ASA pattern is one of declining membership and a stable percentage of members attending the annual meeting. APSA membership has been declining but the percentage of members attending meetings has been increasing. Most of the regional associations have experienced a modest growth in membership with stable or declining percentages of members attending conventions. And while relatively stable percentages of members attended the Southern and Midwest meetings through time, attendance at both meetings has been down in the last two years. Overall, the pattern has been one of declining convention attendance.

The near-term outlook does not bode well for the annual conventions of economists. This is unfortunate because many of these meetings provide an efficient way of dispensing state-of-the-art ideas and technologies in a timely manner. Until the new technologies make their influence felt in academe, it seems likely that the exchange of information will be slowed as more economists wait for the delayed publication of papers in their fields.

References

Employers' and Workers' Inflation Expectations: Prediction Accuracy and the Natural-Rate Hypothesis

WILLIAM F. LOTT and STEPHEN M. MILLER*

I. Introduction

The natural-rate (accelerationist) hypothesis proposed by Friedman (1968) and Phelps (1970) has generated a large literature. The absence of long-run money illusion in their formulation results in a vertical long-run Phillips curve at the natural rate of unemployment. Short-run deviations from the natural rate of unemployment occur because of faulty inflation (price) expectations on the part of workers and employers.

The role of inflation (price) expectations is fundamental to the natural-rate theory. At the macroeconomic level, workers are concerned with forecasting the price index of goods and services they buy; employers are concerned with the price they receive for their output. It is assumed that employers have better information about their own price than workers have about the price index. To operationalize the model at the macroeconomic level, one needs to aggregate. This creates a problem in as much as one prefers not to include the prices for the output of each employer. Therefore, the usual procedure is to adopt a price index reflecting the price the average employer receives for output. Moreover, the assumption of employers having better information is extended to the macroeconomic level. In fact, employers are usually assumed to be perfect forecasters of inflation. That employers have perfect forecasts is either explicitly or implicitly assumed in models that are driven by the difference between actual and expected inflation rates. The actual inflation rate reflects the expectations of employers; the expected inflation rate reflects the expectations of workers. Thus, deviations from the natural rate of unemployment are a result of differences in workers' and employers' expectations but where the employers' expectations are correct.

This dichotomy in inflation forecasting accuracy has come under scrutiny in several recent papers by Parkin, Sumner, and Ward (1976), Misiolek (1978), Holden and Peel (1979), and Lott and Miller (1982). All the papers involve the use of survey data to develop proxies for workers' and employers' inflation expectations. Misiolek used the Michigan Consumer Survey to proxy workers' expectations and the Livingston Survey to proxy employers' expectations in the United States. Parkin, Sumner, and Ward, Holden and Peel, and Lott and Miller used data constructed by Carlson and Parkin (1975) from Confederation at British Industry (CBI) surveys and Gallup Poll interviews to repre

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*For example, see Gordon (1976).
sent employers' and workers' expectations in the United Kingdom, respectively.

Parkin, Sumner, and Ward (1976) estimated several wage equations that included both employers' and workers' expected inflation-rate variables. They concluded that employers' expectations are more important in explaining labor-market activity and that the evidence supports the natural-rate hypotheses.

Miszewski (1978) investigated the appropriate model of expectations formulation for workers and employers. He examined static, extrapolative, and adaptive expectations; he concluded that there were significant differences in the formulation of expectations between the two groups. He then proceeded to present some tentative evidence supporting the natural-rate hypothesis using the different inflation-expectations proxies.

While Parkin, Sumner, and Ward (1976) and Miszewski (1978) introduced both employers' and workers' inflation-expectation variables into the analysis of the labor market, their approaches differed. Parkin, Sumner, and Ward estimated a reduced-form wage equation for the labor market. Miszewski, on the other hand, estimated separate Phillips's curves for employers and workers. This latter approach is suspect since the Phillips's curve is a reduced-form equation indicating the interaction between employers and workers in the labor market.

Holden and Peel (1979) examined the forecasting ability of workers versus employers and concluded that workers are better forecasters of inflation. They stated, "...attempts to solicit incremental output response from the economy by a policy of unexpected inflation may, insofar as it relies on more accurate forecasts of the inflation rate by entrepreneurs than by workers, be misconceived." (1979, p. 239). Lott and Miller (1982) considered the robustness of the Holden and Peel conclusion using alternative procedures for constructing an expected-inflation index from survey data. They still found that workers are more accurate predictors of inflation than employers.

The findings of Holden and Peel (1979) and Lott and Miller (1982) raise serious questions about the standard microeconomic foundations of the long-run and short-run Phillips's curves. We propose in this paper, to investigate a variety of issues related to these four papers. We shall examine the following questions:

1. Are the results of Holden and Peel (1979) sensitive to the method of determining forecasting accuracy?
2. Are workers better or worse forecasters of inflation than employers in the United States?
3. Are differences in the expectations of inflation in the United States consistent with the deviations of unemployment from the natural rate as implied by the natural-rate hypothesis?

II. Sensitivity of the United Kingdom Results

Holden and Peel (1979) used the Thiel inequality coefficient ($U^T$) to measure forecasting accuracy. They found that workers were better forecasters than employers (i.e., $U_{W} = 0.21$ and $U_{E} = 0.38$). We were unable to reproduce their results using the same data. Our estimate of the employer inequality coefficient was approximately the same; any difference was probably due to rounding errors. We differed substantially, however, with the worker inequality coefficient. We found the inequality coefficient to be 0.32 which actually strengthens Holden and Peel's result.

Miszewski (1978) implicitly assumed that employers are better forecasters. The Thiel inequality coefficient is defined as:

$$U^T = \frac{1}{n} \sum_{i=1}^{n} \left( \frac{A_i - P_i}{A_i} \right)$$

where $A_i$ is the actual value and $P_i$ is the predicted value.

This finding, which is counter to the usual theoretical assumption, requires further investigation. One might question the appropriateness of the inequality measure used to compare workers and employers. If wholesale prices are more volatile than retail prices, workers might be better forecasters because they are forecasting a more stable variable. The standard deviations are 2.41 percent for retail prices and 6.03 percent for wholesale prices.

We considered several alternative statistics to compare relative forecasting abilities. First, we investigated the coefficient of variation (CV) for the forecasts. Workers again had the edge in forecasting (i.e., $CV_{W} = 0.41$ and $CV_{E} = 0.90$). Second, we examined the standard deviation of the forecast relative to the standard deviation of the series being forecasted. Here again, the workers had the edge because the workers' forecast standard deviation was 86.5 percent of the standard deviation of the actual inflation rate and the employers' was 65 percent.

Finally, we constructed a variation of the Thiel inequality coefficient as follows:

$$U^{*} = \frac{1}{n} \sum_{i=1}^{n} \left( \frac{A_i - P_i}{A_i} \right)^2$$

The standard Thiel inequality coefficient (i.e., $U^T$) measures the relative performance of the model generating the predictions ($P$) to a naive model that has a forecast of zero everywhere. The statistic $U^{*}$ assumes a naive model that continually forecasts (ex post) the

In a related paper, Lott and Miller (1982) explored another avenue related to this issue. Holden and Peel (1979) utilized the data series constructed by Carlson and Parkin (1971) of expected inflation by employers and workers. The Carlson-Parkin technique was unique up to a factor of proportionality. This factor of proportionality was determined by imposing an external constraint on the process of forecast formation. Lott and Miller (1982) considered a series of other external constraints and reexamined the forecasting ability of employers and workers. As mentioned above, workers were still better forecasters of inflation in all cases.

III. The United States Experience

In this section, we examine the relative performance of workers and employers in forecasting inflation in the United States. We employ the Michigan survey to represent workers' forecasts of the inflation rate for the next year from the first quarter of 1947 to the fourth quarter of 1975 (i.e., 116 observations). For employers, we use the Livingston one-year-ahead forecasts from the first half of 1947 to the second half of 1975 (i.e., 58 observations). The Livingston series includes estimates of both consumer and wholesale prices. Finally, we also utilize the American Statistical Association's (ASA) survey of the implicit price deflator for gross national product to proxy for employer one-year-ahead forecasts from 1970 IV to 1980 IV. Due to two missing one-year-ahead forecasts in the survey.

Inflation rate at the average rate ($\lambda$) over the period. This statistic would improve the relative performance of employers if the variability of wholesale prices about the mean is larger relatively to variability of consumer prices about the mean than the variability of wholesale prices about zero relative to consumer prices about zero. Second, this statistic possesses, we feel, a more realistic behavioral assumption for the naive model in a period of continual inflation. Again, although the discrepancy is much smaller, workers still had a lower inequality coefficient (i.e., $U^{*}_{W} = 0.67$ and $U^{*}_{E} = 0.78$).

In summary, we do not find any evidence refuting Holden and Peel's conclusion that workers are better forecasters of inflation than employers. Now, we turn our attention to the United States and pose the same question.
### Table 1: Measures of The Performance of U.S. Workers and Employers as Inflation Forecasters

<table>
<thead>
<tr>
<th>Statistic</th>
<th>Worker</th>
<th>Worker</th>
<th>Worker</th>
<th>Worker</th>
<th>Worker</th>
<th>Employer</th>
<th>Employer</th>
<th>Employer</th>
<th>Employer</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Original Michigan</td>
<td>Revised Michigan</td>
<td>Livingston CPI</td>
<td>Livingston WPI</td>
<td>ASA IPD</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Theil Inequality</td>
<td>.37</td>
<td>.23</td>
<td>.56</td>
<td>.88</td>
<td>.10</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coefficient (U²)</td>
<td>.34</td>
<td>.46</td>
<td>1.22</td>
<td>1.19</td>
<td>1.24</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean Forecast</td>
<td>1.69</td>
<td>2.74</td>
<td>1.49</td>
<td>1.23</td>
<td>2.25</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Standard Deviation</td>
<td>1.54</td>
<td>2.49</td>
<td>2.57</td>
<td>3.24</td>
<td>1.71</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coefficient of Variation of Forecast</td>
<td>.91</td>
<td>.91</td>
<td>1.72</td>
<td>1.29</td>
<td>.30</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean Actual Rate</td>
<td>3.28</td>
<td>3.28</td>
<td>3.30</td>
<td>3.34</td>
<td>6.99</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Standard Deviation</td>
<td>2.99</td>
<td>2.99</td>
<td>3.04</td>
<td>5.33</td>
<td>2.15</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Actual Rate</td>
<td>.91</td>
<td>.91</td>
<td>.92</td>
<td>1.70</td>
<td>.31</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No. Observations</td>
<td>116</td>
<td>116</td>
<td>58</td>
<td>58</td>
<td>35</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 1 contains the summary measures calculated. The results clearly show that workers typically have been better forecasters of inflation rates. The Theil inequality coefficient for workers (either the original or revised Michigan series) is smaller than for employers (either Livingston consumer or wholesale inflation forecasts). The same result occurs for the coefficients of variation of the forecasts. The ASA forecasts give us a different picture. Both the Theil inequality coefficient and the coefficient of variation are less for employers than for workers. This is the only evidence, in the U.K. or the U.S., that we have found indicating that employers are better forecasters of inflation than workers.

We observe that the wholesale-price inflation rate is more variable and the implicit-price-deflator inflation rate is less variable than the consumer-price inflation rate. Employing our alternative inequality measure (i.e., U²), workers are now better forecasters in all cases. Thus, it appears that the better forecasting ability for the implicit price-deflator by employers is due to the lower variability of the inflation rate being forecasted. Moreover, for the revised Michigan data, the standard deviation of the forecast is 83 percent of the standard deviation of the actual inflation rate; for the Livingston series, the standard deviation of the forecast is 61 percent of the standard deviation of the actual inflation rate; and for the ASA data, the percentage is 80.

In summary, it appears that in the United States, as in the United Kingdom, workers are better predictors of inflation than employers. This result raises questions concerning the conclusions of models that assume employers are better forecasters. In the next section, we run some preliminary tests on the hypothesis that the unemployment rate is dependent on the difference in workers’ and employers’ expected inflation rates in the United States.

### IV. Implications for the Natural-Rate Hypothesis

As mentioned earlier, the natural-rate hypothesis is usually implemented at the macroeconomic level by assuming that employers have more accurate inflation forecasts than workers. Thus, the difference between the expected inflation rate (workers’ expectations) and the actual inflation rate (employers’ expectations) causes deviations from the natural rate of unemployment. The findings of this paper cast serious doubt on this assumption of who has better anticipations.

These results do not necessarily place the natural-rate hypothesis in jeopardy. The natural-rate hypothesis is dependent only upon the differences in expected inflation rates; it does not depend upon the relative accuracy of forecasts. The assumption that employers forecast more accurately was used to implement the natural-rate hypothesis econometrically. Given independent inflation forecasts, the natural-rate hypothesis can be tested using differences in the forecasts. The actual inflation rate, therefore, does not play a role in the econometric analysis.

As a preliminary test of our alternative formulation of the natural-rate hypothesis, we compared deviations of the unemployment rate from the natural rate with the differences between employers’ and workers’ expected inflation rates. Differences in the expected inflation rates predicted the unemployment rate.

With Garden (1976) for a discussion of the econometric implementation of the natural-rate hypothesis.

We used the data series constructed by Perry (1977, p. 38) to calculate deviations of the unemployment rate from the natural rate.

We find that the relationship between the unemployment rate and the expected inflation rates is not significant at the five-percent level. Thus, the equations reported here have not been adjusted for autocorrelation.

### Table 2: U.S. Unemployment Functions

<table>
<thead>
<tr>
<th>Equation</th>
<th>R²</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. U = 7478 - 13322(P_L - P_E) + 1.7454(U_L) - .57P_E + 25.5U_E</td>
<td>.716</td>
</tr>
<tr>
<td>(1.56) (1.53) (1.70)</td>
<td></td>
</tr>
<tr>
<td>2. U = 13322 - 11709(P_L - P_E) + 1.1118(U_L) - .6838P_E + 24.44U_E + 1.200OPEC (2.70) (1.45) (8.00) (3.37) (1.08) (3.04)</td>
<td>.721</td>
</tr>
</tbody>
</table>

*Numbers in parentheses are t values. For each equation, the Durbin-Watson statistic is inappropriate. Moreover, the Durbin h statistic is not calculable. Nevertheless, in both cases, the Durbin h statistic is not significant at the five-percent level. Thus, the equations reported here have not been adjusted for autocorrelation.*

**U** = unemployment rate; **P_L** = employers’ forecast of the inflation rate; **P_E** = workers’ forecast of the inflation rate; **OPEC** = OPEC dummy variable.
The Work Decision of College Students

FREDERICK W. DERRICK*

The objectives of this article are twofold. The first is to broaden the information concerning what determines whether an individual will work in the market while enrolled in an institution of higher education. Previous studies in the area [2, 4, 8] have been directed towards explaining the short-run fluctuations. In contrast, this study employs a life cycle model that assumes no transitory elements and emphasizes the work decision over the lifetime of the individual. The second objective is to acquire two specific results which previously have not been found pertaining to the life cycle model. The two results are (1) estimates of the ratio of the production function parameters and (2) estimates of the production function parameters within the model. The latter will be obtained by combining the ratio results with a previous estimate of the sum of the production function parameters. Estimates of the production function parameters have not been found previously.

With emphasis on the period of specialization in human capital production, i.e. full-time schooling, this paper is in contrast to the usual application of life-cycle models. Ben-Porath [1] in the initial article in the field expresses major emphasis on the period following specialization and does not solve for the breakpoint between specialization and non-specialization in human capital production, Wallace and Blumen [13] follow by deriving the optimal path for human capital accumulation while specializing under more restrictive loan assumptions. In each of these as well as in supporting works [5, 9, 10, 13], rental rates for human capital are fixed over the lifetime of the individual.

While the model applied herein is of similar vein to the previous life-cycle models, the model developed by Johnson [7] differs in two major aspects from previous life-cycle models. The first difference is that the individual receives a lump sum allowance while he is specializing. "Specialization is defined to mean that the total of earnings and allowance just equals the value of purchased inputs to the production of human capital, . . . " [7, p. 3]. The second difference is that the individual receives a fixed wage, which does not change while he is specializing in the production of human capital.

The assumptions of Johnson's model provide a theoretical means of determining whether an individual will work or not work in the market while specializing in the production of human capital. The result of the model is that the individual will work if his allowance is less than the ratio of the coefficient of his own human capital, \( \beta_i \), to the coefficient of purchased inputs, \( \beta_p \), in a Cobb-Douglas production function for human capital times his fixed wage rate. Second, Johnson's life cycle model yields the theoretical result that the ratio of the production function parameters, \( \beta_i / \beta_p \), is equal to the ratio of the foregone earnings to the reported earnings plus the allowance for those who worked.

The preceding results form the basis for the empirical study presented herein. The study of what determines whether an individual will work while specializing in the production of human capital is accomplished by using logi.

References


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