Disaggregate Phillips Curve Regression

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I. Abstract

This project estimates the Phillips curve using disaggregated US data. The panel model for this project was created using relative unemployment rates and metropolitan regional price parities for all items (RPP) for each state from 2008- 2018. The relative unemployment rate was created for each state by taking the state level of unemployment and dividing it by the US national unemployment rate. The metropolitan price parity was created by taking the CPI for all metropolitan areas in a state and a dividing it by the US national CPI for all metropolitan areas in the US. The dependent variable is metropolitan RPP, and the independent variables are the relative unemployment rate, a lagged unemployment rate, and a lagged metropolitan RPP. During the time-period of 2008-2018, the results suggest there is an inverse relationship to the disaggregated Philips Curve. However, the aggregated Philips Curve is flat over this same time-period. I discuss why a disaggregated approach allows for identification of the Phillips curve that is not found using aggregate data.

II. Empirical Model and Variables

$$RPP_{it} = f(UR_{it}, LUR_{it}, LRPP_{it})$$

- RPP_{it} is the log of the regional price parity for all items for all metropolitan areas in a state.

- UR_{it} is the log of the state unemployment rates which have been normalized with the national unemployment rate.

- LUR_{it} is the UR_{it} but has been lagged one time period.

- $LRPP_{it}$ is the RPP_{it} but has been lagged one time period.

III. Theory and Hypothesis

- UR_{it} is hypothesized to have a negative relationship with RPP_{it} because it is expected that when you have high unemployment there should be low inflation.

- LUR_{it} is hypothesized to have a negative relationship with RPP_{it} since the previous period's unemployment can influence expected inflation.

- $LRPP_{it}$ is hypothesized to have a positive relationship since a previous period's inflation will influence expected inflation in later periods.

IV. Data

- Panel Data was collected for all 50 states in the United States for a 10 year time period from 2008-2018.

- Data Sources:
    - Bureau of Labor Statistics (https://www.bls.gov/)
    - Federal Reserve Economic Data (https://fred.stlouisfed.org/)

V. Empirical Results

Variable	Statistics
C (Constant)	-.0243
	(-1.37)
UR_{it}	-.0076*
	(-1.7352)
LUR_{it}	.0051
	(1.1741)
$LRPP_{it}$	1.0050***
	(261.2290)
Adjusted R-Squared	.9927

T-statics shown in parentheses. * indicates significance at 10% level. ** indicates significance at 5% level. *** indicates significance at 1% level. All two tailed tests.

VI. Conclusions

- Our results indicate that the disaggregated state level data has an inverse relationship with regional inflation rates. The results also indicate that previous levels of inflation influence future levels of inflation. It also indicates that the trade off between inflation and unemployment is a non-linear relationship

- These results could help inform the FED and Congress on how their monetary and fiscal policy may affect inflation. Times when unemployment is low inflation should be high and when unemployment is high inflation should be low.