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Inflation, Unemployment and Monetary Policy: An Evaluation of the Korean Recent Experience*

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Alternative views regarding the determinants of inflation and unemployment are empirically investigated for Korea. Consistent with the monetarist view, but contrary to that of neo-Keynesians', restraint in money growth irrespective of the degree of resource utilization is a key anti-inflation policy in Korea. Moreover, as new classical economics contends, the results show that anticipated monetary policy has no short-run effects on unemployment, a finding that is at odds with the monetarist thesis. The policy implications of these results in light of the recent Korean development experience are also discussed.

I. Introduction

Sharp disagreement exists among economists regarding the determinants of inflation and unemployment. For inflation, the Neo-Keynesians, e.g., Modigliani and Papedemos (1976), believe that accelerations and decelerations of inflation are primarily related to the degree of resource utilization (as proxied, say, by the rate of unemployment). On the other hand, Monetarists, e.g., Friedman (1976) and Stein (1978), argue that changes in inflation are the direct result of similar movements in money growth, and have nothing to do with the state of the economy. As to the determinants of unemployment, Monetarists take issue with the relatively more recent school of thought, called the New Classical Economics. Monetarists like Stein (1974) and Carlson (1978) contend that money growth also has important short-run effects on unemployment. However, the New Classical economists, e.g., Sargent (1976) and McCallum (1980), deny such a proposition and claim that

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monetary policy, if fully anticipated, is neutral on unemployment even in the short-run.

Because theoretical discussion could not resolve the debate, most participants have recently resorted to empirical testing. For example, see Barro (1978), Zannoni and McKenna (1980), Desai and Blake (1982), Mishkin (1982), Stein (1982), Rea (1983), and Turnovsky and Wohar (1984).

Surprisingly, all these empirical inquiries, and still many more, have focused attention on the U.S. experience with little work being done on other countries, particularly developing economies. This is despite the fact that investigating the above alternative views has important implications for the proper conduct of stabilization and development policies.

This paper tests the validity of the above conflicting views on inflation and unemployment in the context of the Korean economy using annual data over the period 1963-1987, the maximum time period for which consistent data on the relevant variables is available. In addition to the relative reliability of data, Korea provides a good case for testing the above hypotheses. Among the developing (and perhaps also developed) countries, Korea has been remarkably successful in achieving rapid economic growth and low rates of unemployment, although accompanied with noticeable inflationary pressures in the 1960s and 1970s. It is interesting, therefore, to assess the role of monetary policy in determining the rates of unemployment and inflation, and, at the same time, see whether the low levels of unemployment can help explain the Korean inflationary experience. The rest of the paper is organized as follows. Section II briefly outlines the testing models. Section III presents the empirical results and discusses the policy implications. Section IV concludes the paper.

II. The Models

According to Neo-Keynesian economists, the path of inflation depends primarily on the state of the economy as measured by the prevailing rate of unemployment. For them, as long as unemployment exceeds some critical level, called Non-Accelerating Inflationary Rate of Unemployment (NAIRU), inflation can be expected to decline (see Modigliani and Papademos (1976), p. 4). That is, the acceleration of inflation is made a function of lagged unemployment as follows:[1]

[1] This approach is akin to that of Carlson (1978). See also Stein (1978).

$$(1)\ \dot{P}_t - \dot{P}_{t-1} = a_0 + a_1 U_{t-1} + e_{1,t}$$

where $\dot{P}$ is the inflation rate, t refers to time, U is the rate of unemployment, e_1 is an error term, and $a_1 < 0$ and statistically significant.

However, monetarists like Stein (1982) reject equation (1), and argue that a_1 should be insignificantly different from zero. They contend that a better equation to explain the acceleration of inflation should have the excess of money growth over the ongoing inflation rate as the primary independent variable. That is,

$$(2)\ \dot{P}_t - \dot{P}_{t-1} = b_0 + b_1(\dot{M}_{t-1} - \dot{P}_{t-1}) + e_{2,t}$$

where $\dot{M}$ is the percentage change in money stock, and $b_1 > 0$ and statistically significant.[2]

The Monetarists further claim that their variable; namely the lagged growth of real balances $(\dot{M}_{t-1} - \dot{P}_{t-1})$, is also the major determinant of the rate of unemployment. Hence,

$$(3)\ U_t = c_0 + c_1(\dot{M}_{t-1} - \dot{P}_{t-1}) + e_{3,t}$$

where $c_1 < 0$ and statistically significant.

Equation (3) is rejected by the New Classical economists who argue that unemployment is best described by a function of its own lagged values and is independent of any past (and thus fully anticipated) changes in the monetary variable. Hence, the addition of the monetarist variable into an autoregressive unemployment equation should prove statistically insignificant. That is,[3]

$$(4)\ U_t = d_0 + d_1 U_{t-1} + d_2 U_{t-2} + d_3 U_{t-3} + d_4 (\dot{M}_{t-1} - \dot{P}_{t-1}) + e_{4,t}$$

where d_4 is insignificantly different from zero, while other d's are statistically significant.

2 Of course, other regressors such as additional lagged monetary growth could also be relevant to the model. However, in order to confine our attention to testing maintained hypotheses as proposed by Stein (1982), these additional regressors were not included in the model. At any rate, in an expanded version of the model, a one year lagged money growth was added to models (1) and (2) but proved insignificant in both equations (t-values = 0.85 and 0.87, respectively).

3 As in Stein (1982), a third autoregression is employed. Lagged unemployment beyond the third year, however, were not statistically significant.

III. The Results

The preceeding four alternative models were tested using the Korean annual data over the period 1963-1987.[4] To avoid the spurious correlation problem discussed in Granger and Newbold (1974), a maximum-likelihood method was employed to estimate all regressions subject to autocorrelation adjustments. The empirical results for model (1) are:

$$(1)' \quad \dot{P}_t - \dot{P}_{t-1} = 0.038 - 0.009\ U_{t-1}$$
$$(0.93)\ (1.11)$$

$R^2 = 0.05$, SE = 0.065, r = −0.209, Rho = −0.24, DW = 1.98, TAU = 14

where the numbers in parentheses below the coefficient estimates are the absolute values of t-statistics, r is the correlation coefficient, Rho is the maximum-likelihood estimate of the autocorrelation adjustment coefficient and TAU is the Geary non-parametric statistic to test for general serial correlation. According to the Durbin-Watson (DW) and the Geary tests, there is no evidence of remaining serial correlation. This implies that the t-statistics reported above are reliable indicators of whether or not the estimated coefficients are statistically significant (see Granger and Newbold (1974)).[5]

The regression results from equation (1)' show that the effect of unemployment rate upon the acceleration of inflation (the Neo-Keynesian effect) is not significantly different from zero at the 5 (and even at the 10) percent level of significance. These results, therefore, seem to reject the Neo-Keynesian view. Since the unemployment coefficient is of a correct sign and carries some significance (albeit only at the 15 percent level), one may be interested in computing the implied non-accelerating inflationary rate of unemployment. Setting $\dot{P}_t - \dot{P}_{t-1} = 0$, and solving for U, the value of NAIRU is 4.22 percent. This suggests that if unemployment in Korea rises to, say, 8 percent, then inflation, according to the Neo-Keynesian equa-

[4] The inflation rate, $\dot{P}$, is the percentage change of the GDP deflator. Money growth, $\dot{M}$, is the percentage change of the narrowly defined money stock, and the annual data is the average of quarterly figures. The price and the money stock data were derived from the *International Financial Statistics*, various issues. The unemployment rate data was obtained from various issues of the *Yearbook of Labour Statistics*. All data series are available from the author upon request.

[5] Note that the inflation and unemployment models tested in this paper are not designed to capture all factors that may affect inflation or unemployment. Moreover, under fairly general assumptions (see Batten and Hafer (1983)), such "missing" variables would not bias the results. Finally observe that the inflation equations (1) and (2) are cast in first-difference form and thus are expected to yield low R^2. On this, see Granger and Newbold (1974).

tion, may decline by 0.03 of a percentage point, a very small response. In addition to such negligible quantitative impact of unemployment on the acceleration of inflation, the Neo-Keynesian inflation equation suffers from structural instability. The Chow (1960) stability technique was used to test for the equation stability over time. Using the mid-point as the breaking date,[6] the calculated F-value is 32.70. At the 5 percent level, the critical F-value is 3.47. Thus, according to the Chow test, the Neo-Keynesian equation is highly unstable and consequently it is useless for policy purposes. Moreover, the significant value of Rho may indicate a serious omissions of variables.

Turning now to the Monetarist view, the empirical results of model (2) are:

$$(2)' \quad \dot{P}_t - \dot{P}_{t-1} = -0.025 + 0.233\ (\dot{M}_{t-1} - \dot{P}_{t-1})$$
$$(1.61) \quad (2.60)$$

$R^2 = 0.26$, SE = 0.057, r = 0.53, Rho = −0.14, DW = 1.91, TAU = 10.

This monetarist-inflation model explains a larger proportion of the variation in the acceleration of inflation, and R^2 is increased by more than five fold. Importantly, this monetarist equation is free from any serial correlation (Rho is not significantly different from zero). The Neo-Keynesian equation, however, did suggest the presence of significant serial correlation which is apparently the result of ignoring the monetarist variable.

The results of equation (2)′ indicate that the monetarist variable $(\dot{M}_{t-1} - \dot{P}_{t-1})$ does exert a significant impact upon the acceleration of inflation at the 5 (and even at the 1) percent level of significance. The results suggest that inflation in Korea could accelerate by 0.23 of a percentage point in every year following the year in which money growth exceeds the inflation rate by one percentage point. If money growth and inflation in the previous year were equal, then current inflation will hardly change (inflation would drop by only 0.025 of a percentage point). It should further be pointed out that the Monetarist inflation equation is found structurally stable. Applying the Chow test, the calculated F-value is 0.52 which is far below the corresponding critical F-value of 3.47 at the 5 percent level.

Therefore, the results for Korea show that changes (acceleration) in inflation depend primarily on the behavior of money growth rather than on the degree of slackness in the economy (as proxied by the unemployment

6 Farley, Hinich and McGuire (1975) have suggested the use of the mid-point breaking date to maximize the empirical power of the test.

rate). Consequently, the empirical results are at variance with the Neo-Keynesian view of inflation but are consistent with the Monetarist thesis.

We come now to testing the Monetarist view versus the New Classical's regarding the determinants of unemployment. The results of the monetarist-unemployment model are:

$$(3)' \quad U_t = 5.733 - 0.771\ (\dot{M}_{t-1} - \dot{P}_{t-1})$$
$$\qquad\quad (3.53) \quad (1.18)$$

$R^2 = 0.50$, SE = 0.508, Rho = 0.97, DW = 1.65, TAU = 8

On several grounds, this monetarist-unemployment model is not acceptable. For one, the equation suffers from highly significant serial correlation problems pointing to severe omitted variables bias. Secondly, the equation does not explain a sizeable proportion of unemployment, noting that the dependent variable is measured in levels not in first-differences. In fact, most of the explanatory power comes from the constant term which approximates the impact of variables other than $(\dot{M}_{t-1} - \dot{P}_{t-1})$. Thirdly, the coefficient on the monetarist variable is not significantly different from zero even at the 10 percent level. Finally, the equation is structurally unstable at the 10 percent level as indicated by the Chow test (calculated F-value = 2.79, the critical F-value = 2.57). All in all, these results seem to reject the Monetarist claim that actual growth in the previous year has significant effects on the current level of unemployment.

Unemployment, according to the rival New Classical Economics, is best explained by an autoregression of its own lagged values, and is independent of any past (lagged) values of the monetary variable. The testing equation is:[7]

$$(4)' \quad U_t = 0.504 + 1.355\ U_{t-1} - 0.811\ U_{t-2} + 0.359\ U_{t-3} - 1.650\ (\dot{M}_{t-1} - \dot{P}_{t-1})$$
$$\qquad\quad (1.66) \quad (11.84) \qquad (5.50) \qquad (2.32) \qquad (1.33)$$

$R^2 = 0.94$, SE = 0.500, Rho = −0.55, Dh = −0.33, TAU = 16

The addition of the New Classical variables, the lagged values of unemployment, did significantly improve the fit of the equation, whereby the value of R^2 has increased by almost two fold. The F-value associated with the addition of the three lagged unemployment rates is

7 The Durbin-h (and not the DW) statistic is calculated due to the presence of a lagged dependent variable. Use of the DW test in this case will produce biased results.

52.35 which far exceeds the critical F-value of 3.10 at the 5 percent level. In contrast, the addition of the monetarist variable does not significantly improve the fit of a pure autoregressive unemployment model, with an F-value of only 1.77 and a critical F-value of 4.35 at the 5 percent level. Interestingly, the addition of the New Classical Economics' variables (lagged unemployment) has apparently corrected for the instability problem. The Chow test could not reject the stability hypothesis in equation (4)' even at the 10 percent level (calculated F-value = 1.48, critical F-value = 2.27). Taken together, these empirical results seem to verify the New Classical Economics' position for Korea. This implies that contrary to the Monetarist view, lagged (and thus anticipated) monetary policy cannot influence real economic activity (unemployment) in the short-run.

IV. Concluding Remarks

In this paper, I have tested alternative views regarding the determinants of inflation and unemployment in the context of the Korean economy.

Consistent with the Monetarist view, accelerations and decelerations of inflation in Korea are directly related to excessive money growth. Contrary to the Neo-Keynesian position, changes in inflation do not depend on the degree of resource utilization.

On the other hand, the Monetarist position of a significant short-run impact of lagged money growth on unemployment is rejected for the Korean data. As the New Classical Economics contends, unemployment is best explained by an autoregression of lagged unemployment values, with no significant short-run effect coming from fully anticipated monetary policy.

Given the brevity of our sample size, these results should be interpreted with caution. At the very least, though, the empirical results do suggest the following tentative policy implications. Restraint in money growth, irrespective of the prevailing unemployment rate, is an effective anti-inflation policy in Korea. Furthermore, excessive money growth in an attempt to reduce short-run unemployment will be frustrated and only yield high inflation. From both angles, therefore, the monetary authorites in Korea should strictly follow a price-level stabilization program.

The empirical results reported in this paper are borne out by the Korean recent experience. In 1980, and for the first time in her recent history, real GNP in Korea declined by 5.2 percent and unemployment rose to 5.2 percent. At the same time, inflation soared, reaching more

than 22 percent (35 percent as measured by CPI). Fearing the grave and disruptive consequences of such tremendous inflationary pressures, the Korean monetary authority (the Bank of Korea) adopted tight monetary policy. Money growth was persistently reduced from 18 percent in 1979 to 16 percent in 1980, to 10 percent in 1981, until it reached 3 percent in 1985. This consistently tight monetary policy was remarkably effective in bringing inflation to a halt. Inflation rate fell from 22 percent in 1980, to 14 percent in 1981, to 6 percent in 1982 and to only 2.2 percent in 1986. This conforms to our empirical finding of a prominent role of monetary restraint as an anti-inflation policy.[8] Perhaps more interesting, despite the persistent tight monetary policy during 1980-1985, unemployment did not rise in Korea as the Monetarist view might have predicted. On the contrary, unemployment continued to fall in every year during the 1980-1985 period. Unemployment fell from 5.2 percent in 1980 to 4.6 percent in 1981, to 4.4 percent in 1982, to 4.1 percent in 1983, and down to 3.8 percent in 1986. Once more, these outcomes are strikingly consistent with our finding that money growth in Korea does not exert significant short-run impact upon real economic activity.[9]

[8] It should also be pointed out that monetary growth escalated in 1986 and 1987 to reach 13 and 17 percent, respectively. As a result of the monetary expansion in 1986, the inflation rate doubled in 1987 to reach 4.33 percent compared to only 2.2 in 1986.

[9] It is clearly not the purpose of the present paper to identify all the factors responsible for the recent unemployment decline in Korea since that would require a complete structural macroeconomic model. However, several governmental actions may have been behind the decline in unemployment in the 1980-1987 period. Supported by a stand-by arrangements with the IMF, the Korean government introduced a series of structural reforms in the post-1980 period aimed at enhancing economic productivity and efficiency. The program included tax reforms, trade liberalization, a more flexible exchange rate policy, and various incentive measures to support the industrial and export sectors. For more details, see Aghevli and Marguez-Ruarte (1984).

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