years are $4\frac{1}{2}$, $5\frac{1}{2}$ and 6 $\frac{1}{2}$ percent.

Suppose 14-1 relationship between growth rate and unemployment rate existed in the Korean economy. 1 percent decline of unemployment rate implies 14 percent increase of growth rate above the trend growth rate.[5)]

3. The Okun Coefficient in the Korean Economy

In estimating the Okun coefficient we will use three kinds of methods. The first method is to estimate the relationship between growth rate and changes of unemployment rate. The second is to

5) In the next section we shall find that the relationship between growth rate and unemployment rate ranges from 11.9-1 to 15.4-1 relationship.

estimate the relationship between real GNP and the rate of employment. The third is to imvestigate the relationship between potential GNP gap and unemployment gap.

(1) The First Method[6]

In Figure 1 we roughly observe that negative relation exists between the growth rate and the change of the unemployment rate. To find this relationship rigorously we regress the changes of unemployment (DU) on growth rate (DG). For the period 1968-1985 we obtain the following regression equation.

$$DU = 0.581742 - 0.083978\ DU \quad \cdots\cdots(1)$$
$$(3.10) \qquad (-4.22)$$
$$R^2 = 0.53 \quad \bar{R}^2 = 0.50 \quad D.W. = 2.11 \quad f = 17.90 \quad \rho = -0.033$$

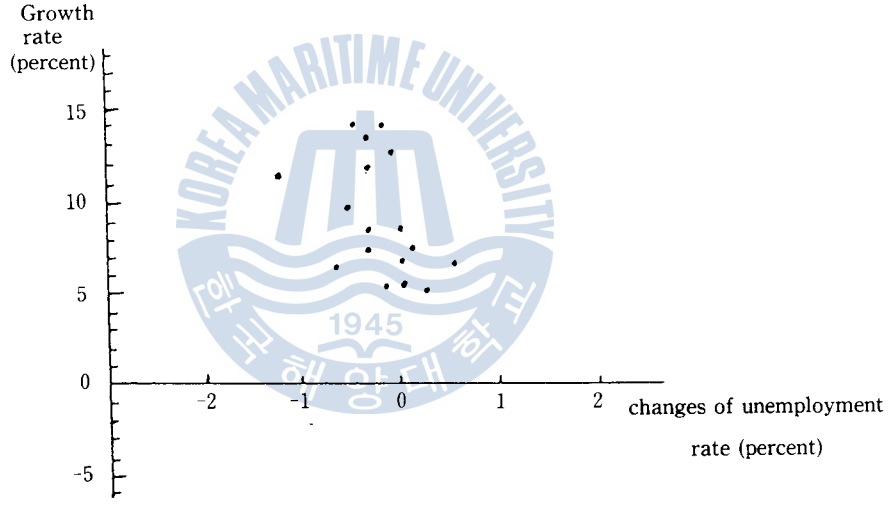

figure 1 Growth and the change in the Unemployment Rate[7] (1968-1985)

,where the entry in parentheses is t-value, R^2 is coefficient of determination, $\bar{R}^2$ is adjusted coefficient of determination, D. W. is Durbin-Watson statistics, F is F-value of the equation, and ρ is first order regressive coefficient in the Cochrane-Orcutt method.

6) Hamada and Kurosaka(1984) did not use this method. They argue that regular negative relationship can hardly be found between unemployment rates and growth rates in real GNP. But perhaps they would make a mistake. They misunderstood changes of unemployment rate as unemployment rate itself.

7) See Appendix for the data of growth rate and changes of unemployment rate.

The estimated equation (1) gives the value of Okun coefficient equal to 11.9[8] According to the estimated coefficient, for 11.9 percent of growth rate the unemployment rate diclines by 1 percent point.

(2) The Second Method

This method assumes a stable relationship between real GNP and the rate of employment (= 100-unemployment rate). In using this method, we assume the followitng function;

$$N_t = f_t(Q_t) \quad \cdots\cdots(2)$$

, where N is the rate of employment (100−U : U being the rate of unemployment), Q the real GNP and t time trend.

Also we assume that $f_t(Q_t) = f(Q_t, t)$.[9]

The functional form of this equation is linear as follows.

$$\ln N_t = \beta_0 + \beta_1 \ln Q_t + \beta_2 t \quad \cdots\cdots(3)$$

For the period 1968-19085, we obtained the following equation.

$$\ln N_t = 3.949563 - 0.004597t + 0.064757 \ln Q_t \quad \cdots\cdots(4)$$

$$(27.72) \quad (-4.02) \quad (4.28)$$

$$R^2 = 0{,}72 \quad \bar{R}^2 = 0.69 \quad D.W. = 1.73 \quad F = 19.72 \quad \rho = 0.34$$

This gives the value of Okun coefficient equal to 15.4.

This value is larger than that of the first method, 11.9.

(3) The Third Method

This method is to estimate a single Okun coefficient for the whole period by postulating the trend of potential growth as well as the benchmark year for full capacity output.

First, we shall find the years of full employment. Okun assumes that full employment rate level corresponds to a 4 percent unemployment in the U.S.A economy and also assumes that actual output equalled potential output in the middle of 1955 when unemployment rate was 4 percent.

Hamada and Kurosaka(1984) assumes that in Japanes economy the full employment level corresponds to a 1.26 percent unemployment rate and the benchmark year is the year of 1967 when unemployment rate was 1.26 percent.[10]

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8) 11.9 is the inverse of DG coefficient(1/0.083978).

9) This assumption means that the change of functional form can be translated into the addition of one argument in this function.

10) For additional explanation, See p 79 in the paper of Hamada and Kurosaka (1984).

In Korean economy I decided to take the year of 1985 as the benchmark year, because inflation rate is very stable, that is, in 1984 and 1985 wholesale price change is respectively 0.7 percent and 0.9 percent and consumer price change is respectively 2.3 percent and 2.5 percent.

We estimate potential output by the following regression equation,

$$\ln Q = \beta_0 + \beta_1 t \quad \cdots\cdots(5)$$

Potential output is calculated by taking the actual GNP in 1985 as the potential output and by extrapolating the value forwards and backwards with those estimated trend values. We then calculated the GNP gap and unemployment gap in terms of percent by the following formulae :

$$\text{GNP Gap(GG)} : GG = (\text{Potential GNP} / \text{Actual GNP} - 1) \times 100 \quad \cdots\cdots(6)$$

$$\text{Unemployment Gap(UG)} : UG = U - 4.0^{11)} \quad \cdots\cdots(7)$$

, where U is unemployment rate.

The relationship between the GNP gap and the unemployment rate gap is depicted in figure 2.

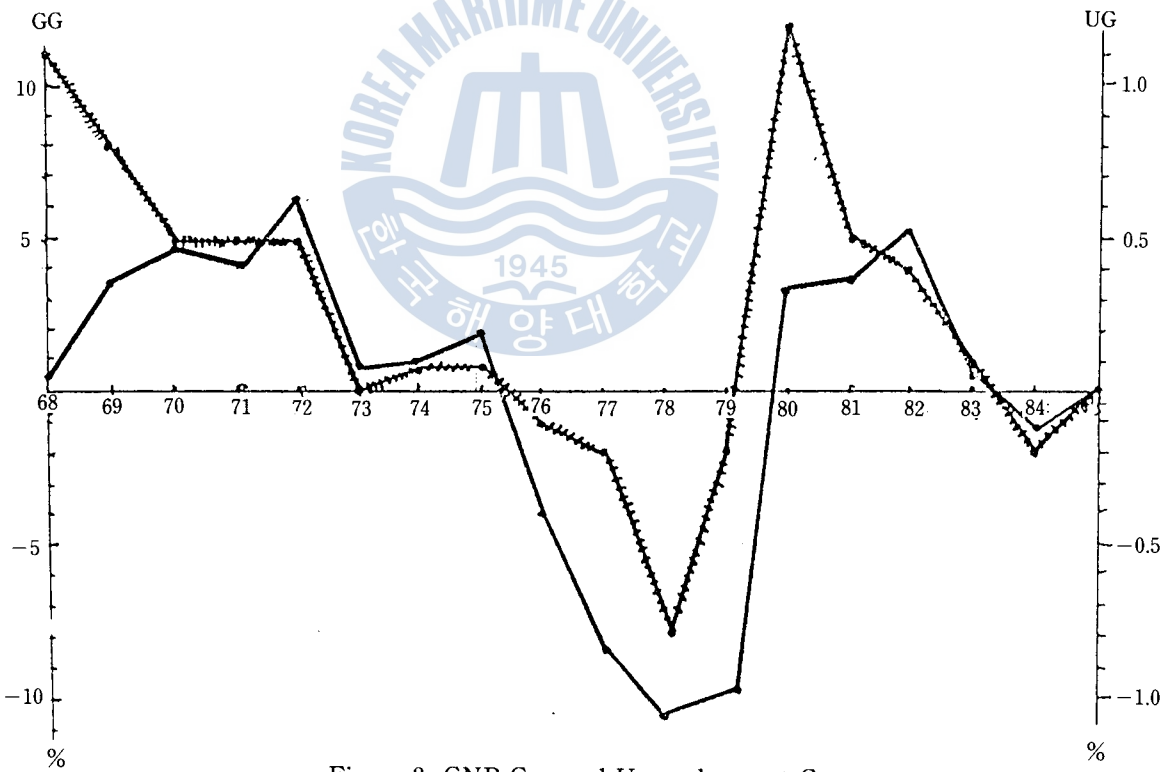

Figure 2. GNP Gap and Unemployment Gap

11) According to our Korean benchmark year, full employment rate level of Korea corresponds to 4 percent unemployment rate.

We ran a regression of the following equation:

$$UG = C_0 + \alpha\, GG \quad \cdots\cdots (8)$$

the obtained result is as follows.

$$UG = 0{:}187195 + 0.070904\ GG \quad \cdots\cdots (9)$$

$R^2 = 0.54$ $\bar{R}^2 = 0.51$ D.W.$= 0.97$ $F = 18.43$

This gives the value of Okun coefficient equal to 14.1. These three methods give similar Okun coefficients which range from 11.9 to 15.4.

4. A Comparison With U.S. and Japan Case

Hamada and Kurosaka(1984) present the Okun coefficients of Japan and U.S.[12] The estimated equations are as follows.

(Japan) $\ln N = 4.23 + 0.354 \ln Q - 0.0027t$ $\cdots\cdots (10)$
(4.52) (−4.71)

$\bar{R}^2 = 0.420$ SE$= 0.0017$ $\rho = 0.726$

(U.S.) $\ln N = 2.01 + 0.413 \ln Q - 0.015t$ $\cdots\cdots (11)$
(8.87) (11.2) (−11.7)

$\bar{R}^2 = 0.819$ SE$= 0.005$ $\rho = 0.15$

(Japan) $UG = 0.0356\ GG$ $\cdots\cdots (12)$
(2.95)

$\rho = 0.95$ SE$= 0.189$

(U.S) $UG = 0.420\ GG$ $\cdots\cdots (13)$
(11.9)

$\rho = 0.63$ SE$= 0.47$

In the above equations SE means standard error. Okun coefficients of Japan obtained from equations (10) and (12) are respectively 28.2 and 28.0.

The equations (11) and (13) also give Okun coefficient of U.S., which respectively corresponds 2.41 and 2.36.

We can find some interesting facts from these resulets. Korean Okun coefficients are larger than those of U.S., but smaller than those of japan. These values of Korea are about six times as large as those of U.S. and about a half time as large as those of Japan. Notably we can observe that

12) Hamada and Kurosaka(1984) used the annual series of potentisl GNP listed in the Appendix of Gordon(1984).

Okun coefficients of three countries are all very stable.

5. Some Implications and Concluding Remarks

We can find some interesting facts which lurk in the Korean economy. Also we can observe that Okun's law can be applied to a developing economy such as Korea, as well as developed economies such as U.S. and Japan. Okun coefficients obtained from three different methods are very significant statistically, and have similar values in each country. This fact shows that there exists a certain regularity between production growth and unemployment in developing economies as well as developed economies.

Korean Okun coefficients range from 11.9 to 15.4. This means that output growth rate of Korea is very responsive to the unemployment rate change and that reversely unemployment rate change of Korea is very unresponsive to the output growth rate. This implies that the unemployment rate does not go up very much in recession period and output loss is so great.

In this respect we must acknowledge that demand management policy in the Korean economy is very effective in augmenting growth rate, but ineffective in reducing unemployment.

Appendix : Data

OBS	DU	DG	Q	PQ	GG
1968	-1.100000	11.30000	15269.00	15441.59	0.453939
1969	-0.300000	13.30000	16064.00	16760.98	3.662352
1970	-0.300000	7.600000	17284.00	18171.45	4.458099
1971	0.000000	8.800000	18797.00	19677.17	4.006089
1972	0.000000	5.700000	9869.00	21282.30	6.436691
1973	-0.500000	14.10000	22678.00	22990.98	0.703693
1974	0.100000	7.700000	2425.00	24807.29	0.888734
1975	0.000000	6.900000	26113.00	26735.23	1.706432
1976	-0.200000	14.10000	29804.00	28778.73	-4.116471
1977	-0.100000	12.70000	33590.00	30941.55	-8.561057
1978	-0.600000	9.700000	36852.00	33227.33	-10.512194
1979	0.600000	6.500000	39249.00	35539.51	-9.872798
1980	1.400000	-5.200000	36672.00	38181.32	3.439317
1981	-0.700000	6.600000	39089.00	40855.74	3.843367
1982	-0.100000	5.400000	41212.00	43665.47	5.276858
1983	-0.300000	11.90000	46109.00	46612.89	0.416979
1984	-0.300000	8.400000	50003.00	49700.05	-1.282287
1985	0.200000	5.100000	52573.00	52928.62	0.000000

OBS	UG	U	N
1968	1.100000	5.100000	94.90000
1969	0.800000	4.800000	95.20000
1970	0.500000	4.500000	95.50000
1971	0.500000	4.500000	95.50000
1972	0.500000	4.500000	95.50000
1973	0.000000	4.000000	96.00000
1974	0.099999	4.100000	95.90000
1975	0.099999	4.100000	95.90000
1976	-0.099999	3.900000	96.10000
1977	-0.200000	3.800000	96.20000
1978	-0.800000	3.200000	96.80000
1979	-0.200000	3.800000	96.20000
1980	1.200000	5.200000	94.80000
1981	0.500000	4.500000	95.50000
1982	0.400000	4.400000	95.60000
1983	0.099999	4.100000	95.90000
1984	-0.200000	3.800000	96.20000
1985	0.000000	4.000000	96.00000

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